

THE INFLUENCE OF LEAN THINKING ON DISCRETE MANUFACTURING
ORGANISATIONAL STRUCTURE AND BEHAVIOUR

by

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ABSTRACT

In following a lean transformation specifically for discrete manufacturing, how and why will the organisational structure be affected? How will the employees deal with this profound change? Lean theory and literature propose that organisations should be restructured according to the value stream of the organisation; what does this imply and how can it be accomplished? The purpose of this study was to determine, from a new perspective, guidelines and theory that could indicate how and why organisational structures and behaviours might change with lean transformation. Two discrete manufacturing organisations in South Africa were purposively sampled for this purpose.

A conceptual framework was used at the outset that indicated constructs for the independent lean variables and the dependent organisational structure and behaviour variables.

Using a mixed methodology case study and quantitative multiple linear regression approach, hypotheses and propositions for the research were developed. Multiple linear regression was used to test the hypotheses, and case study methodology was applied to analyse and test the qualitative data.

Findings confirmed the hypotheses and propositions that a flat structure consisting of business units that support manufacturing cells achieves effective lean transformations in discrete manufacturing organisations. The research revealed the components of an effective lean structure as open constructive leadership, an effective lean champions unit and business units that support linked manufacturing cells. These are led by cell leaders who cultivate supportive behaviours through cross-functional teamwork and through self-directed work teams who run manufacturing cells or flow support functions.

KEY WORDS

Lean thinking; organisational structure; organisational behaviour; discrete manufacturing.

DECLARATION

I declare that the work contained in this research study is the result of my own efforts, except where otherwise indicated. It is submitted in fulfilment of the requirements of the Doctorate in Business Leadership at the University of South Africa (Unisa).

SIGNATURE DATE

HERBERT DE VRIES

DEDICATION

This thesis is dedicated to my family for supporting me so steadfastly during the period of this research. To my wife Dorothea, who acted as scribe, administrator editor and loving supporter, I remain indebted forever. To my sons Herman and Bertus, who continuously encouraged me to keep going and never give up, I remain humble and appreciative. To my sister Dorothea, who from England kept me inspired until her tragic passing in December, 2013. To my brother Roland, a well-known South African major general and author of "Firestorm", now a classic in defence literature, who motivated me to share my knowledge and experience.

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LIST OF DEFINITIONS OF MAIN CONCEPTS

Autonomous inspection – Refer to Jidoka

Batch production – Producing more than one piece per operation, before moving to the next operation. Refer to Womack and Jones (2010).

Breakdown – Unplanned or unexpected event when a workstation is unable to perform its normal functions. Normally associated with maintenance work effectiveness. Refer to Nicholas (2011).

Capacity – In terms of production, the ability for a workstation to perform to a standard time per item and operation, normally measured in units of time. Refer to Nicholas (2011).

Cell – Arranging of workstations in sequence in an optimised manner to reduce movement and set-up times. Refer to Womack and Jones (2010)

Cellular manufacturing – Arranging a process in the correct sequence with operators remaining with the cell for the duration of the production cycle. Refer to Womack and Jones (2010)

Changeover – A process in which production is stopped and tooling or settings changed to perform a different operation. Refer to Womack and Jones (2010)

Changeover time – The time taken to change an operation to perform a new function. Normally the time taken to change tools and reset the workstation Refer to Womack and Jones (2010).

Continuous flow – A concept of processing items one piece at a time from process to process without interruption. Refer to Womack and Jones (2010).

Cycle – A sequence of operations and the time taken to perform the sequence until completion. Refer to Womack and Jones (2010)

Discrete manufacturing – The main manufacturing area to which lean thinking is applied and refers to batch production processes that make a finished saleable item from input raw- or partially processed material/s and that have to be transformed to effective flow operations based on one piece flow and level scheduling thinking. Refer to Abdulmalek et al. (2006)

Down-time – Time taken when production stoppages occur. Refer to Nicholas (2011)

Error proofing – Refer to Poka-yoke.

Five S's – Japanese terms beginning with S and similar use of English words also beginning with S to clean up and tidy the work place in order of: Seiri to sort; Seiton to set in order; seiso to shine; Seikitsu to standardise; Shitsuki to sustain and establish the habit. Refer to Womack and Jones (2010)

Down time – Time taken when production stoppages occur. Refer to Nicholas (2011)

Functional layout – Practise of grouping machines or workstation that perform similar functions. Refer to Dolcemascolo (2008).

Lead-time – the total time that the customer must wait before receive an ordered item. Refer to Keogh (2006)

Lean thinking – A theory developed by Womack and Jones (1990) based on the Toyota production system focused on the elimination of all wastes from the production system.

Line balancing – A process whereby work elements are evenly distributed and balanced to meet Takt time or average demand. Refer to Bertoneclj and Kavcic, (2012)

One-piece flow – A process whereby production operations are redesigned to enable the production of one item at a time. Refer to Dolcemascolo (2008).

Pull system Production control process that triggers production down stream for an item that has been delivered to or collected by the customer. Refer to Womack and Jones (2010).

Value stream All activities identified as value adding and non - value adding from a customer's perspective. Refer to Womack and Jones (2010).

Value stream mapping – Refer to VSM per acronyms.

Waste – Any activity that consumes resources without adding value to the manufacturing process or the physical change to a item being manufactured. Refer to Womack and Jones (2010).

Work in progress or work in process – Items between machines or workstations, waiting to be processed. Normally associated with waste. Refer to Womack and Jones (2010).

LIST OF ACRONYMS

Five S's – Japanese terms beginning with S and similar use of English words also beginning with S to clean up and tidy the work place in order of: Seiri to sort; Seiton to set in order; Seiso to shine; Seikitsu to standardise; Shitsuki to sustain and establish the habit. Refer to Womack and Jones (2010)

GEMBA – Japanese term for management visiting the shop floor in a constructive and interactive manner. Refer Womack and Jones (2010)

Heijunka – Japanese word for leveling production by averaging demand across facilities. Refer to Takt time. Refer to Womack and Jones (2010).

JIT – Term used as a technique used to implement flow meaning just in time. The technique combines reduced cycle time, quick changeovers and level scheduling. Refer to Womack and Jones (2010).

Hoshin Kanri – A technique developed by Toyota that involves the effective deployment of an organisation's strategic plan strategic plan, involving all organisational levels. Refer to Jusko (2007)

Jidoka – Japanese word for stopping a line automatically when defective parts are detected. Workers are empowered to stop the line on which they are working when defects occur. Refer to Womack and Jones (2010).

Kaizen – Japanese word for gradual continuous improvement. Refer to Womack and Jones (2010).

Kanban – Japanese word for card or visible record utilised to control production. Refer to Womack and Jones (2010).

PDCA – Means plan – do – check – act and is a planning process utilised in Hoshin Kanri which involves all the employees working in teams to resolve issues and achieve organisational objectives cascaded up and down the organisation. Refer to Dennis (2006).

Poka-Yoke – Japanese word for making a process mistake proof. Refer to Womack and Jones (2010).

Seven wastes – Theory of guidelines to eliminate all wastes from the organisation namely: transportation; inventory; over-production; waiting; and queuing; over-processing and unnecessary motion or movement. Refer to Ōhno (1988)

SMED – English translation meaning single – minute – exchange of die and taken from the Japanese technique of arranging and designing set-ups such that the time taken is reduced to less than ten minutes per set-up. Refer to Nicholas (2011).

Takt time – Rate of customer demand that is utilised to pace production in sequence. Takt is a German word for rhythm. Refer to Womack and Jones (2010).

TPM – A management planning and control system that has as its purpose the overall care of plant, equipment and services, with the main objective being zero downtime. Refer to Nicholas (2011)

TPS – Toyota production system on which lean thinking is based. Refer to Womack and Jones (2010).

OEE – Utilised with total productive maintenance as a measure for equipment effectiveness and which refers to the product of a work station's efficiency, availability and rejection rate. Refer to Nicholas (2011)

VSM – Means value stream mapping which is a process to map the current and future value stream of the organisation, taking account of current capacities, run times, set up times inventory and work in progress and flow to the customer. Refer to Womack and Jones (2010)

WIP – Refer to work in progress per list of definitions.

CHAPTER ONE: BACKGROUND AND ORIENTATION

1.1 INTRODUCTION

In the four decades of lean thinking (Stone, 2012 a), dating from the Japanese organisation Toyota's turnaround in the 1970s (Ōhno, 1988) and the subsequent study of the Toyota Production System (TPS) by Womack and Jones (1990), to a clarification of theory in 1996 by Womack and Jones (1996), Western organisations have continued in their attempts to emulate Toyota. Although some remarkable achievements have been cited (Womack & Jones, 2003; Lander, 2007), the success rates of lean implementations remain in contention (Cooper, 2011).

Approaches to resolve the challenges facing success vary from proposals covering frameworks (Quarterman, 2007), to lean applications such as Heijunka (Jones, 2006) and value stream mapping (Rother & Shook, 2003; Lander, 2007), to organisational behavioural issues (Sawhney & Chason, 2005; Pinheiro, 2010). Other specific aspects include management and leadership (Johnson, 2009) and organisational culture (Gander, 2009).

Based on the literature covering the last ten years, and more recent observations, more than ever, the challenge of achieving high performing manufacturing organisations remains with the West (Vermaak 2008; Pinheiro, 2010; Stanlib group, 2013) and the adoption of a lean transformational strategy is one way that organisations can achieve the desired performance levels (Haug, 2012).

In this research study the approach taken was the consideration of organisational transformation from a different perspective, namely, to investigate lean thinking and how it influences the organisational structure and behaviour of the discrete manufacturing organisation. The research relevant to this aspect has been critically reviewed with the purpose of establishing a new theory or guidelines for lean transformations.

It is argued in this study that the issue of lean thinking and how it should be implemented remains a point of discussion throughout the world, and in this context, some specific research (Spear & Bowen, 1999, Womack 2002, Hines, Holweg & Rich, 2004; Quarterman, 2007) has been conducted into lean successes and failures, fuelling the ongoing debate on whether lean implementation will fulfil its promise of creating highly competitive and effective organisations.

Since the 1980s, several scholars (Womack & Jones, 1990, Womack 2002, Liker, 2004, Quarterman, 2007; Lander, 2007) have struggled with the so-called Toyota way. To date,

some 17 Lean Enterprise Institutes (Leanglobal, 2013) have been established worldwide to assist organisations in the process of implementation and other issues. Although extensive research exists regarding implementation of the system (Womack, 2002; Brown, Collins & McCombs, 2006, Hettler, 2008; Lander, 2007; Quarterman, 2007; Bo & Mingyao, 2012), it seems that not much research has been done on how organisations should deal with issues of organisational restructuring and behaviour when making a lean transformation. A detailed and extensive literature study covering but not limited to the period 2003 to 2013, revealed only two studies dealing directly with lean implementation and organisational structure (Haug, 2012; O'Carroll, 2004) and 14 studies dealing directly with lean implementation and organisational behaviour. A number of these studies discuss lean implementation and organisational behaviour in terms of a specific type of behaviour, in which communication and commitment feature prominently (Gagnon, 2004; Sawhney & Chason, 2005; Worley & Doolen, 2006; Harris, 2007; Bhasin, 2011, Boyle, Scherrer-Rathje & Stuart, 2011; Cooper, 2011; Losonci, Demeter & Jenei, 2011; Poppendieck, 2002 ; Shetty, 2011; Testani & Ramakrishnan, 2011; Tress & Espinoza, 2012, Pinheiro, 2010; Cameron-Strother, 2009). The literature review, however, revealed that these studies focused only on behavioural aspects and did not consider the influence of lean thinking on the organisational structure.

A general overview of the literature indicated that, with lean implementation, organisations should restructure along the value streams of the organisation (Jones, Medlen, Merlo, Robertson & Shepherdson, 1999; Nahm, Vonderembse & Koufteros, 2003; Haug, 2012, O'Carroll, 2004; Brown, *et al*, 2006; Worley & Doolen, 2006; Hettler, 2008); however, the content does not include what type of restructuring should be done or how this should be carried out. A further observation was that the identified literature studies, after careful analysis, did not provide insight into the interrelationship between organisational structure and organisational behaviour during lean transformation.

The literature review included a Google scholar analysis using the search terms lean thinking, organisational structure and behaviour, lean or thinking or organisational or structure or behaviour excluding: health; care; construction; diet; six; sigma and accounting. The search covered the period 2003 to 2013 and provided 1000 hits with only one article relating lean to the organisational structure of the Shell organisation and matrix type structures. Guldmond, Ten Have and Knoppe (2010) did, however, involve the process industry and not the discrete manufacturing industry to which this research is delimited. One article was found relating leadership to lean implementation and

organisational behaviour, a power point presentation (Bamford, 2011). This article is useful in terms of models of human behaviour and leadership. However, it does not relate directly to the research area as far as organisational structure is concerned. A number of articles covered lean implementation, organisational learning, agile organisations and value chains, but did not relate specifically to the research area. Eighty-eight percent of the search indicated articles that were not related to lean thinking at all. These were articles from the search including words such as: lean; organisation; structure and thinking.

1.2 THE TOPIC

The topic of this research study is the influence of lean thinking on discrete manufacturing organisational structure and behaviour. Since its inception in the 1980s, lean thinking has evolved as a theory that has had a dramatic impact on the way manufacturing organisations conduct business. Case studies documented in the literature (Lander, 2007; Haug, 2012) indicate that, if lean thinking is successfully implemented, the organisation can significantly improve quality, reduce defects, reduce costs, and improve product design and product delivery.

1.3 THE CONTEXT OF THE RESEARCH INTEREST

The context of the study is the manufacturing industry: the study investigates how lean thinking and its implementation will affect discrete manufacturing organisational structure and behaviour. According to Womack and Jones (2003) and Quarterman (2007), lean thinking as a theory consists of five principles and includes between 20 and 23 techniques.

The five principles are:

1. Identify value from customers' perspectives.
2. Identify the value-adding steps for product transformation from raw material to delivery of the product, leading to the value stream.
3. Establish the value-adding stream through rearrangement of the value-adding steps to create flow.
4. Establish pull through from supplier to customer to achieve continuous flow.
5. Refine to perfection the established flow, with continuous improvement or Kaizen.

The lean techniques are methods that have been developed to implement the five principles (Womack & Jones, 2003; Quarterman, 2007). These techniques are defined as:

- 1 Problem-solving using the three C's and five Why's techniques, fishbone and the A3 PDCA (Plan, do check, act) method.
- 2 The establishment of Kaizen or continuous improvement.
- 3 The clean-up programme for the organisation designated five S, meaning to sort, set in order, shine, standardise and sustain.
- 4 Visual management of measures of the degree of lean implementation and results obtained.
- 5 Seven wastes elimination of transportation, inventory, over-production, waiting and queuing, over-processing and unnecessary motion or movement.
- 6 Distinguishing value from waste from the point of view of the customer and the elimination of non-value-adding work during transformation processes.
- 7 Value stream mapping of current and envisioned flow lines.
- 8 Single-digit minutes exchange of die (SMED) or set-ups of work.
- 9 Cycle time reduction of both value-adding and non-value-adding necessary work.
- 10 One-piece flow in place of batch production.
- 11 Heijunka or level scheduling and line balancing in pace with the average customer demand or TAKT time, derived from the German word or rhythm and equal to the production capacity available over a specified period divided by the average customer demand over the same period.
- 12 Cellular manufacturing of similar product family processes.
- 13 Kanban to promote pull to achieve effective flow from supplier, through manufacturing to customer.
- 14 Poka-yoke or mistake proofing and Jidoka, for in process, automatic inspection.
- 15 Building in of quality into the design of the product through value engineering techniques or per the concepts introduced by Dr Genichi Taguchi (Todd, 1995).
- 16 Total productive maintenance (TPM) to improve the facilities of the organisation by the people at ground level measured as overall equipment effectiveness (OEE).
- 17 Policy deployment for updating strategy, policies, goals, objectives and action plans.
- 18 Hoshin Kanri for strategic planning, utilised with policy deployment.
- 19 Teamwork and total employee involvement with lean implementation.

- 20 Standard work for all established operating processes and routines to establish to what extent an organisation had progressed with lean implementation.

The context of the study reflects the uncertainty experienced by organisations attempting to conceptualise strategy formulation, implementation and sustainability. This uncertainty stems from the perceived complexity of lean thinking (Quarterman, 2007; Haug, 2012), understanding how techniques relate to principles, how techniques are to be implemented (Boyle *et al.*, 2011) and how the resultant organisational transformation will impact organisational structure and behaviour (Haug, 2012; O'Carroll, 2004).

The basic principle underlying lean thinking is the systematic and persistent elimination of all organisational waste (Ōhno, 1988). Waste is identified as any organisational function, characteristic or element that does not add value to the direct transformation of the product from raw material to final product (Ōhno, 1988; Womack & Jones, 1990). It may, therefore, be expected that organisational units and functions will be critically analysed and evaluated in terms of this basic principle. Ōhno (1988) observed that the inspection function could be replaced by mistake-proofed processing (Poka-yoke) and automatic inspection (Jidoka). It is, however, noteworthy that the studies identified in the literature search covering 2003 to 2013 do not consider this aspect in terms of reference, relevance or by example.

In theory and based on the Toyota production system (Ōhno, 1988), seven wastes are identified and can be summarised as follows:

1. Transportation – The movement of goods
2. Inventory – The storage of goods
3. Motion – Any motion that does not add value to the product, such as walking, reaching, and other body movements made difficult due to the work place layout and design.
4. Waiting – Machine or person or product not having value added to it while other products are having value added to them.
5. Over-production – Making the product in quantities greater than the customer requires or before the customer required it.
6. Over-processing – Adding more to a product than a customer values or including steps that are not necessary in creating value.
7. Defects – Anything that is not done right the first time.

The points above provide a comprehensive summary of waste in lean thinking and will be discussed further in the sections dealing with the theory and the relevant literature.

Eliminating waste is of prime importance to the process of implementing lean thinking. In addition to these, Womack and Jones (2003) include an eighth waste, which they define as manufacturing goods or services that do not meet customer demand or specifications.

In linking the aspect of waste to organisational theory, it can be argued that the functions of the organisation can be regarded as wasteful whenever they are not being effectively utilised or integrated. This is observed by Ōhno (1988) and Shingō (1989) regarding the integration of sales into manufacturing and the replacement of the inspection function with Poka-yoke and Jidoka. Based on organisational theory as summarised by Lægaard and Bindlev (2006), it can be said that the functions of a manufacturing organisation are typically identified as marketing, sales, manufacturing, materials control, plant maintenance, inspection, quality control, quality assurance, financial management and control, costing, manufacturing engineering (or industrial engineering), human resources (HR), design engineering, legal issues and some others that are defined in time and need, as perceived by the top structure of the organisation. However, lean implementation can be expected to influence the functionality of the organisational structure significantly, and this aspect was critically examined in the literature review and in the fieldwork conducted for this study.

With the introduction of lean thinking, organisational restructuring will be implemented along the value streams of an organisation, leading to flat, highly responsive organisational structures (Haug, 2012). This will significantly affect the functionality of the organisational structure (O'Carroll, 2004; Haug, 2012) and organisational behaviour will change accordingly (Pinheiro, 2010; Losonci *et al.*, 2011).

1.4 PURPOSE OF THE RESEARCH

The purpose of this research is to provide new guidelines and new theory regarding how lean organisational structures should evolve and how organisational behaviours could be cultivated to support the organisational change process. In this way it is hoped that a constructive contribution would be made to the body of knowledge on lean implementation and its influence on organisational structure and behaviour.

Why then is this topic such an important issue? The answer is that the implementation of lean thinking requires highly responsive organisational structures that will produce the performance required of a highly effective and competitive organisation, one that is able to survive, thrive and grow in a highly competitive global market. The limited understanding of the effect of lean thinking on organisational transformation has led to early failures, expensive lessons and disillusionment with the process (Hines *et al.*, 2004).

1.5 THE RESEARCH PROBLEM

Based on the above analysis, the research problem resides in the fact that for discrete manufacturing organisations, major uncertainties exist surrounding the question of how the organisation will be affected once a lean transformational strategy has been adopted (Haug, 2012). It follows that the organisation will be affected in terms of its organisational structure and behaviour; however, a gap exists in the theory (Womack & Jones, 2003) and the literature regarding how and why the organisational structure and behaviour will change. In Chapter 4, the problem area is expanded upon in some detail.

1.6 THE RESEARCH QUESTIONS

Gaps in the literature, the statement of the research problem, and the purpose of the research have given rise to the following main and sub research questions:

1.6.1 Main question

What are the significant influences of lean thinking on organisational structure and behaviour?

1.6.2 Sub questions

1. How will lean thinking affect organisational structure and behaviour?
2. What changes in organisational structure can be expected with the implementation of lean thinking and why do these occur?
3. What changes in organisational behaviour can be expected with the implementation of lean thinking and why do these occur?
4. What organisational designs will lead to optimal implementation of all the applicable lean techniques and principles?

1.7 OBJECTIVES

The theoretical objectives were to:

- determine from the available literature the lean thinking applications and their influence on organisational structure and behaviour.
- determine whether studies have been conducted that explain the relationships between lean thinking and organisational structure and behaviour.
- determine the gap in the literature regarding lean thinking and how it affects organisational structure and behaviour.

Based on the gap in the literature, the empirical objectives were to:

- establish to what extent organisations have implemented lean thinking in terms of techniques and organisational performance.
- determine to what extent lean strategy implementations change organisations in terms of organisational structure and behaviour.
- determine which organisational structures and behaviours best suit the organisation in the implementation of lean thinking implementation.
- provide new guidelines and a framework that will add to the body of knowledge regarding lean thinking and its influence on organisational structure and behaviour.

1.8 THE CONCEPT

The concept explored the relationships between lean thinking and organisational structure and behaviour. The concept, therefore, considered interrelationships between the aspect of lean thinking and the aspects of organisational structure and behaviour. The premise was that, when lean thinking is accepted as a corporate strategy for organisational transformation, analysis will lead to the answer of the research questions. The concept was concerned with discrete manufacturing organisations and excluded process and project manufacturing. The aspect of lean was measured using lean thinking techniques as the independent variables. The aspect of organisational structure was measured by means of variables that were derived from the literature study. The factors of leadership and corporate culture were taken into account in the concept. Environmental factors were considered when interactivity was analysed. The performance of the organisation was measured during field research, by comparing past to current performance in terms of: defects; inventory level; margin and on-time delivery and other measures. Interactive analysis prior to the field work was based on the conceptual framework and literature review, which led to the formulation of the research hypotheses and propositions. Testing of the hypotheses and validating of the propositions was undertaken once the field work had been concluded.

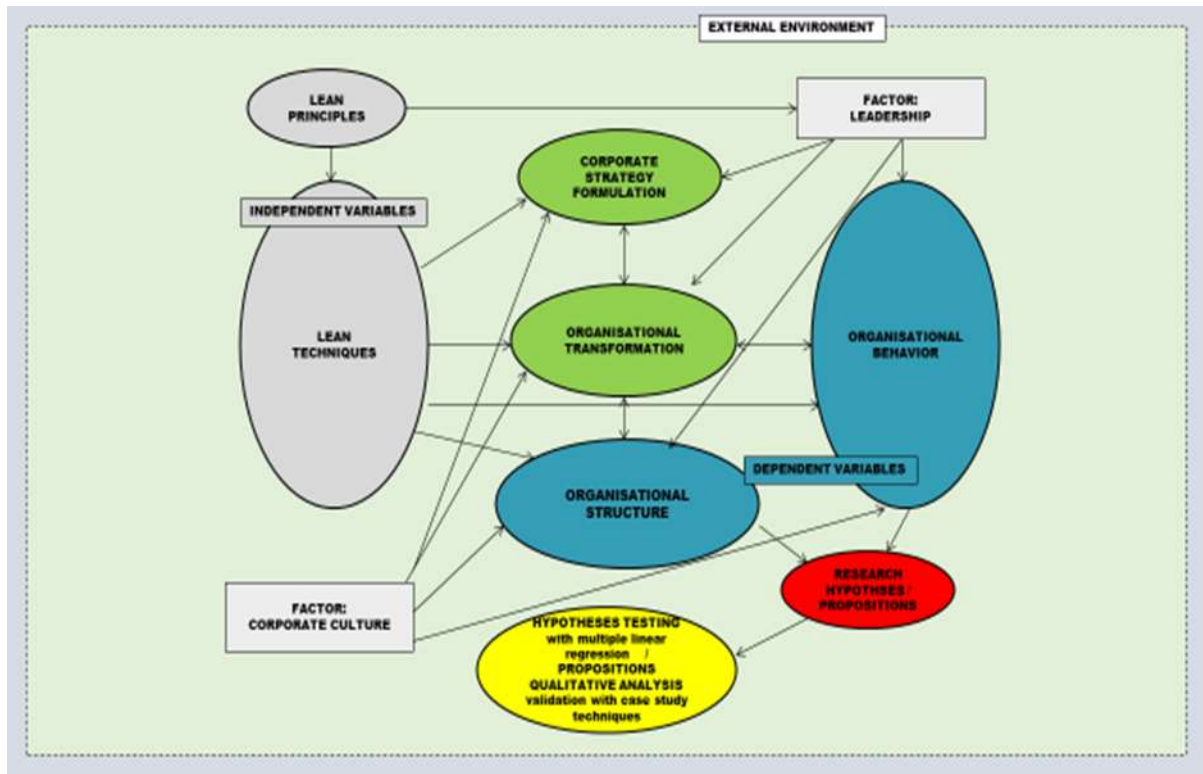
1.9 CONCEPTUAL FRAMEWORK AND DERIVED HYPOTHESES AND PROPOSITIONS

The hypotheses and propositions were derived from a detailed theory and literature review, the concept and rationale of this research.

1.9.1 The conceptual framework

Figure 1.1 illustrates the conceptual framework with the aspects described as lean thinking, organisational structure and behaviour. The events and processes are corporate strategy formulation, including a lean strategy in all its facets, and organisational transformation occurring as a result of the adoption of a lean transformational strategy.

Figure 1.1 The conceptual framework (Source: author's own)



The components of Figure 1.1 are discussed next. The independent variables are the lean techniques discussed in Section 1.3 that served as direct measures of the implementation of lean thinking. These techniques are elaborated on in context in Chapter 3. The dependent variables were derived from the literature review and based on the organisational structure constructs used by Nahm *et al.* (2003) in their research which was based on 224 responses received from time based manufacturing organisations in the United States of America, together with the specific organisational designs identified by Haug (2012) who had analysed two case studies of multinational electronic component manufacturers based in the United states of America. These variables are described as: the number of hierarchical layers; levels of horizontal integration; locus of decision-making; nature of formulisation; level of communication; cellular format (Haug, 2012).

The organisational behaviour dependent variables were derived directly from the literature study and are identified as: awareness of a lean vision, mission values and organisational goals; communication of lean methodology; perception of leadership; participation and involvement; roles and responsibilities; knowledge of process; commitment; motivation; attitude; respect.

Table 1.1 shows the coding of the independent and dependent variables that were utilised in the formulation of both the research hypotheses and propositions.

Table 1.1 Coding of the independent and dependent variables for the research

Constructs utilised as the independent variables			
Organisational structure variable	Abbreviation and code	Organisational behaviour variable	Abbreviation and code
Number of hierarchical levels	NOHL	Awareness of a lean vision, mission values and organisational goals	ALVMG
Level of horizontal integration	LHINT	Perception of leadership	PERCL
Locus of decision-making	LOCDM	Participation and involvement	PARTINV
Level of communication	LCOM	Roles and responsibilities	RLSRESP
Nature of formalisation	NOF	Knowledge of lean process	KNOWLP
Cellular format	CELFM	Commitment	COMM
		Respect	RESP
		Attitude	ATT
		Communication	COM
Lean techniques utilised as the dependent variables			
Teamwork	TW	Cycle time reduction	CTR
Taguchi	TAG	Total productive maintenance	TPM;
Five S	5S	Visibility	VIS
Kanban pull	KAN	Hoshin Kanri	HOSHK
Kaizen	KAIZ	Problem-solving	PROB
Seven wastes	7W	One-piece flow	SPF

Constructs utilised as the independent variables			
Organisational structure variable	Abbreviation and code	Organisational behaviour variable	Abbreviation and code
Standard work	STAND	Heijunka	HEIJ
Cellular	CM	Value stream mapping	VSM
Value per customer	DISTVAL	One digit exchange of die	SMED
Mistake proofing	POKJID	Policy deployment	POLDEP

Table 1.1 lists the coding of the lean thinking techniques as independent variables that influence the structural and behavioural constructs, the dependent variables.

1.9.2 The research hypotheses and propositions

The research hypotheses and propositions were formulated from the conceptual model used in this study and were expanded on in terms of the interactive processes and dynamics of lean thinking principles and techniques that influence the organisation. Hypotheses were formulated from the analysis of trends in the variables, based on a multiple linear regression approach, discussed in Chapter 4, Section 4.5 and in terms of the expected multiple regression equations in Chapter 5 in the section that deals with research design. The propositions of the research as defined by Yin (2014) were worded according to the trends in variables that identified the study area, and were derived from ‘how’ and ‘why’ questions in a qualitative case study approach (Yin 2014), and are discussed in more detail in Chapter 4, Section 4.5. The methodology used to formulate the hypotheses and propositions and to match these to actual field observations is discussed in detail in Chapter 5 utilising a mixed method quantitative as well qualitative case study methodology. This mixed method research approach is based on the observation by King, Keohane and Verba (1994) that indicated that utilising a quantitative methodology effectively supports a qualitative methodology including comparative case study research. Section 5.2 discusses the quantitative study followed by Section 5.4 for the qualitative case study methodology.

1.10 THE RATIONALE FOR THE STUDY

The rationale for this study emanates from the uncertainty organisations experience when conceptualising lean strategy formulation, implementation and sustainability (Haug, 2012). As discussed in Section 1.3, this uncertainty stems from the perceived complexity of lean thinking, the difficulty in understanding how techniques relate to principles, how

techniques are to be implemented and how the resultant organisational transformation will affect organisational structure and behaviour.

Factors leading to successful lean implementation feature strongly in the literature (Tracey & Flinchbaugh, 2006; Czabke, Hansen & Doolen, 2008; Vermaak, 2008; Scherrer-Rathje, Boyle & Deflorin, 2009; Cooper, 2011; Bhasin, 2011). However, many failures have also occurred, as reported by Cooper (2011), who found that there had been a 70% failure rate in lean thinking implementations in the United States before he undertook his own study.

Vermaak (2008) contends that manufacturing organisations in South Africa are far from competitive in world class terms and proposes that lean thinking become a strategic necessity if those organisations are to compete globally. He further refers to the state of the South African manufacturing industry, coupled with the limited number of organisations that have implemented lean thinking in some form or another, as a major source of concern. In support of Vermaak's (2008) views, Roberts (2011) reported on an interview with economist Iraj Abedian, in which Abedian indicated that the South African manufacturing sector has been in decline since the year 2000. This state of affairs appears to have remained unchanged since the Stanlib group (2013) reported a shocking decline in South Africa's manufacturing activity of 2.2% m/m.

Organisations' uncertainty when conceptualising lean strategy formulation, implementation and sustainability, together with the gap in the literature on how organisational restructuring occurs and the current situation globally and specifically in South Africa, provides the rationale for this research study.

1.11 IMPORTANCE OF THE RESEARCH

Uncertainty regarding lean transformation in organisational design, structure and behaviour, if countered effectively, could lead to quicker, cheaper and more effective lean transformations for discrete manufacturing organisations. It is hoped that this study will go some way towards filling the void that exists in the literature regarding organisational design, transformation and behavioural aspects when lean thinking is adopted as a transformational strategy by discrete manufacturing organisations.

1.12 ETHICAL CONSIDERATIONS

On 27 February 2014 the School of Business Leadership granted the researcher ethical clearance to conduct the study. The research commenced in March 2014 and was concluded in September 2014. Two organisations selected as cases named F01 and W01 respectively, participated in terms of the approved methodology.

The qualitative research involved prior arrangements with the respective chief executives of organisations, as did the case study methodology. A participant information letter was sent or handed to the respective organisations before data collection commenced. The process involved institutions such as the Lean Institute Africa, the Automotive Industrial Development Corporation and the Aluminium Association of South Africa, in order that industrial representation was taken into account to ensure possible support and assistance during the study.

The issue of confidentiality was addressed in all cases, with the researcher's signing of the confidentiality agreement of the particular organisation or by his provision of the letters requesting individual participation and indicating that permission had been granted. The researcher also ensured that the two case organisations F01 and W01, were not competing with each other.

The question of protecting participants of interviews was addressed directly in consultation with the respective chief executives, with the department heads involved and the interviewees themselves. In one case, permission was granted by an official letter from the organisation. In the second case, the chief executive agreed to sign the letter in the ethical clearance document and this granted permission. Sensitivities were resolved as far as was humanly possible before interviews were conducted, and the question of voluntary participation was consistently highlighted.

1.13 THE RESEARCH DESIGN AND METHODOLOGY

A mixed method research study commenced with a literature study on the influence of lean thinking on organisational structure and behaviour. Two organisations were selected as compelling and purposive cases for the case study research. The reason being that these two organisations, having adopted a lean transformational strategy, exhibited the context of the research in such a way as to provide the research opportunities of combining lean implementation processes with, and utilising lean assessment relative to marked performance improvements and changes that could be observed and recorded in terms of changes pertaining to organisational structure and organisational behaviour. Employees from two organisations that had adopted lean thinking were interviewed after a thorough literature review had been completed. The selected organisations were coded F01 and W01 and are referred to as such throughout this thesis.

The study included interviews with focus groups as well as individuals from top management, middle management and the general workforce. Questionnaires were designed for the quantitative component of the research using Likert scales and covering

the lean techniques as the independent variables (see Appendix A), structural constructs as the dependent organisational structure variables (see Appendix B) and behavioural constructs as the organisational behaviour dependent variables (see Appendix C). Interviews were semi-structured, open-ended and held in a relaxed setting. They were designed to elicit the views of individuals and groups regarding the research area. Analysis of the data was objective and based on the views, opinions and examples provided by individuals and focus groups.

The qualitative element of the study took the form of a case study as used by Yin (2014). An extensive literature review led the researcher to the decision that this was the best approach, given the circumstances and limitations of the field in which the study was to be conducted. The work by Meredith (1998) was especially useful in this regard. He contrasts rationalist and case study research as an objective versus an interpretative approach. Rationalist research is based on quantitative methods, while case study research uses both qualitative and quantitative methods. Meredith (1998) supports case study research, since it assists the researcher in understanding both the principles underpinning events and the mechanisms that may be identified by quantitative means during the study. He stresses the value of rationalist research, since it can be used to test any derived theory.

1.14 DELIMITATIONS AND SCOPE

The sample design of the quantitative research component of the case study method was limited owing to the small number of organisations that have successfully implemented, or are in the process of implementing lean thinking in South Africa. Purposive sampling was therefore used in the case study.

The research focused on lean thinking, including its synonyms lean production and lean manufacturing but excluding other closely associated terms such as 6 sigma, Lean 6 sigma, total quality management (TQM), agile manufacturing and value chain.

Specifically, organisations subscribing to a material requirements planning system (MRP system) were excluded from the research because of the requirement of a Kanban or pull production control system.

The research was confined to discrete manufacturing organisations and did not include other research areas such as banks, health care, departments of justice or service organisations.

1.15 LIMITATIONS

The nature of the research required detailed interviews with the chief executives of organisations in order to determine whether an organisation was truly committed to lean thinking implementation. Sensitivities and individual bias may thus have limited the data collection process; however, all CEOs appeared relaxed and confident about the research process and it is the researcher's view that bias was never an issue.

The nature of the research required the assessment of behaviour at organisational level, and this may have resulted in subjective responses from individuals. In order to counteract this, the researcher made use of the units of research to check the views of individual participants when bias was suspected. The method adopted was to utilize the coding of participants that identified them by: level; function; department; role and responsibility; years of service with the organisation and exposure to lean processes. The use of questionnaires and assessment surveys may have resulted in resistance on the part of individuals or groups as a result of the infringement on normal work time and space, and concerns related to organisational transformation; however, this concern was counteracted to a great extent by the positive manner in which top management and individuals supported the research process.

1.16 OUTLINE OF THESIS

Chapter 1 has discussed the introduction and background to the research, as well as the context, concept, rationale, problem statement and research questions and objectives. The chapter includes an overview of the research methodology, the scope and delimitations as well as the limitations and the ethical concerns of the study.

In Chapter 2, the basic theory, including lean theory as well as basic organisational theory is discussed. The chapter articulates how the basic theory was applied in the context of lean thinking and its influence on the organisational structure and behaviour of discrete manufacturing organisations in South Africa.

Chapter 3 covers the literature review and includes a presentation made to the School of Business Leadership examination forum. This chapter provides a summary of findings that applied to the research area that was identified in terms of the gap that was found in the literature review. This identification also served as a guideline to the fieldwork.

In Chapter 4 the problem area is discussed in detail, including the problem statement, the hypotheses and propositions.

Chapter 5 deals with the research design methodology. This was a qualitative case study that included a detailed quantitative aspect. The methods are discussed in some detail, together with a plan of how each was applied. The research questionnaires were finalised for the case study together with the open-ended approach envisaged for the qualitative study in terms of the interview process. The conceptual framework is discussed in this chapter and all aspects of ethical clearance are explained, as well as issues of the validity and reliability of the study.

Chapter 6 presents the analysis of the results of the qualitative study and the case studies separately. This includes interpretations to test the hypotheses and to validate the results. This chapter includes the discussion of findings of the fieldwork.

Chapter 7 includes a discussion of the research process and outcomes, the conclusions of the study as well as the significance of the outcomes and recommendations. The chapter closes with recommendations for future research in this field.

1.17 SUMMARY

In this chapter the researcher outlined the conceptual framework, context and problem statement and specific research questions and objectives. The choice of methodological approach was also discussed. The rationale for the research was provided from both a practical and theoretical point of view. Preparation for this research spanned more than two years of consulting and training. Continual in-depth research into lean thinking and lean techniques has elevated the importance of the study against the backdrop of many failed lean transformation attempts. The future of western discrete manufacturing organisations, not only those in South Africa, hangs in the balance; they lag very far behind when compared with the dynamics of the emerging Asian manufacturing industries.

A few researchers have undertaken limited research into the influence of lean thinking on organisational structure and behaviour, but the details and results of this research have left many unanswered questions. The next two chapters review a framework used to review lean theory, organisational theory and the literature that is relevant to the research area. The literature regarding lean techniques is covered in some detail, searching beyond technical applications and critically analysing the influence that these techniques have or could have on discrete manufacturing organisational structure and behaviour.

CHAPTER TWO: BASIC THEORY

2.1 INTRODUCTION

In 1984 Womack and Jones (1990) were pondering the future of the automobile, realising that Japan was rapidly gaining market share. At that time, they did not understand why, and it took another five years of studying the Japanese automobile industry for them to realise that a new theory had been developed. They named this theory lean thinking. The study they undertook was named the international vehicle programmeme (IMVP) and was sponsored by the Massachusetts Institute of Technology. The outcome of their study was published in a book in 1990 that covered the superiority of the Japanese automobile industry and, more specifically, of the Toyota motor company. Womack and Jones (1990) observe that the term lean comes from a word coined by Krafcik, a researcher working on the IMVP survey. In explaining the motivation for choosing this name, they note that lean production uses less of everything compared to mass production – half the human effort, half the manufacturing area, half the investment in equipment and tools, half the product development time and less than half the amount of inventory. According to Womack and Jones (1990), lean production also results in far fewer defects and a much greater variety of products. Lean theory is discussed in more detail in the context of this research study in Section 2.2.

The basic organisational theory underpinning this study is drawn from organisational design and behaviour theory in order to link these to the influence of lean thinking on organisational structure and behaviour. The work of Thompson (1967) and Lorsch and Lawrence (1970) was considered most appropriate in this regard. The review of their respective theories is provided in Section 2.3.

This chapter summarises the review of the basic theory in terms of its applicability to the research area, and addresses the gap in the theory relative to the research area in Section 2.4 with respect to the effect of lean thinking on the discrete manufacturing organisational structure.

2.2 BASIC LEAN THINKING AND ORGANISATIONAL THEORY IN CONTEXT

The introduction to this chapter provided the background to the origins of lean thinking. In theory, this is based primarily on the concepts of mass production developed originally by Henry Ford and on the systems, processes and techniques that have since been developed by the Toyota Motor Organisation (Womack & Jones, 1990). The basic theory of lean thinking has, therefore, much to do with the work of Ōhno (1988) and Shingō (1989)

regarding the Toyota production system. The work of these scholars contributes to the lean thinking theory developed by Womack and Jones (1990, 2003) and Liker (2004).

The basic theories of organisational structure and behaviour used in this research study are those developed by Thompson (1967), on the organisation in interaction with its environment, and by Lorsch and Lawrence (1970) on the design of organisations, based partly on Thompson's (1967) work and the work of other prominent practitioners. Lorsch and Lawrence (1970) are best known for their contingency theory of organisations. The work of Thompson (1967) and Lorsch and Lawrence (1970) is especially relevant to this research area as it established the basic thinking behind organisational design.

2.2.1 Basic theory – lean thinking

As acknowledged above, the basic theory of lean thinking evolved primarily from the work done by Ōhno (1988), who was managing director of the Toyota Motor Corporation in the 1970s, and by Shingō (1989), an engineer and manager at the same company. Their contributions are indeed significant, as can be deduced from their writings dealing with the Toyota production system. Ōhno (1988) explains that the Toyota production system evolved from necessity since Japanese automobile manufacturers were not able to imitate the mass production systems of the USA. Observing the USA's dependence on large-batch production with long set-up times, they set about changing their system to one based on the absolute elimination of waste, reduced batching, the drawing of required materials from upstream facilities only when needed and building inspection into the process. They emphasised that human attention should only be required when a defect was detected. Ōhno (1988) explained production levelling and the average rate of demand from customer named TAKT time after the German word for rhythm, saying that if 1000 parts were needed in a 25-day month, 40 parts per day should be made. He identified the seven wastes discussed in Chapter 1.

Ōhno (1988) proposed one-piece flow, also known as single-piece flow, explaining that if the production day were 480 minutes long, only one part should be made every 12 minutes. He introduced cellular manufacturing by positioning machines according to the flow of work and enforcing multi-skilling among workers so that one worker could be assigned to more than one machine. He refers to the resistance of workers in this regard but emphasises the discipline of one operator, many processes, as the most appropriate method. He claims that production is two to three times more efficient than the one operator, one process system of mass production. Ōhno (1988) acknowledges the work of Shingō, who in turn in his research refers to Ōhno as the manager and to himself as

the teacher (Shingō, 1989). Shingō (1989) made the remarkable observation that the Toyota production system required single minute exchange of die named SMED as a means of achieving effective flow in terms of very quick changeover times for small-lot processing, and rapid response to sudden changes in consumer demand. He notes that Ōhno (1988) demanded that three-minute changeovers be achieved. Shingō (1989) regarded SMED as separate from the Toyota production system, and his brilliance lies in the simplicity of how effective flow can be achieved. In relentlessly pursuing the elimination of waste and the achievement of flow, Shingō (1989) developed the autonomous inspection Jidoka, and the fool-proofing of Poka-yoke in the process of eliminating inspection after production. Together with Ōhno, Shingō (1989) also developed the techniques of cycle time reduction, Kanban and level scheduling, and Heijunka with cellular manufacturing to achieve perfect flow.

Basing their research on the Toyota production system but at the same time acknowledging work done by Henry Ford, Womack and Jones (1990, 2003) developed the lean thinking theory.

Womack and Jones (2003) explain that value is determining how the customer perceives value. They distinguish three categories of actions to determine value, namely those that create value from the customer's viewpoint, those that create no value but are required to conclude the production process and cannot be eliminated immediately, and those that add no value and can be eliminated immediately. The value stream are those value adding activities that physically transform the product, and that can be traced as a route from beginning to completion of the product. Flow is arranging the transforming facilities in sequence to create continuous flow. Pull triggers the flow and is the information flow upstream that ensures that nothing is manufactured unless requested. Perfection is working at continuously improving the things that improve flow and that reduce wastes further until perfection is achieved. This last principle is seen as constant since there is always a better way of doing things (Womack & Jones, 2003).

Following the work of Ōhno (1988) and Shingō (1989), Womack and Jones (2003) and Liker (2004) refer to all the lean techniques that are defined in Section 1.3. Womack and Jones (2003) refer to just-in-time (JIT) as a technique used to implement flow. They explain that this technique combines reduced cycle time, quick changeovers, Heijunka and Kanban pull. In addition to these techniques, Liker (2004), as part of his 14 principles, includes the following items: strategic long term thinking (Hoshin Kanri); creating a culture of right first time; utilising only reliable and tested technology; developing people,

teamwork and leadership; cultivating respect for people; visiting the shop floor and practising intensive and critical reflection.

2.2.1.1 Observations regarding the research area – Section 2.2.1

All the theorists of the Toyota production system and lean thinking recognise the importance of organisational structure and behaviour in lean implementation. Ōhno (1988) refers to resistance from workers regarding flexibility and multi-skilling in the manning of manufacturing cells. Womack and Jones (2003) refer to the need to restructure along the value stream in order to sustain the achievements of lean thinking. They also discuss the importance of teamwork and bottom-up value stream management in order to involve all individuals in the organisation. Liker (2004) discusses people and teamwork development as key to an organisation becoming like Toyota.

The theoretical objectives of lean applications and influences in this study are, therefore, the confirmation of the impact of lean thinking on organisational structure and behaviour. Even in the basic theory, the objective of determining whether theory exists regarding the research area was confirmed.

The gap in the literature is apparent as there is no clear indication from the basic theory of how to restructure along the value stream and how to cultivate behaviours that will promote the implementation and sustainability of the process. In this regard, Womack and Jones (2003) propose that a lean function be established, together with product development teams reporting directly to the chief executive. They also discuss restructuring, with the functions of marketing, engineering, HR, finance, operations and purchasing reporting directly to the chief executive; however, this appears to be the common method used to structure functional organisations. Another observation is that Womack and Jones (2003) do not discuss how lean thinking will impact on the non-manufacturing or non-operations functions of an organisation. It can be concluded that these functions have not been restructured along the value stream. It would thus appear that the basic theory does not address the structural issue adequately and this confirms the gap in the theory. In the field research, this question was critically examined in the context of finding organisational behaviours that would assist in the implementation of lean thinking and that would guide the researcher in establishing new guidelines or theories.

2.2.2 Basic organisational theory

In this section, the basic organisational theory is reviewed in order to consider the basics of organisational design. In this context, Thompson (1967) and Lorsch and Lawrence

(1970) used an open systems approach in their studies of the organisation. Their approach was to view the organisation as being influenced by its environment. Thompson's (1967) work was based on qualitative analysis and he built a unique and uncontested theory of organisational design in terms of technologies and environmental influences. Lorsch and Lawrence's (1970) work was based on Thompson's (1967), from which they developed the contingency theory of the organisation.

Thompson (1967) distinguishes between two basic strategies: a closed system strategy and an open system strategy. The closed system strategy seeks certainty through goal formulation and achievement while in an open systems approach the strategy shifts from goal achievement to survival, accepting uncertainty; Thompson (1967) reasons that both approaches are equally useful. The closed system includes the technical level, the provider of the organisation's products, and a second level providing a service to the technical level.

Thompson (1967) explains that the service level mediates between the technical level and the users of the organisation's products. The service level can be viewed as the managerial level that interacts with the environment, providing resources and materials to the technical level and interacting with the users of the organisation's products, that is the customers. The managerial level determines the sequencing of tasks at the technical level and mediates between the input at the technical level and the output from the technical level.

Thompson (1967) includes a third level, classified as the institutional level, that oversees internal controls and organisational routines that are or will be acceptable to the organisation's community and eventually its environment at the technical and managerial levels. This internal control assists the organisation in functioning independently from the environment; however, in terms of environmental influences, the institutional level experiences interdependence, which will, through routines and interpretations, manifest itself in the formulation of internal controls.

Task decisions are made at the technical level and rationality dictates how these tasks will be carried out. Thompson (1967) identifies this process as the technologies employed by the organisation. These technologies are: long-linked technology, where tasks are sequential, meaning that the downstream task cannot be executed until the upstream task has been completed, e.g. the flow line in lean thinking falls into this category; intensive technology, where a variety of different tasks are completed to fulfil a requirement, e.g. a

construction project and the mediating technology, where the task is to link an input with an output, such as when banks link depositors with borrowers.

In manufacturing, the problem being resolved by lean thinking is the creation of flow lines with pull from customers through to suppliers just in time, or JIT, so as to avoid inventory build-ups at the end of the flow line, or finished goods or work in progress build-ups as a result of unbalanced facilities. Thompson (1967) makes the point that, in long-linked technologies, organisations buffer their technology with inventory to shield the technical level from uncertainty. This so-called rational thought process is so ingrained that this is what most western organisations did before the advent of lean thinking. So is Thompson (1967) still applicable in terms of organisational buffering? The answer is yes, since even the originators of lean thinking applied buffer stock at the beginning and the end of the flow line so as to reduce the degree of variability (Jones, 2006).

In this study, the research area is limited to discrete manufacturing and only long-linked technology is applicable. Other technologies are not considered in this research as for example where lean thinking is utilised in process manufacturing organisations, banks and construction work. Expanding on the notion of long-linked technology, Thompson (1967) observes that the isolation of the technical system can be achieved by buffering the organisation using both input and output requirements, e.g. raw material and finished goods inventories, by smoothing out input and output transactions, and by forecasting and rationing.

The theory of organisational design posited by Lorsch and Lawrence (1970) can be closely identified with that of Thompson (1967) since these authors also view the organisation as an open system in a contingent relationship with its environment. They explain that, in its contingent relationship, the organisation will develop functions inside the organisation to deal with environmental aspects in terms of market, scientific and techno-economic information. This approach leads to functionally structured organisations that operate in terms of the dimensions of formality of structure, goal orientation (long versus short term), time orientation, interpersonal orientation and task concerns versus relationships concerns.

Realising that different types of functions will be applicable to different parts of the environment, Lorsch and Lawrence (1970) considered the degree of differentiation between functions and how best to coordinate these. Using Thompson's (1967) theory, Lorsch and Lawrence (1970) also considered the types of interdependence that would and could exist among organisational units, namely: pooled interdependence, where each

organisational unit renders a discrete contribution to the whole although no direct interaction is required between the different units of the organisation; sequential interdependence, when direct interdependence can be specified; reciprocal interdependence, when the output of one unit is the input to another unit and vice versa.

Dealing with the above issue, Lorsch and Lawrence (1970) again refer to Thompson (1967), who notes that pooled interdependence rules and procedures are adequate for integration, while sequential interdependence is achieved by plan. Reciprocal interdependence means face-to-face interaction or working with cross-functional teams.

The literature objectives have been partially met in the above analysis; however, for the work in the field, the basics of organisational design have to be taken into account when options are considered, especially in terms of the aspect of integration. It was anticipated that the research would be sensitive to this issue when a new organisational design concept was anticipated.

2.2.2.1 Observations regarding the research area – Section 2.2.2

Relating the theory discussed above to lean and discrete manufacturing organisations, interdependence is found in all the above types; hence the emphasis placed on teamwork by lean practitioners. For example, integration between functions that receive and/or accept a customer order and production needs to be perfect in JIT organisations. For this reason, integration should be reviewed as an organisational shift, with sales completely integrated with manufacturing (Shingō, 1989). Is this occurring in western organisations, even those using lean thinking? The answer, based on lean application studies covering the last 10 years (Lander, 2007; Kucner, 2008 Cooper, 2011), is an emphatic no.

Another question that emerges from the basic organisational theory is: what happens in functional tasks, when functions are confronted by a high degree of cross-functional teamwork, such as that which is promoted by all prominent lean practitioners (Womack & Jones, 2010; Liker, 2004; Quarterman, 2007)? Again, this question remains unanswered, except to discontinue lean thinking, as is explained in the case discussed by Scherrer *et al.* (2009).

The basic theory indicates that discrete manufacturing can be regarded as a long-linked technology, analogous with the value stream (Womack & Jones, 2003), which requires detailed solutions regarding the integration of the functions of the organisation, with pooled, sequential and reciprocal interdependence occurring. Implications for lean thinking are that integration requires cross-functional teamwork, demanding that

individuals focus on cross-functional tasks and functional tasks. This complexity in creating a balance between cross-functional and functional tasks may not be adequately dealt with in the literature when lean thinking is considered as a transformational strategy. This aspect was taken into account in this research study.

As far as the research objectives of lean applications and their influences and the existence of literature in this regard are concerned, it was observed that these are partially satisfied by the conclusions regarding lean and basic organisational theory. The gap in the literature was highlighted by the questions regarding structure and functional tasks, including organisational functions that remained unanswered. The analysis of the qualitative data provided findings that answered these questions fully.

2.3 SUMMARY

The theory developed by Ōhno (1988) and Shingo (1989) has significance as the first theory derived from the Toyota production system that formed the basis of the lean thinking theory developed by Womack and Jones (1996).

The theory developed by Womack and Jones (1996, 2003) and followed by Womack and Jones (2010) forms the basis of this research study, particularly the lean principles and techniques covered in their work and the principles, disciplines and techniques associated with flow and pull. Discussions of organisational design and behaviour were repeatedly linked to these concepts throughout the literature review and the fieldwork.

The researcher observes that lean theory as posited by Womack and Jones (2003) covers the technical aspects rather than the organisational and structural aspects, although an attempt is made to discuss the suitability of a matrix to lean organisations. Specific structural change emerged from the early work of Toyota's Ōhno (1988), who eliminated the inspection function and integrated sales and manufacturing functions. Early theory highlights worker concerns about multi-skilling (Ōhno, 1988). The integration of functional units proved to be significant in the establishment of the set of propositions discussed in Chapters 4 and 5 of this thesis, that led to the formulation of new principles for lean discrete manufacturing organisational design.

Basic organisational theory (Thompson, 1967; Lorsch & Lawrence, 1970) covers mainly the structural considerations of organisations following, firstly, a closed systems approach, followed by an open systems approach. An open systems approach was used in the conceptual framework of this study. The work by Thompson (1967) takes into consideration the influence of technology on organisational design, since it identifies the

lean approach as a long-linked technology, with an emphasis on flow and buffering of the organisation against variability from the environment. The concept of long-linked technology and buffering was especially relevant in the literature review where lean techniques associated with flow and pull were considered in terms of organisational structure and where behavioural issues that emerged were confirmed during the field research. Contrast emerged with F01's managing director indicated his concerns regarding whether Kanban could be an applicable technique, given the poor performance delivery of South African foundries, compared to W01 that had effectively established a consistent supply through their scrap division and work teams effectively running visible area Kanbans.

In the next chapter the discussion of the basic theory is extended to structural and behavioural research.

CHAPTER THREE: LITERATURE REVIEW

3.1 INTRODUCTION

Having introduced the origins of lean thinking and organisational design and behaviour (Section 3.1), Section 3.2 covers the literature related to lean thinking. In this section, the literature is reviewed as it relates to this research study and the conceptual framework that sought to determine the relationships between lean thinking and the transformation of the discrete manufacturing organisation to an effective global competitor. The question of whether there was a relationship between lean thinking and on the organisational structure and behaviour is expanded on by using basic theory and the related literature and linking these to the principles and techniques of lean thinking.

The literature review considers relevant and current literature related to lean thinking and organisational structure and behaviour. Section 3.3 explores the general applications of lean thinking and, more specifically, reviews questions surrounding implementation issues. It investigates whether there were sections in the literature dealing with organisational behaviour and structural issues. The literature objectives of research dealing with the applications and influences of lean thinking is assessed for the research process, as is the existence of literature that addresses the research area. This section also discusses the research objective of identifying a gap in the literature regarding the influence of lean thinking in organisations.

Section 3.4 deals directly with lean thinking and organisational structure and behaviour. This section provides a synthesis of the literature relating to the research area. Apart from the focus area of lean thinking and organisational structure and behaviour, this section focuses on other areas of relevance such as lean and organisational learning, the factor of leadership and the factor of organisational culture.

Organisational structure, behaviour and transformation or change are discussed in Section 3.5. Aspects that are reviewed are those contained in the most current literature concerning organisations that need to change. Organisational learning is analysed together with the question of organisational culture and organisational leadership. A critical analysis of the literature is provided in order to draw on the parallels in lean implementation and organisational structure and behaviour.

In Section 3.6, lean thinking techniques are analysed and possible links between organisational structure and behaviour are investigated. An evaluation of the extent to which organisations have implemented lean techniques and how this process affects

organisational performance is provided. The debate on whether lean techniques can be used as a measure of lean implementation is also discussed. This approach takes into account the objectives of lean applications and investigates whether literature exists that explains the relationship between lean thinking and organisational structure and behaviour.

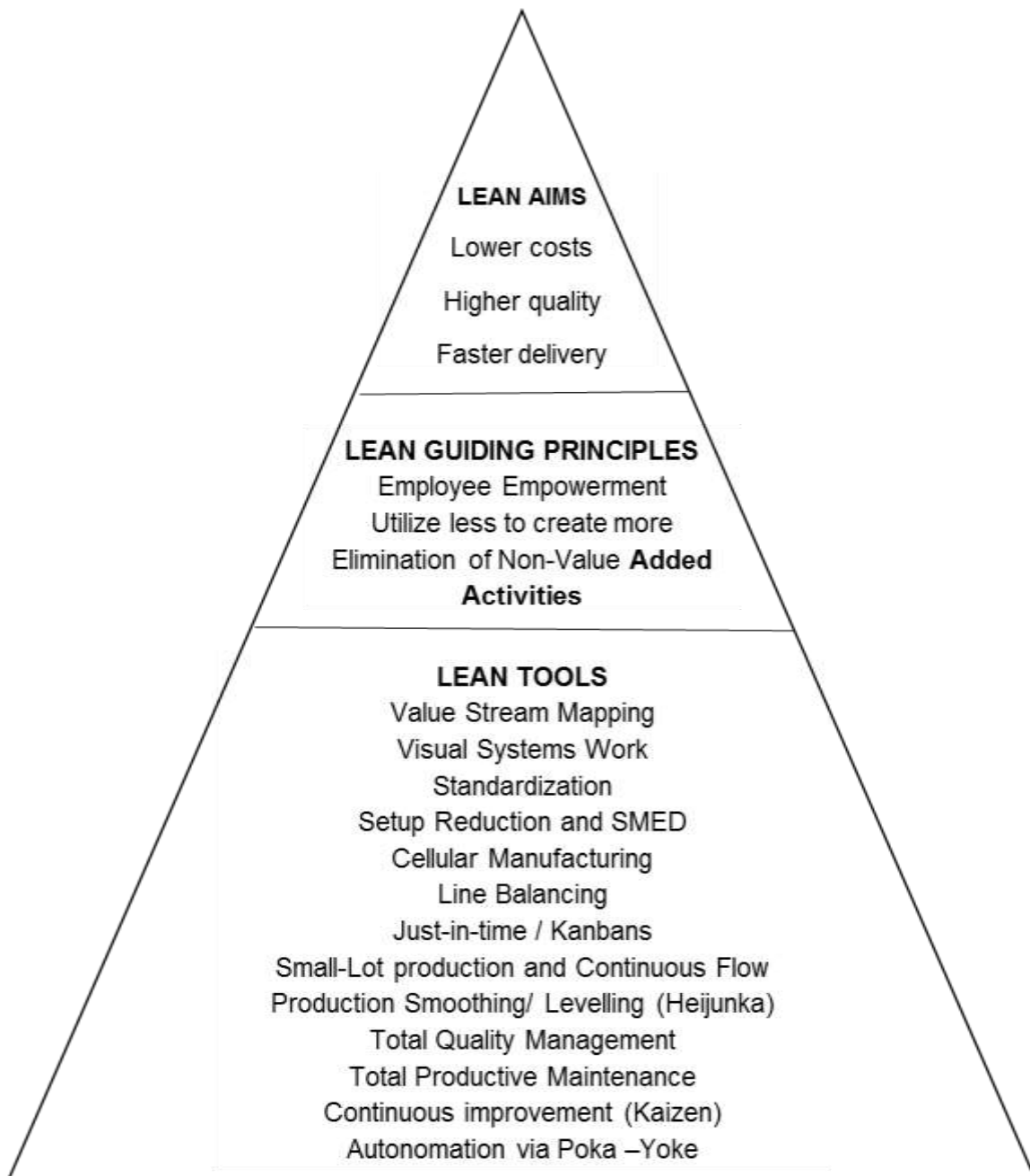
This chapter concludes with a detailed summary that provides an overview of the achievement of the theoretical objectives set out in Chapter 1.

3.2 LEAN THINKING – APPLICATIONS AND IMPLEMENTATIONS

The purpose of this section was to establish whether pure lean thinking did have components that referred in some way to aspects of organisational structure and behaviour. A further consideration was included regarding the determination of whether literature in this category that related to the research area existed and whether the gap in the literature could be further substantiated.

As a general approach, the literature review used the work of Abdulmalek, Rajgopal and Needy (2006), who provide an effective framework for the application of lean thinking. This framework was tested in an utilisation study of a steel mill organisation. Figure 3.1 shows this framework, which was considered very effective and useful by the researcher, since it identifies the levels of lean applications as a pyramid, including 14 of the 20 lean techniques identified in the conceptual framework. The top level deals with the aim, the second level identifies the guiding principles for lean implementation: employee involvement, using less for more and the elimination of non-value activities. The third level shows 14 of the 20 lean techniques that were defined in Chapter 1.

Figure 3.1 Framework for the implementation and application of lean thinking (Abdulmalek *et al.*, 2006)



The framework in Figure 3.1 is in complete alignment with the work by Womack and Jones (2003). The pyramid provides an effective overview of what lean manufacturing aims to achieve when organisations adopt a lean transformational strategy.

The framework by Abdulmalek *et al.* (2006) proved useful in the field when interaction with CEOs, managers and employees occurred. It served as an effective guideline in establishing how individuals perceived lean thinking in their respective organisations.

Using the framework also helped to establish a focus during the field work when attempting to determine appropriate organisational behaviours in context.

3.2.1 Lean thinking implementation

The literature search provided a number of diverse studies dealing with lean implementations. This review has attempted to categorise approaches in order to determine the patterns that relate to the research area. Synthesis was applied in order to determine how the theoretical and literature objectives had been achieved.

Womack (2002), Brown *et al.* (2006), Hettler (2008), Lander (2007) and Bo and Mingyao (2012) all support the view that value stream mapping is a vital step in determining the current state of an organisation, including the drawing of a value stream map of the future state of the organisation in order to envision what is realistically achievable with lean transformation. Womack (2002) proposes the appointment of an individual who is given this task and the necessary authority and financial backing to achieve the future state map. He also emphasises the need for truly rigorous pull systems to secure flow. As far as the organisation is concerned, Womack (2002) recommends that all value stream managers, manufacturing engineers, industrial engineers and information managers in production control and logistics functions are brought together to support every value stream. He further proposes that, once the value streams have been established and are continuously improved at the facility level, the scope should be expanded to include the larger value stream from raw materials to customer.

Brown *et al.* (2006) in their research of one case study propose the formation of a Kaizen team to assist in transformation and the promotion of manufacturing cells to identify with the future state value stream map. In order to transform the organisation, Brown *et al.* (2006) suggest a solution based on lean thinking in order to change an organisation from traditional batch manufacturing to lean production. These authors have a project approach in mind, with a Kaizen manager and team interacting with the value stream. Brown *et al.* (2006) developed their implementation proposal, based on a case study, to transform an organisation from a traditional batch manufacturer to a lean manufacturer in order to reduce inventories and improve the organisation's cash flow. However, the implementation steps in Figure 3.2 coincide with all the similar techniques, supported by the identified lean practitioners.

Figure 3.2 Lean implementation to change an organisation from batch to lean production (Brown *et al.*, 2006)

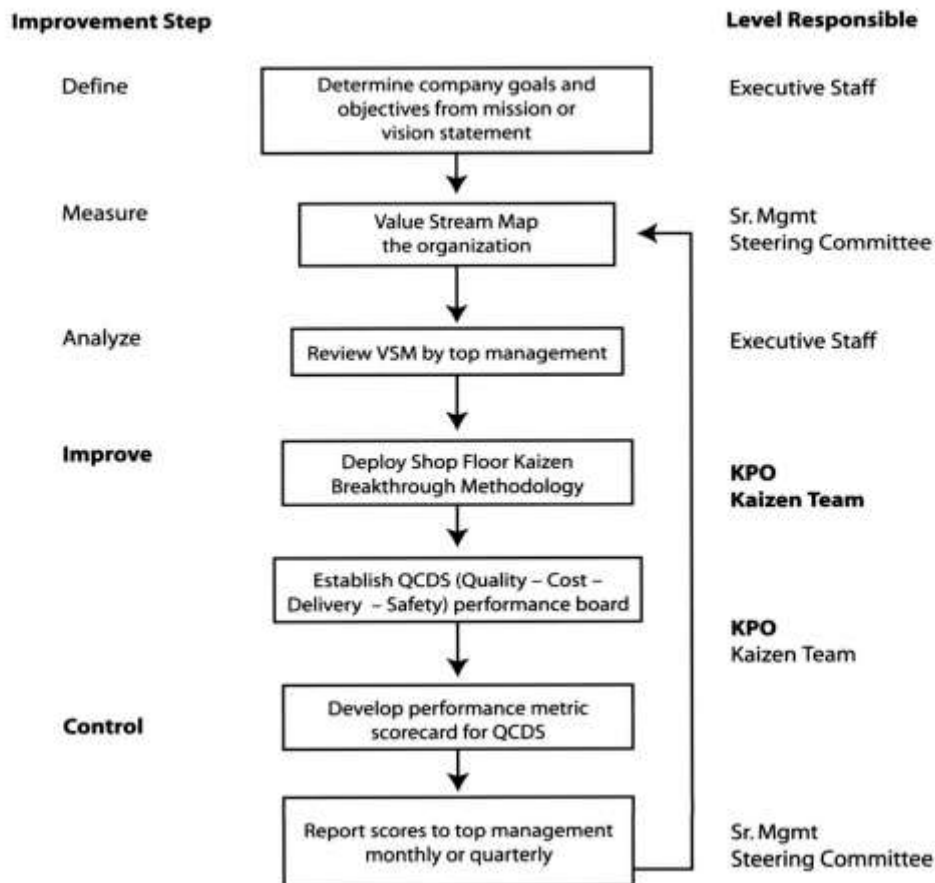


Figure 3.2 reflects the steps required to change an organisation, commencing with the setting of organisational goals, the preparation of the current state value stream map and implementation of the change by a Kaizen team. Gonzalo (2007) proposes an executive committee to coach lean (analogous with a Kaizen team), charters for the setting of organisational goals and charters for the work stream teams, similar to value stream teams. Gonzalo (2007) adds an important aspect to his proposal, recommending adult education as part of the implementation process. Quarterman (2007), a management consultant, proposes that his organisation’s lean assessment tool be used to determine the current state of: inventory; teamwork; processes; maintenance; layout and material handling; suppliers; set-up; quality and scheduling. He also , indicates that the future state workflow (analogous with value stream) and infrastructure should be identified, priorities set, and implementation plans developed. Hettler (2008) based on his experience at the Owens Corning Corporation in Ohio, United States of America, also subscribes to the

analysis of the current state value stream map, observing that this technique assists in identifying all the waste of the organisation, assists in seeing value through the customer's eyes, enforces agreement on the current processes, becomes a communication tool for alignment of the total organisation, and becomes the basis for decision-making. He believes that once the ideal value stream map has been prepared, it serves as a true north for a 100% value added process for the organisation. He explains that from the ideal map, a realistically achievable map can be prepared for full implementation. This serves as a gap that drives the organisation. Regarding the organisation, Hettler (2008) highlights the fact that the information flowing from the value map through the manufacturing processes should also flow through the sales, marketing, customer service, purchasing and materials planning processes. An effective example, he explains, is sales receiving an order and delaying it for several days before informing manufacturing, which can execute the order to lean principles very quickly. He makes the important point that lean implementation throughout the whole organisation will not be easy as a result of the functional silos that exist and that have developed over time.

The review discussed above contributed much to the theoretical objective of lean applications and its influence on organisational structure. The question of behaviour required further analysis and is covered in more detail in the sections that follow. The objective of determining the existence of relevant literature regarding the influence of lean thinking on structure and behaviour continued to be achieved. The gap in the literature as far as the issues highlighted by all the lean practitioners mentioned in this section are concerned, was further emphasised. The points made by Hettler (2008) regarding functional silos were especially relevant to the field research, as is evident in the F01 case discussed in Chapter 6 where clear patterns emerged from the case study research (refer comments by senior management per paragraph 6.2.5.2). The value stream mapping approach used by Lander (2007) is discussed later (see Section 3.2.4) owing to the use of Toyota style thinking in his study. Bo and Mingyao (2012) use value stream mapping in Chinese industry, noting that under current economic conditions, organisations are experiencing increased labour and material costs. Therefore, they propose value stream mapping as a method to improve the situation.

With marked success using value stream mapping in their research being reported by scholars (Lander, 2007; Hettler, 2008; Bo & Mingyao, 2012), it proved useful to include this approach in the fieldwork, especially in the context of Hettler's findings that were linked

to the research process and which led to the patterns that emerged from the qualitative research.

3.2.2 Measurement of progress and assessments – Lean implementation

The importance of measuring progress in terms of defined metrics for lean implementation is upheld by Womack (2002) – increased margins and increased market share of the product; Brown *et al.* (2006) (they propose a scorecard) – quality, delivery, cost and safety; Lander (2007) – defects, delivery days, inventory, product variety; Jones *et al.* (1999), Jones (2006), Alukal (2007) and Van Aken *et al.* (2010) – quality, cost and delivery.

Measures of leanness were investigated by Stone (2012a & 2012b), using the Lesat assessment method. This method is an audit that determines the extent of lean implementation by organisations according to measurement scales developed by the Massachusetts Institute of Technology. From a somewhat different perspective, Shetty (2011) proposes a new model to understand lean implementation, using employee perceptions that are studied during lean transformation. He believes that such a perspective brings to the forefront the way in which an employee comprehends and applies the skills and development of lean training. Behrouzi and Wong (2011) measured lean performance after implementation with fuzzy logic and found waste elimination and JIT to be the most important components.

The literature objectives regarding lean thinking and how it relates to organisational structure and behaviour were partially met in the abovementioned lean assessment methods. The proposed approach of using an assessment method also proved significant in the fieldwork since the expected role of cross-functional and self-directed teamwork was realised in the research and proved to be a requirement for a more effective organisational structure with lean thinking. The aspect of cultivation of behaviours for the participation in lean assessment also proved to be a major factor as the study progressed.

3.2.3 Lean thinking – Reasons for failure

Although there is a marked degree of similarity in the implementation approaches taken by the lean practitioners in this study, there are diverse reasons for the failure of lean implementations. A general view is provided by Womack who, in an interview with Blanchard (2007), observes that lean management is required for successful lean implementations, but that this is a problem in the USA. Regarding successful lean organisations in the USA, Womack cites Danaher and General Electric. He also identifies Boeing as an organisation making good progress.

Spear and Bowen (1999), Womack (2002), Hines *et al.* (2004) and Quarterman (2007) all provide specific reasons for failures in lean implementation. Spear and Bowen (1999) ascribe failure to the Toyota production system (TPS), saying that many organisations have tried to emulate this renowned system, but have not followed the unwritten rules of the system, including highly specified work, specified product flow and improvements made according to a scientific approach with a teacher's guidance. Womack (2002) ascribes failure to a lack of collaboration between the value stream managers, manufacturing engineers, industrial engineers and information managers. He also explains that organisations rely on consultants to implement lean; however, once they move on, the manufacturing systems return to what they were before (Blanchard, 2007). Hines *et al.* (2004) explain that western manufacturers emulated the shop-floor techniques, the structural parts of lean, but often found it difficult to introduce the organisational culture and mind set, indicating that many early lean efforts had only a localised impact and fell short of their intended influence on the overall system's performance. Quarterman (2007) attributes failure to the fact that organisations muddle through trial and error events or through repeated Kaizen events.

Bhasin (2011) mentions that lean failures are attributed to many different causes. He observes that corporate culture is a significant factor in lean implementation and that every company should find its own method of implementing lean thinking. He suggests a change strategy to improve the success of lean implementation. In his research, he found that lean thinking influenced the total organisation and that the implementation of lean thinking is extremely complex and requires considerable time and effort.

The question of failure in lean applications was taken into account in both the qualitative and the case study elements of this study. Focusing on the areas of failure proved useful and facilitated the analysis of organisational behaviour, providing guidance on how structural changes associated with a transformation to lean thinking can benefit an organisation.

3.2.4 Other approaches to the study of lean applications and implementations

Apart from value stream mapping and step-by-step implementation, as discussed in Section 2.3.1, other approaches were reviewed. These include a simulation study by Meade, Kumar and Houshyar (2006), a case study by Lander (2007) using both value stream mapping and Toyota style thinking to implement lean thinking in five organisations, and a case study by Kucner (2008) using the organisational contingency design model with the product-process matrix.

Meade *et al.* (2006), through the lean attribute of reducing inventories, used a post cellular manufacturing system in their simulation. Their model reflects the reduction in lead time to customers, which enables the organisation to reduce raw materials, work in progress and finished goods inventories. The findings of the simulation, not unexpectedly, were that the financial benefits resulting from improved operational performance did not counteract the negative impact of the accounting systems that reflected a reduction in profits until the Inventory levels stabilised.

In his five case studies, Lander (2007) combined Toyota-style thinking with a value stream mapping approach. His summary of Toyota-style thinking is provided in Table 3.1.

Table 3.1 Toyota style thinking (Lander, 2007)

	Philosophy	Methods	Tools/Practices
Organisational Identity	<ul style="list-style-type: none"> • Sense of purpose • Strong and stable culture • Long term perspective • Customer focus 	<ul style="list-style-type: none"> • Purpose and beliefs supercede short-term financial results • Long-term vision and plan to achieve it • Assess current information in light of the vision 	<ul style="list-style-type: none"> • Hoshin Kanri • Plan-do-check-act method (PDCA)
People	<ul style="list-style-type: none"> • Respect for humanity • Mutual trust and mutual responsibility • Teamwork • Effective leadership • Education and development 	<ul style="list-style-type: none"> • Develop a system of deep knowledge • Build people before building product 	<ul style="list-style-type: none"> • Knowledge is built on theory and practice • Define expectation (predicted by theory) • Scientific method • Compare prediction to reality
Processes	<ul style="list-style-type: none"> • Stability • JIT • Built-in quality 	<ul style="list-style-type: none"> • Continuous flow • Pull • Synchronised process 	<ul style="list-style-type: none"> • Cell layout • Reliable and predictable processes • Cross trained team • Rapid problem-solving • Quick changeovers
Continuous improvement	<ul style="list-style-type: none"> • Spirit of challenge • Relentless improvement 	<ul style="list-style-type: none"> • All activities promote learning 	<ul style="list-style-type: none"> • No-blame environment • Job security

	Philosophy	Methods	Tools/Practices
	<ul style="list-style-type: none"> • Thorough decision-making based on facts • Ensuring organisational learning • Learning to learn 	<ul style="list-style-type: none"> • Environment is conducive to experimentation • Learn from mistakes • Capture new knowledge 	

Columns 2, 3 and 4 of Table 3.1 reflect the philosophy, methods and tools and/ or practices involved in how Toyota perceives its system, while column 1 represents the categories of organisational identity, people, processes, and continuous improvement. This table proved useful in this research study since it was applied to all the objectives of lean applications in the literature. The gap in the literature was highlighted by the lack of clarity regarding how behaviours should be cultivated and how restructuring is to be achieved with lean thinking.

The approach of value stream mapping was discussed in Section 3.5. One of Lander's case studies is briefly discussed to illustrate his use of this approach (Lander, 2007). Lander (2007) explains that the case study concerns an organisation, Merilat, the largest cabinetmakers in the USA. Orders are processed in production control to obtain supplies from component makers and external suppliers. The system is forecast and materials requirement planning (MRP) driven. In strategising, Merilat constructed its current state value stream map as illustrated in Figure 3.3.

Figure 3.3 Merilat value stream map before implementation of Toyota-style thinking (Lander, 2007)

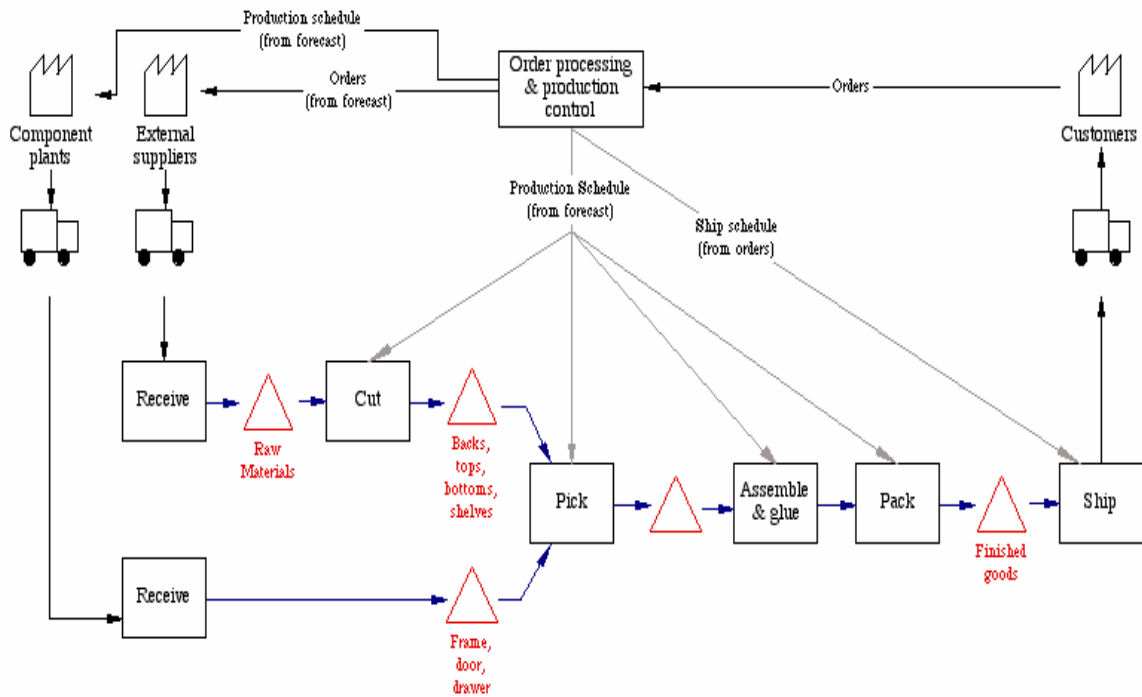


Figure 3.3 shows the current state value stream before implementation of Toyota-style thinking. In this flow, Merilat has 20 000 cabinets in the finished goods inventory and delivery to the customer takes ten days. The number of different product designs is 9800.

Figure 3.4 illustrates the development after the implementation of Toyota-style thinking. It should be noted that the value stream map shows the flow through one manufacturing cell, which was not previously the case. Merilat developed 10 manufacturing cells over a number of years. They replaced MRP with made-to-order systems and electronic Kanbans.

Figure 3.4 Merilat value stream map after improvements and application of Toyota-style thinking (Lander, 2007)

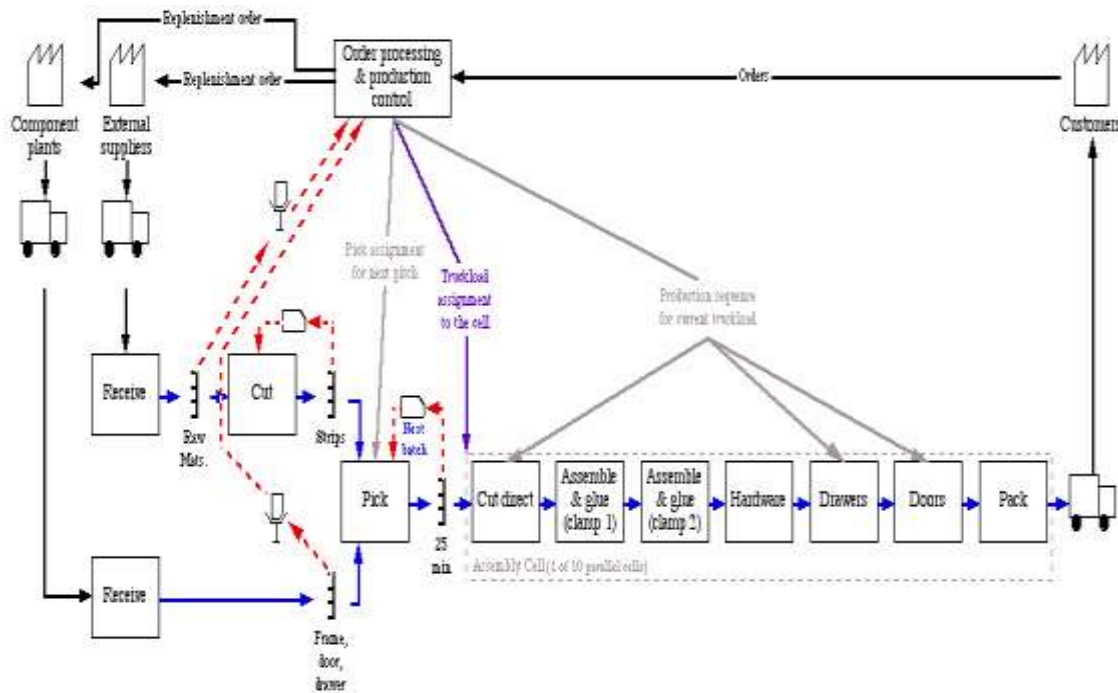


Figure 3.4 details the new flow with the improvements. Lander (2007) applies the metrics that were used with the study to determine the progress made, and the results are provided below in Table 3.2.

Table 3.2 Merilat results before and after implementation of value stream mapping and Toyota-style thinking (Lander, 2007)

Metrics before and after % change			
Performance metric	Before TPS	After TPS	% Improvement
Lead time in days	10	5	50%
Finished goods inventory	20 000	0	100%
Product offering number of types	9 800	30 000	206%

Table 3.2 shows significant improvements in terms of the metrics considered. The reduction in inventory is noteworthy and supports Womack and Jones' (2003) views that organisations will experience a cash windfall with the implementation of lean thinking.

Remanufacturing with lean thinking implementation is considered by Kucner (2008). Four case studies are analysed in terms of lean applications, and he uses the organisational contingency model for the product mix matrix in order to bridge the gap between manufacturing theory and remanufacturing application. Both high and low variability applications of lean methods are identified for remanufacturing applications. Kucner

(2008) found that all lean techniques can be successfully applied to remanufacturing. He observes that, with high variability, buffers may have to be increased while with low variability, remanufacturing will closely resemble OEM manufacturing. This researcher considers this to be stating the obvious. A comment that with the demands of variability, cross-functional teams should work closely together to resolve the demand issues was taken into account in this study.

3.2.4.1 Observations regarding the research area – Section 3.2

A detailed analysis of the basic literature revealed that value stream mapping is a very powerful transformational tool in identifying the gap between the current and ideal states and highlighting what is realistically possible. There were contradictions in the literature concerning the implementation of lean thinking techniques, with one author stating it as a condition, and another suggesting that alternatives are acceptable. The finding that functionally structured organisations present barriers to effective lean thinking implementation was an important observation and was proved in the fieldwork. The question of changing organisational culture if the implementation of lean thinking is to be effective was noted, and another important observation in this regard was that the repeated process of entrenching lean techniques will lead to a change in organisational culture. The theoretical objectives of determining the existence of literature and the applications of lean thinking and its influence on organisational structure were partially met; however, the issue of organisational behaviour required further review. This aspect was taken into account in the fieldwork, where better ways of approaching organisational behaviour and structures in order to achieve greater success with lean thinking were investigated.

3.3 LEAN THINKING AND ORGANISATIONAL STRUCTURE AND BEHAVIOUR

In the sections above, lean theory and organisational theory were discussed as separate theories. This is followed in this section by an analysis of literature covering the last ten to twelve years, dealing with lean thinking and lean thinking implementation. This evaluation took into account the central theme of this thesis, that is, that lean thinking will significantly influence the organisational structure and behaviour through considerable organisational transformation. In this section, the literature that directly or indirectly links lean thinking to organisational structure and behaviour is discussed.

3.3.1 Lean thinking and organisational structure

Jones *et al.* (1999), O'Carroll (2004) Nahm *et al.* (2003), Brown, Collins and McCombs (2006), Worley and Doolen (2006), Hettler (2008) and Haug (2012) all discuss the issues and possible outcomes associated with lean thinking and organisational structure. All these researchers share the view that traditional organisational structures are functionally structured and characterised by disconnected processes that impede the implementation of lean thinking. Brown, Collins and McCombs (2006) add that traditional manufacturing organisations are departmentalised and that accounting systems encourage maximum batch sizes to reduce overall costs. They highlight the belief that departmentalisation leads to intangible barriers, which often block communication. Worley and Doolen (2006) believe that functionality makes communication difficult, but that it does not provide a solution in the structure. Jones *et al.* (1999) do not provide a proposed structure but observe that any structure should be process based. Nahm *et al.* (2003) provide guidelines in terms of time based organisations, noting that these structures are flatter with few hierarchical levels, have a low locus of decision-making, have high levels of horizontal integration through cross-functional teams, have high levels of communication and rules and procedures that encourage creativity. They further point out that organic organisations recognise the variability in the environment and their technologies are typically not routine. Organisational structures are based on close-knit teamwork, face-to-face interactions, learning and innovation. Nahm *et al.*'s (2003) study correlated these structures with plant performance, measuring the following lean techniques: the re-engineering of set-ups; the use of cellular manufacturing; quality improvements; preventative maintenance; dependable suppliers; and pull production. They found a positive relationship between the use of the specified lean techniques and flatter organisation structures with a low locus of decision-making and horizontal integration.

The method used by O'Carroll (2004) to create structure for lean thinking implementation was to develop effective self-directed work teams; however, his structure was part of an overall structure and it is not clear how other functions or departments were ordered or affected. O'Carroll (2004) did, however, significantly reduce the number of hierarchical levels from three to one.

Haug (2012) proposes a similar approach to the one used by Nahm *et al.* (2003) and provides empirical evidence from two electronic organisations of organisational structures that are arranged according to the value stream in the form of manufacturing cells. His research, however, does not elaborate on how the structures were derived. A further

observation made from Haug's (2012) study is that other aspects of the organisation are still functionally structured, but no explanation is provided regarding these particular functions.

In contrast to the above studies, Spear and Bowen (1999) observe that the organisational structures at Toyota differ from division to division. They speculate that organisations adopting the Toyota production system will in, the long term, shift to adapt to the nature and frequency of the problems they encounter. Spear and Bowen (1999) note that, as organisational changes are usually made at a very low level, these can be difficult for outsiders to detect. They observe that the Toyota rules create an organisation with a nested modular structure, comparing this aspect to traditional Russian dolls placed one inside the other, and this enables Toyota managers to delegate a high level of responsibility without creating chaos.

In terms of the theoretical objectives, the above studies provided valuable insights into lean thinking applications and influences on organisational structure. The objective of determining the existence of literature was partially achieved. The gap in the literature regarding how lean structures evolve and what they should look like was further substantiated. The question of how other non-operations or non-manufacturing functions are influenced remained unanswered, and pointed the way forward for the intended empirical study, discussed in Chapter 1. Of particular value were the findings by Haug (2012) regarding cellular organisational structures and this proved to be very useful in the fieldwork, especially in terms of the development of new disciplines and how to create effective lean organisational structures.

3.3.2 Lean thinking and organisational behaviour

Organisational behaviour relative to lean thinking, in terms of possible indications of how organisational behaviour can be cultivated to support lean thinking and to achieve the objectives of lean applications and influences, as well as determining the gap in the literature, were discussed in this section.

In the context of the implementation of lean thinking, the following studies have been conducted: Gagnon (2004) studied employee behaviour and organisational strategy; Harris (2007), Angelis, Conti, Cooper and Gill (2011) and Losonci *et al.* (2011) investigated organisational commitment; Cameron-Strother (2009) considered employee behaviour under conditions of performance evaluation; Poppendieck (2002) investigated empowerment and the lean elements in her research and Pinheiro (2010) also focused on employee empowerment; Hasle, Bojesen, Jensen and Bramming (2012) researched

employee health; and Tress and Espinoza (2012) identified the attitudes associated with successful lean thinking implementation.

In his study, Gagnon (2004) researched employee behaviour in alignment with organisational strategy and found that workers reacted positively when they were made aware of organisational strategy. He concluded that knowledge of strategy correlates with a commitment to this strategy. Harris (2007) explains that discretionary behaviour surfaces when individuals exhibit new skills, such as: repairing their own machines; participating actively in Kaizen events; participating in empowered work teams; making positive suggestions; and developing Autonomation. In his study, he used the three-component model for organisational commitment developed by Herscovitch and Meyer (2002). This model has three components of commitment: firstly, affective commitment, according to which an employee strongly identifies with the organisational goals; secondly, continuance commitment, meaning that the employee commits to the organisation as a result of compelling reasons such as pension and service pay or social reasons, for example loss of friendship when leaving the organisation; thirdly, normative commitment, where an employee feels obliged to stay with the organisation. Although not conclusive, Harris (2007) found that affective and continuance commitment applied to discretionary behaviour.

Angelis *et al.* (2011) observe that successful lean operations make the existence of a committed workforce a necessity. Their research focuses on settling an on-going debate on whether the characteristics of lean thinking inherently enhance or impede commitment. Building on the work done by Allen and Meyer (1990) and Harris (2007), Angelis *et al.* (2011) also refer to affective, continuance and normative commitment. They point out that these types of commitment can be explained as 'I want to stay', 'I need to stay' and 'I ought to stay'. Based on this assessment, they are of the opinion that affective commitment is the only type that will lead to effective lean thinking implementation. However, their findings revealed that both the study's macro-implementation analysis and micro-regression work practice results supported the conclusion that affective commitment is neither inherently supported by lean production nor inherently impeded by it. An important finding was that enhancing commitment appears to be conditional, depending on the effectiveness of management in designing and operating the lean technical and human resource policies and practices. Angelis *et al.* (2011) comment further on their findings regarding lean work practices and their impact on worker commitment. Their results showed seven work practices that influenced commitment

favourably, while seven others had a negative effect. This aspect has significance for this study and Table 3.3 below distinguishes the identified work practices.

Table 3.3 Lean work practices that positively and negatively affect commitment (Angelis *et al.*, 2011)

Lean work practices positively affecting commitment	Lean work practices adversely affecting commitment
Improvement projects	Overtime to keep to level schedule
Task support	Speed over quality
Use of buffers	Ergonomic difficulties
Job rotation	Blame for defects
Cycle time	Lack of tools
Parts fitting difficulties	Pace/intensity
Individual output display	Flow interruptions

Reviewing Table 3.3, the researcher notes that only improvement projects, task support, job rotation, cycle time reduction and individual output display can be designated as lean practices. All other practices are not lean practices and should be classified as wasteful practices that require urgent and ongoing improvement.

Losonci, Demeter and Jenei (2011) identify commitment and belief by workers, lean work methods and communications as critical factors in lean thinking implementation at the shop floor level. They emphasise that gender and process characteristics can also have a marked effect on worker perceptions. Cameron-Strother (2009) found a negative relationship between the performance measurement of workers and lean thinking implementation, but that a significant relationship existed between manufacturing work teams and initiatives to achieve lean manufacturing goals.

Pinheiro (2010) investigated the relationship between the level of lean manufacturing principles integrated with employee empowerment and organisational change. He found that organisational change in a traditional factory setting begins with training, continuous improvement, managers targeting employees and plant managers, or by soliciting corporate resources to assist in training and development; in successful lean thinking implementations, employees were significantly empowered, allowing them the autonomy and freedom to adopt different roles in support of the process. Some evidence exists that when there is a change in culture, lean projects indicate good progress; clear evidence exists that, without active employee involvement, lean implementation will fail. Poppendieck (2002) states simply that the underlying principles of lean thinking are the

elimination of waste, the empowerment of frontline workers, immediate response to customer requests and optimisation along the value chain. She proposes that the organisation centres on people who add value. Poppendieck (2002) believes that unskilled workers should be incentivised to participate and report issues, and that flow is key to lean thinking success.

A comprehensive literature review is presented by Hasle *et al.* (2012). They chose 11 quantitative and qualitative studies to determine the effect of lean implementation on the working environment and employee health and well-being. They recognise that lean thinking will bring considerable changes to the organisation and, with these, stress and consequences for all in the organisation. Their findings are summarised in Table 3.4.

Table 3.4 A summary of findings from 11 literature studies (Hasle *et al.*, 2012)

Effects/Category	Primarily negative effects	Both negative and positive effects	Primarily positive effects	Indecisive or missing information
Working environment	5	2	2	2
Health and well-being	7	2		2

Table 3.4 reflects more negative than positive responses from employees. However, Hasle *et al.* (2012) suggest that the effects of lean thinking should be derived not from the concept as such, but from the way lean thinking is practised and the context into which it is introduced. In this connection, the involvement of employees, both in lean thinking implementation and in the operation of the lean production system in practice, seems to be the most important means of preventing negative effects on the working environment and employee health and well-being from occurring. Hasle *et al.*'s (2012) research has significance in determining how to develop and cultivate organisational behaviours for the implementation of lean thinking embedded in change of organisational culture, one of the research questions in this study. Therefore, although the literature provides some guidance, it does not explicitly indicate the appropriate organisational actions required to cultivate behaviours that will effectively support the implementation of lean thinking. This aspect highlights a further gap in the literature, which is addressed in the qualitative part of this study.

Tress and Espinoza (2012) discuss a model that identifies the key attitudes required to succeed in the implementation of lean thinking and to make these attitudes part of

organisational behaviour. They base their model on Bloom's taxonomy of learning domains (Bloom, 1956). They observe that lean implementation will bring about a cultural change in the organisation and that engagement with employees is essential from the top to the bottom of the organisation, a process that will require a different way of thinking. They discuss the following learning domains derived from Bloom (1956): the cognitive domain involving knowledge, that is intellectual skills that include the recall or recognition of specific facts, procedural patterns, and concepts; the affective domain that includes the manner in which humans deal with things emotionally, such as feelings, values, appreciation, enthusiasms, motivations and attitudes; the psychomotor domain, including physical movement, coordination and the use of motor-skills that requires practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution. Tress and Espinoza (2012) focus their research on the affective domain, which deals with receipt of information, responding and reacting to information and phenomena, valuing the information and phenomena, prioritising and organising experiences and the formation of character by internalising value. Using Bloom's (1956) taxonomy and combining affective factors with success factors, Tress and Espinoza (2012) created their model for lean human manufacturing success (LHMS). Their model identifies 36 attitudes gathered from lean experts and is summarised in Figure 3.5.

Figure 3.5 Essential attitudes for lean manufacturing success collected from lean experts' perspectives (Tress & Espinoza, 2012)

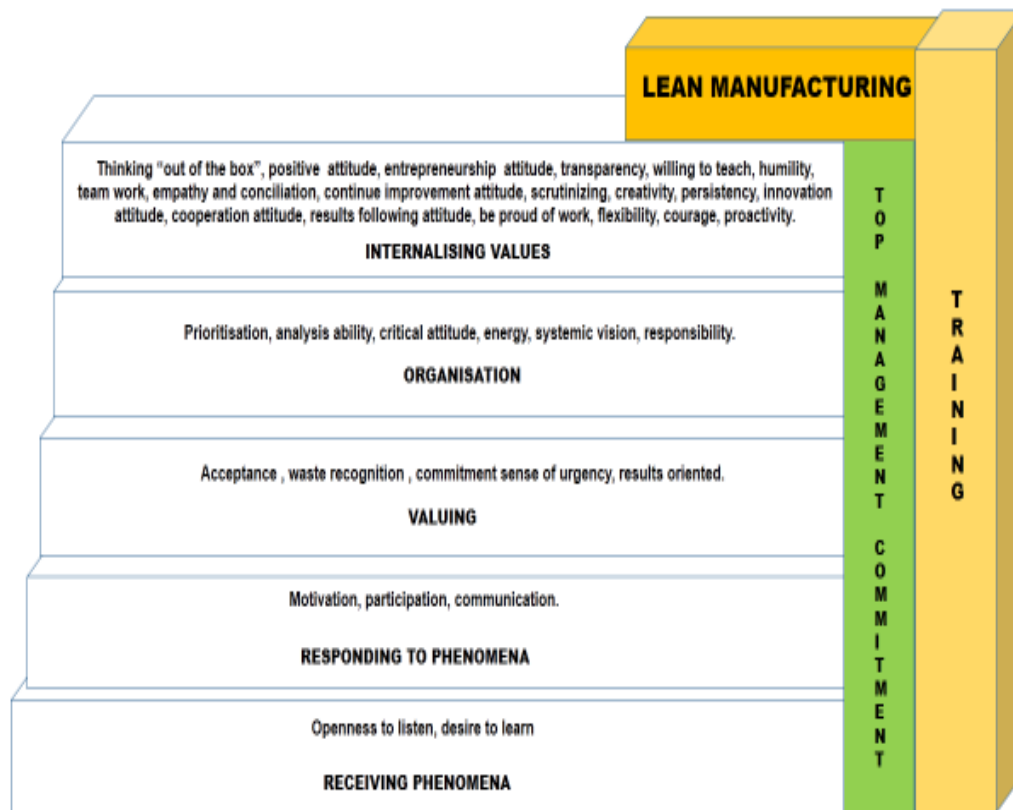


Figure 3.5 shows the 36 attitudes in steps and according to the five categories. It illustrates how the involvement of top management and training lead to lean thinking implementation. This literature review provided valuable insights into specific organisational behaviours and these were very useful in the fieldwork conducted in this study. The question of how to cultivate appropriate behaviours required further extensive research and is discussed in the section on research methodology in Chapter 5.

3.3.3 Organisational culture and lean thinking

Jones *et al.* (1999) emphasise flow without barriers and that the key to achieving all the identified lean principles is the existence of a culture of trust and empowerment, rather than of command and control. Sawhney and Chason (2005) developed the personnel behaviour-based lean model (PBBL) to study the human element in lean production and to aid lean thinking implementation efforts. Gander (2009) investigated the culture of trust relative to formal controls in the organisation. Jones *et al.* (1999) believe that traditional organisations have a culture of command and control; set targets are based on financial

criteria, rather than being customer focused. They also observe that a lean culture is one of trust, with operations people involved in decision-making; the culture is one of pride in a job well done, and this acts as an intrinsic motivator. Sawhney and Chason (2005) found in their case study that an organisation's culture and associated organisational behaviour are critical components of successful lean thinking implementation. Gander (2009) related organisational cultural aspects to employee behaviour in the context of formal and informal controls in a case study. She cites the example of a cabinet of expensive tools from which, despite strict controls, some were regularly removed. When management trusted employees, no tools went missing; however, when new employees were appointed, tools were once again stolen. Gander (2009) concludes that a culture of trust is essential and once instilled should be enforced by the leadership through proper screening and induction. She believes that with a culture of trust and empowerment, informal controls take over and costs are reduced. Enforcing procedures leads to inflexibility and resentment and creates more work. Gander (2009) makes the point that when culture breaks down, root cause analysis should be carried out by the leadership to rescue the situation. She maintains that leaders should be seen to live the values of the organisation and should use effective screening and mentoring when new employees join the organisation. Gander (2009) concludes by recommending that successes and culture are celebrated and that profits should be shared with employees, or that they should be given stock options. Marksberry, Bustle and Clevinger (2011) stress that the lean problem-solving technique of plan-do-check-act (PDCA) can result in radical improvements but that organisational norms, values and beliefs have to change before this can be achieved.

The analysis of the literature regarding organisational culture and lean thinking identified organisational culture as a significant factor in this study. The observations regarding organisational behaviours that emerged when evaluating culture are of particular significance to the fieldwork, which included an assessment of the relationship between organisational culture and appropriate organisational behaviours.

3.3.4 Factors leading to lean thinking success

Tracey and Flinchbaugh (2006), Czabke *et al.* (2008), Vermaak (2008), Scherrer *et al.* (2009), Cooper (2011) and Bhasin (2011) have investigated factors that lead to successful lean thinking implementation. Tracey and Flinchbaugh (2006) found that teamwork, metrics, communication across barriers, managers explaining employees' roles in lean implementation and acknowledgement of success of lean implementation are key predictors of successful lean implementation. Czabke *et al.* (2008) found that

communication and respect for employees were major success factors in lean implementation. Vermaak (2008) found that a sense of purpose, as highlighted by Liker (2004), strategic drivers, a lean promotion office (Womack & Jones, 2003) and stability were major success factors. Vermaak (2008) explains that stability means that the infrastructure, machines and equipment are reliable in lean implementation. Scherrer *et al.* (2009) identify commitment by management, team autonomy, organisational communication and interest in lean as key behaviours in successful lean deployment. In his study, Cooper (2011) identified highly capable leadership communication channels with effective feedback systems as vital success factors. The development of collaborative relationships between management and employees, being well versed in the practice of change management, understanding how to effect changes in culture and mores within an organisation are also crucial.

Cooper (2011) notes that there is a 70% failure rate in the USA and questions why, with such a high failure rate, a management philosophy can be so popular. He ascribes this to organisations wishing to emulate the successes of Toyota. He suggests that failures are caused by a combination of both business and human elements. Cooper (2011) cites as typical reasons the dismissive relationships between production and industrial engineering employees, the undermining by the senior manufacturing engineer of the director of operations and the lack of top management support to guide a collaborative effort. Cooper (2011) proposes that organisations should use the lean tools applicable to their situation. He says that the fundamental building blocks of organisational leadership, organisational culture and organisational change should be in place before implementing lean transformation. He found that leadership was the major obstacle to lean implementation. He believes that for lean thinking to succeed, leaders should be fully committed to the lean transformation initiative and should master change management before embarking on transformation. He identifies communication channels with effective feedback systems as being vital to lean transformation. He stresses that metrics should be used to determine how well transformation is progressing, and cites examples of set-up reduction and reduced work in progress. Cooper (2011) also acknowledges the role of organisational culture and the need for a collaborative effort by lean experts and champions.

These findings regarding success factors in the implementation of lean thinking assisted the fieldwork, specifically with regard to organisational behaviour and routines that lead to effective lean thinking and more effective organisational structures. The findings on

leadership (Cooper, 2011) proved sensitive, and it was found necessary to adjust the fieldwork regarding this particular issue.

3.3.5 Leadership and lean thinking

The literature review revealed diverse views on transformational leadership in lean thinking implementations. Doolen, van Aken, Farris, Worley and Huwe (2008) and Worley and Doolen (2006) researched management support, Johnson (2009) considered transformational leadership characteristics and Testani and Ramakrishnan (2011) hypothesised that constructive leadership was required.

A study by Doolen *et al.* (2008), relating Kaizen to organisational performance, found that the success of Kaizen events was varied and required positive attitudes and management support related to human resource outcomes. Worley and Doolen (2006) investigated the role of management support in lean implementation and the impact of lean thinking on communication. They found that management support affected lean implementation both negatively and positively and that moderate support was indicated for communication relating to lean implementation. Their research further indicated that a dynamic relationship exists between lean implementation and organisational communications and that convincing management and employees to think differently about how to approach aspects such as waste reduction and the implementation of pull production and dealing with demand variations from customers is difficult. They conclude that it is essential that management is totally committed to the lean thinking implementation process, and they emphasise that a transition to lean thinking should be driven by the executive management team. They explain that lean thinking requires clear communication between multiple shifts and value streams.

Johnson (2009) studied the relationship between leadership and lean Six Sigma implementation. She found that transformational leadership's inspirational motivation and contingent rewards had the greatest positive relationships with organisational performance, while transactional leadership's passive management by exception and laissez-faire leadership had the most significant negative effects on a company's performance.

Testani and Ramakrishnan (2011) consider a lean transformation leadership model, focusing on leadership's role in creating a lean culture. In their study, they investigated the relationship between organisational culture and leadership styles. They describe their model as a solar system, or planetary model, where the transformational leader is a celestial body located at the centre of the departments, functions, organisations and

corporations that are in orbit around them. Testani and Ramakrishnan (2011) explain this structure as similar to the Newtonian behaviour of celestial bodies in orbit, where a gravitational pull is exerted between the rings in the system. Although they admit that their model is somewhat intuitive, they hypothesise that it is a constructive leadership style that will create an adaptive, high-performing organisational culture conducive to lean transformation.

Following the review of literature dealing with leadership issues, further fieldwork was done to assess this factor for the research in the best way. The sensitivity of the issue of successes in lean thinking implementation was taken into account when the fieldwork was undertaken and was not underestimated during the interviews.

3.3.6 Observations regarding the research area – Section 3.3

The literature discussed in this section was particularly relevant to the research area and the study's three theoretical objectives of determining the existence of literature on this topic and the applications and influences of lean thinking. The gap in the literature was emphasised since there was a lack of clarity in the literature on how to structure and how to cultivate organisational behaviour using lean thinking. The lack of clarity is the absence of details regarding how and why specifically the organisational structure will evolve and how and why organisational behaviour should be cultivated conducive to lean implementation.

Nahm *et al.* (2003), O'Carroll, (2004) and Haug's (2012) linkage of lean thinking and organisational structure indicates that with effective lean implementations, organisations have fewer hierarchical levels and a greater degree of horizontal integration. Formalisation in the organisation that is conducive to assistance rather than constraint and that encourages learning is positively associated with lean implementations. Functional structures are not conducive to lean implementation, and functionality presents barriers to the creation of a truly lean enterprise. Teamwork with cross-cultural communication is identified as a prerequisite for a successful lean transformation. It would appear that the utilisation of self-directed work teams can lead to flatter organisational structures.

Organisational behaviour that supports lean implementations involves affective behaviour, such as creative thinking and a willingness to learn and to participate in teamwork. Values such as proactiveness and persistence regarding constant improvement are positively associated with lean implementations. Organisational behaviour such as a critical approach and systems thinking as well as effective prioritisation are all associated with

success in lean thinking. Other aspects include recognising waste and communicating effectively.

Organisational cultures that encourage learning, creativity and innovation are positively associated with affective commitment to lean implementation. Organisational culture will undergo significant changes with the implementation of lean thinking. The instilling of a new culture involves the consistent follow-through in the implementation of lean techniques and methods.

A considered lean strategy will lead to complete organisational transformation; however, this requires total commitment and persistence by top management. Lean initiatives that follow a bottom-up approach do not work since these compete with top structure initiatives. The empowerment of employees is vital to lean implementation and leaders can often present a stumbling block to the process. Without total employee involvement, lean thinking may fail.

3.4 ORGANISATIONAL CHANGE, BEHAVIOUR AND STRUCTURE

Having made significant progress with the three literature review objectives regarding applications and influences of lean thinking and the existence of related literature, this section reviews literature that deals with how the implementation of lean thinking can radically transform an organisation. The review commenced with studies of organisational learning by Burnes, Cooper and West (2003) and Curado (2006) that discuss the rate of learning and organisational design for learning.

Burnes *et al.* (2003) claim that organisational learning is experiencing renewed interest as a result of two major factors: firstly, the pace of change and secondly, the threat to competitiveness posed by globalisation. In their study, they found that organisations are acquiring increasing amounts of knowledge in order to keep pace and to learn how to implement change. This, they explain, can be attributed to the rate at which the Japanese acquire new knowledge, disseminate and act on it. They observe that the Japanese are able to translate commitment into individual learning and into organisational learning, enabling them to produce the right product at the right time and at the right price. Burnes *et al.* (2003) conclude that organisations should learn as fast as the environment changes, changing their learning and involving all the employees and adopting recommendations from learning and applying them to organisational structure, culture and change. In order to understand the extent of the learning required, they advise that organisations review what is needed between the poles of stability and rapid change. This researcher observes

that lean thinking provides a way of doing this effectively through assessment and articulation.

In her study, Curado (2006) investigated organisational learning and design and arrived at the following conclusions: in designing a learning organisation, it is better to consider low formalisation and high integration instead of following the mechanistic design approach that is characterised by a high degree of formalisation and centralisation; integration and combination of knowledge are effective methods for organisational design since they integrate tasks and workflows of knowledge-intensive operations; organisational capabilities emerge over time through organisational learning processes; and coordination is achieved through social reward and internal normative systems. Curado (2006) believes that social rewards and normative systems are useful in designing for learning, and are preferable to hierarchical control and structured incentives. This researcher believes that a lean thinking organisation is also a learning organisation, therefore Curado's (2006) observations regarding organisational design are of major importance to this study. Her proposals regarding hierarchy and formalisation coincide with Nahm *et al.*'s (2003) views and therefore support the achievement of the literature objectives. The gap in the literature is highlighted again by the absence of information on how to restructure and how to cultivate supporting behaviours. Francis, Bessant and Hobday (2003) and Carbery and Garavan (2005) advocate quick organisational transformation and learning before, during and after the transition.

Carbery and Garavan (2005) emphasise that the capacity to change quickly is a major predictor of business success and that organisations develop complex structures to perform effectively in hyper-competitive environments. Francis *et al.* (2003) found that radical transformation is often unexpected, with the result of a minor failure or a catastrophe. Their research indicated that organisations have to acquire new competencies to deal with such situations. This is especially applicable to lean transformations when organisations find themselves challenged by global superiority. Francis *et al.* (2003) identify five competencies required in dealing with unexpected change, namely: recognising change; determining a strategy; innovating; and upgrading or changing leadership and managing systematic change as illustrated per Figure 3.6.

Figure 3.6 Organisational competencies to manage organisational transformation (Francis *et al.* 2003)

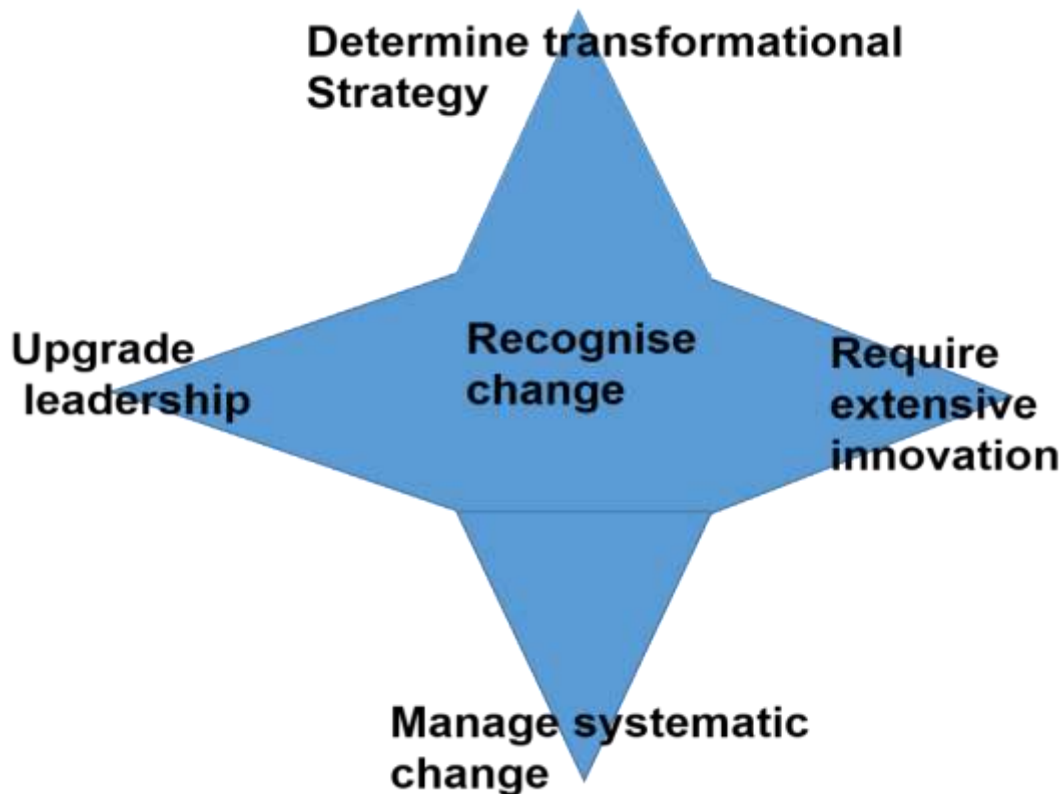


Figure 3.6 illustrates these leadership competencies. Each competency supports the next in a step-by-step process that requires organisational actions to deal with change. Francis *et al.* (2003) discuss the matching of the five competencies, as reflected in Table 3.5.

Table 3.5 The five organisational and management competencies required for radical organisational transformation (Francis *et al.*, 2003)

Competence	Brief description
Recognise the challenge	Top management recognises the need for change and realises that radical change is essential.
Determine the transformational strategy	A clear transformational strategy is developed. As this may be tentative, experiments may have to be conducted, alternatives explored and agreements reached.
Require extensive innovation	Many people in the organisation are required to think creatively and take the initiative if widespread innovation and internal entrepreneurship is to be developed and sustained.
Manage systematic change	Those parts of the organisation that need to change are fully involved in a comprehensive change process.

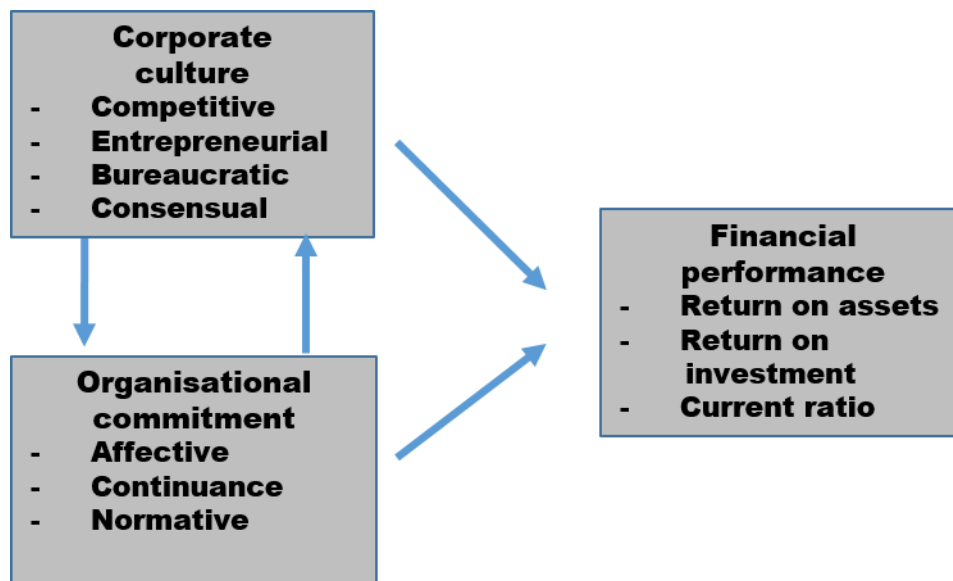
Competence	Brief description
Upgrade leadership processes	Top management has the required competencies to manage transformation. In most cases, this means that new management must be brought in.

Table 3.5 explains the actions related to the competencies. Francis *et al.* (2003) expand on these actions by including the demand for the enrolment of key decision makers, and the identification of the best managers to lead the change. They support the role of HR in preparing the organisation for the inevitable and stress the need for extensive innovation, tested by experimentation and new learning. Changing management is not excluded from the process when current leadership is not equipped for the challenge. Under the pressure of transition, Carbery and Garavan (2005) found that employees acquire new learning but with the observation that subordinates are less likely to seek the path of self-development than their superiors, supervisors or managers.

An example of a radically transformed but highly successful organisation is the Brazilian organisation Semco, led by chief executive Ricardo Semler. Jumara (2005) found that knowledge increased regarding the content and process of organisational change in this organisation. He refers to Semler who, although generally regarded as a maverick in the world of business, reconstructed his business based on three values, namely, employee participation, profit sharing and open information sharing. Jumara (2005) believes that in Semler's reasoning, participation gives people control over their work, profit sharing gives them a reason to do their work better and information systems tell them what is working and what is not. With regard to Semco's organisational structure, Jumara (2005) found that after extensive research, Semler has developed a lattice-type organisational structure according to which six to 10 manufacturing employees are in charge of all the aspects of production, including budgets and setting of goals. He maintains that through this process, Semler achieved the ultimate goal of restructuring, namely the alignment of the organisation's goals with those of its employees. This led to increased productivity and reduced costs. Jumara (2005) observes that Semler believes that leadership is about people leading themselves and not about the person leading them. This includes the extensive deployment of work groups and leaders encouraging employees to take charge in order to maximise empowerment. He concludes that the rule is to identify who can do this, to educate and relinquish complete power to the fullest extent with decision-making authority.

With organisational commitment such an important issue, as was discussed in Section 2.4.2, Rashid, Sambasivan and Johari (2003) and Lok and Crawford (2004) found a significant correlation between organisational culture and organisational commitment; they also found that organisational culture and commitment influence organisational performance significantly. Rashid *et al.* (2003) based their research on the theoretical framework illustrated in Figure 3.7.

Figure 3.7 Literature framework for the relationships between corporate culture, organisational commitment and financial performance (Rashid *et al.*, 2003)



The framework in Figure 3.7 identifies four types of culture, namely competitive, entrepreneurial, bureaucratic and consensual, while three types of commitment are identified following Allen and Meyer (1990), namely affective, continuance and normative. The financial constructs used by Rashid *et al.* (2003) were return on assets, return on investment and current ratio. They found that a consensual culture, associated with tradition, loyalty, teamwork and self-direction, related positively to affective commitment but negatively to normative and continuance commitment. In addition, they argued that risk-taking dynamism and creative culture associated with an entrepreneurial culture had a positive relationship with continuance commitment and a negative relationship with affective commitment. Furthermore, they established that a competitive culture associated with values related to demanding goals, competitive advantage, market superiority and profits correlated negatively with affective commitment. No relationship was found between a bureaucratic culture associated and rules, procedures and a high degree of formalisation and hierarchical coordination.

Lok and Crawford (2004) found that Australian managers scored higher on the innovative and supportive measures and on job satisfaction and commitment than Hong Kong managers. They argued thus that innovative and supportive cultures are supported more in Australia than in Hong Kong. Age was found to be a factor in Hong Kong managers' scoring higher on job satisfaction. Lok and Crawford (2004) concluded that national culture has a significant effect on leadership, organisational culture, job satisfaction and commitment.

Both the studies discussed above have significance for lean implementation. The first found affective commitment to be the desired outcome of lean implementation while the second investigated the effect of national culture on the process, and the fact that lean thinking can change the organisational culture (Pinheiro, 2010; Angelis *et al.*, 2011).

Furthermore, the effects of changing culture, i.e. changing from a product-oriented to a service-oriented culture, were researched by Nuutinen and Lappalainen (2012). Their findings correspond with those of Pinheiro (2010), who emphasises that lean techniques will change the organisational culture. Nuutinen and Lappalainen (2012) also established that changing the core task of a business can lead to a radical cultural shift.

Hosie and Smith (2009) and von Rosenstiel (2011) have similar views on the study of organisational behaviour and whether research is factual and valid. Hosie and Smith (2009) believe that surveys are one-sided and opinionated and based on academic predictions. They cite Semco as an example of an organisation deviating completely from the more prevalent understanding of organisational behaviour. Von Rosenstiel (2011) expresses a similar view, noting that research studies are predominantly based on surveys. Hosie and Smith (2009) propose an approach where hybridised theorising and research is developed and communicated to a wider practitioner audience, while von Rosenstiel (2011) believes that most researched behaviour has to do with organisational performance and job satisfaction and that a large portion of the body of knowledge regarding human behaviour has not been studied, implying that a more objective view needs to be taken in research into organisational behaviour. These findings had relevance to the aspect of the cultivation of organisational behaviour that was considered in the fieldwork.

Acknowledging as it does commitment, empowerment and teamwork as highly significant to the research area and noting deviations from expected organisational behaviour, the research by Afsar (2010) of employee involvement in high performing work systems is especially relevant as was indicated and evident from the performance incentive systems

linked to high performance, that was developed by W01 and F01 considering sharing the proceeds from benefits with workers in the near future. In terms of high performance levels achieved. Afsar (2010) emphasises the role of HR, observing that it follows directly from the demands of rapidly changing product markets and the corresponding decline of command and control in organisational structures (Jones *et al.*, 1999; Nahm, 2003; Jumara, 2005). Afsar (2010) refers to Ichniowski *et al.* (1997), who found that high-involvement HR systems had a positive impact on productivity in a sample of US steel finishing lines. He elaborates by explaining that this finding is reinforced by a subsequent study by Ichniowski and Shaw (1999), which compares the operating performance of US and Japanese steel finishing lines. Afsar (2010) in a literature study and Nahm *et al.* (2003) also found that flatter organisational structures with decentralised decision rights are required to provide more timely and consumer friendly responses. In this regard, Afsar (2010) believes that organisations appreciate individual employees with valuable knowledge and skills that can be used to implement organisational strategies. Emphasising the role of HR, Afsar (2010) mentions careful selection and hiring in alignment with strategy, reward systems that support strategy and developing HR strategies that emphasise training and performance.

The work by Afsar (2010) is especially relevant to this study since it identifies the role of HR in the lean organisation. The integration of HR into manufacturing was considered in the fieldwork on developing a new theory for lean organisational structures. The question of employee participation was also addressed and provided an opportunity for further fieldwork in this regard. Emerging patterns regarding this relevance is discussed per F01 with the human resources manager positively interacting with a forklift driver providing ideas for improvement. (Refer paragraph 6.2.3.4).

3.4.1 Observations regarding the research area – Section 3.4

The literature reviewed here supported the research objectives of determining the existence of literature that can be related to the implementation of lean thinking as well as the applications of lean thinking and its influence on organisational structure and behaviour. The work done on organisational transformation was especially relevant as it confirmed that lean implementation does result in radical changes in an organisation. The observations regarding the question of how to research organisational behaviour were especially relevant, and the research methodology took cognisance of this aspect. Organisational commitment emerged as a major factor and this was reflected in the fieldwork which took special note of how to cultivate affective commitment. Cognisance

was taken of the role HR plays in high-performance management systems. This aspect was also investigated when the fieldwork was done.

3.5 LEAN TECHNIQUES – CONSIDERING THE METHODOLOGIES AND POSSIBLE EFFECTS ON ORGANISATIONAL STRUCTURE AND BEHAVIOUR

The literature research engine was structured to allow for the highlighting of any interrelationships. However, in virtually every case there was no clear indication how lean techniques affect organisational structure and behaviour. Therefore this section of the literature study highlights the gap in the literature on how lean thinking influences organisational structure and behaviour.

3.5.1 Problem-solving with lean thinking

Ōhno (1988), Womack and Jones (2010), Liker (2004), Marksberry *et al.* (2011) and Nicholas (2011) all point to problem-solving as the basis of lean thinking and the Toyota production system. The observation is that Toyota trains its managers thoroughly in this technique. Various approaches have been discussed since the 1990s, with the more recent thinking focused on A3 problem-solving and the PDCA. Marksberry *et al.* (2011) explain that Toyota uses an eight-step PDCA approach and that its organisational structure accommodates this method by means of a teamwork structure consisting of team members reporting to a team leader who reports to a group leader, who in turn has four teams reporting to him. A middle manager oversees four group leaders. Although the organisational structure was of importance to the research area of teamwork, the question of organisational behaviour is largely missing in the literature, possibly as the technique appears to be totally integrated in the Kaizen process which is discussed in Section 3.5.2.

The problem-solving approach was further analysed in the field in terms of organisational behaviour and structure that assisted the lean thinking process. It also provided guidelines and even some definite routines to be followed in cultivating organisational behaviours that lead to a more effective lean organisation.

3.5.2 Kaizen – continuous improvement

Kaizen means continuous improvement and is implemented by means of problem-solving. Ōhno (1988), Liker, (2004), Manos, (2007), Doolen (2008), Womack and Jones (2010), Marksberry *et al.* (2011) and Nicolas (2011) all explain this technique. Van Aken *et al.* (2010) propose that Kaizen events should be effectively administered by means of a programme backed by a strategic initiative. The programme follows a sustainment process and is finalised by support initiatives including education, managing the

programmeme and motivating employees. Doolen (2008) found mixed results with Kaizen events since at the outset positive attitudes did not result in the desired outcome in organisational performance. He also ascribes programme failure to a lack of follow through and the setting of unrealistic targets that lead to early disillusionment. The Kaizen technique combined with a problem-solving approach was important in the field research and was included for review as an approach that could be used to cultivate new organisational behaviours. The findings regarding this technique indicated that the cultivation was supported by way of routine and consistent teamwork backed by a supportive leadership structure and is discussed in greater detail in the emerging patterns found from the analyses.

3.5.3 Five S

Osada (1991) is credited with developing the so-called five S-system. He named the system according to five Japanese words

- **Seiri** – to separate useful from non-useful items
- **Seiton** – to neatly arrange useful items for easy identification and retrieval
- **Seiso** – to clean, tidy up and maintain a state of cleanliness and tidiness
- **Seiketsu** – to standardise and ensure maintenance of the first three ‘S’s
- **Shitsuke** – to cultivate discipline and habits that ensure that workers execute the three ‘S’s as an inherent culture (Nicholas, 2011).

In a more recent study involving three case studies of three organisations who had applied lean thinking to their particular operation in Mexico, Suárez-Barraza and Ramis-Pujol (2012) found that organisations use the five S-system as a steppingstone to lean implementation, driven through a lean strategy. Lynch (2005) found that the five S-system enhanced cycle time reduction and increased productivity. This finding suggests that the five S-system has a significant impact on other areas of improvement addressed by lean thinking and this aspect was taken into account in the fieldwork, particularly in terms of motivation and empowerment.

The five S-system technique proved to be an opportunity for organisations to involve the total organisation in the lean process and assisted the fieldwork in its investigation of organisational behaviours and structures that lead to a more effective organisation. As was expected, the five S-system proved to be one of the first techniques to be implemented in both the F01 and W01 cases.

3.5.4 Visual management

As before, several of the prominent practitioners (Womack & Jones 2010; Likert 2004) refer to visual management as an effective means of controlling and communicating results and progress made on the shop floor. Nicholas (2011) refers to visual management as visibility and refers to this technique as a lean principle, as does Likert (2004). Nicholas (2011) refers to production target charts, defect analysis, and five S-progress as examples of visual controls. He also mentions Kanban cards and areas as visual management, seeing the flow and control of the product on the shop floor. More recently, Braden, Corbin, Moore and Walsh (2012) established from Pratt and Whitney, a USA aerospace organisation, that the visual workplace improves performance by providing information, and by enabling workers through self-direction and empowerment to make decisions quickly without the need for oversight. This observation has particular relevance to the fieldwork in this study into how organisational structure evolves and what behaviours apply. In both the F01 and W01 organisations, visual management was a cornerstone that was applied in the green areas (F01) and team meeting areas (W01) and this technique cultivated empowerment behaviours, encouraged by management and displayed by team members taking the initiative when acting as team leaders and team members updating their own control instruments.

3.5.5 Seven wastes

Ōhno (1988), Shingō (1989) and Womack and Jones (2010) identify the seven wastes as: defective work; transportation; inventory; over-production; waiting and queuing; over-processing; and motion or movement. Ōhno (1988) believes that the basis of the Toyota production system is the complete elimination of waste. He explains that the two pillars that this is based on are JIT and automation (a term combining two words, automation and autonomous). He refers to the waste of over-production and indicates that Toyota makes only what is needed when it is needed. Shingō (1989) identifies the means of eliminating waste as the SMED. Nicholas (2011) identifies seven principles for waste removal including simplification, five S, visibility, cycle time reduction, agility, measurement and reduction of variability. The combination of these techniques by Nicolas (2011) informed the fieldwork by indicating how these techniques were related to the organisational behaviour and organisational structure. In the case of W01 in particular, team members updated maintenance check sheets, working closely with maintenance specialists to keep their manufacturing flow lines or manufacturing cells in top running condition.

3.5.6 Distinguishing value from waste from the point of view of the customer

Womack and Jones (2010) make the fundamental observation that value has to be determined from the point of view of the customer. This is done by means of distinguishing value from waste on the premise that the customer does not want to pay for the inherent wastes of the organisation. They note that value can be determined by distinguishing between incidental activities and transforming activities. Incidental activities such as set-up or loading work are necessary but wasteful, since this work does not in fact transform the product. A further point made by Womack and Jones (2010) is that the target cost for value needs to be determined. They refer to Shingō's view that instead of $\text{price} = \text{actual cost} + \text{profit}$, the modus operandi should be $\text{selling price} - \text{cost} = \text{profit}$ (Ōhno, 1988). This aspect was relevant in terms of how the two case organisations approached value from the customer's viewpoint when the field research was conducted. F01 was highly focused on cost reduction and had achieved marked progress in this area with costing manager and the plant manager working closely together to affect measurement and obtaining support from the developed work teams. W01 had achieved major successes and was effectively competing with European organisations in this context.

3.5.7 Value stream mapping

Rother and Shook (2003) explain the process of value stream mapping as identifying all the value stream activities by product families and arranging these as a flow line. The flow includes the inflow of orders through the various units of the organisation. As explained by Lander (2007) in the case of Merilat in Section 2.3, a current state map is prepared together with an ideal state map that is for the goal. Nicolas (2011) points out that realistically achievable value stream maps are prepared and implemented from time to time until the ideal is achieved. The ideal future state map acts as a vision and targets are set in terms of goals to close the gap between current to future state indicated by means of the value stream map. Value stream mapping was used in the case study methodology in order to determine all the aspects of flow that could affect lean implementation.

As discussed per Section 2.3, the value stream management approach proved useful in the field research in terms of flow and how this affected organisational structure and behaviour; however, as was expected, it appeared that shop floor teams were not familiar with this technique as it is usually used by specialists in both the F01 and W01 organisations. However, where manufacturing cells were operating well, the work team members achieved an effective affinity for the technique and fully appreciated the advantages to be gained from the flow line layouts, which had emanated from the value

stream mapping exercises. This finding explained why it is necessary to have lean champions in the organisation to guide teams in their various Kaizen endeavours. In the W01 case, top management formed teams and actually implemented the changes on the shop floor with the work teams, working intensively together to create the desired flow.

3.5.8 SMED

Shingō (1989), the originator of the Toyota production system, stresses three things: one, implement SMED to eliminate over-production; two, shorten cycle times based on SMED methods; three, utilise SMED to produce according to customer demand. In foundry production, Singh and Khanduja (2010) found SMED techniques to be highly effective in die casting. More recently, Nicholas (2011) explained the method of SMED in press work where dies are set to stops from one operation to the next, but at the same press height. The design of jigs, fixtures and change over systems is done in such a way as to achieve set-ups of fewer than 10 minutes. This aspect had high relevance to the study since it impacted flow and the teamwork organisation that accompanies the process. The technique played a vital role in determining a new approach to organisational structures, which in the case of W01 consisted of up-skilled teams who worked closely with die correctors and die manufacturers to optimise the flow (refer Table 6.5, pattern WSP1P5.)

3.5.9 Cycle time reduction

Cycle time reduction addresses all types of waste related to the time it takes for the product to flow from raw material to finished goods state (Rother & Harris 2001). Rother and Harris (2001), Johnson (2003) and Keogh (2006) stress that detailed process analyses are required to reduce cycle times. Keogh (2006) focuses on reducing lead times through the value stream. Rother and Harris (2001) propose a process and time study to determine the elements that make up the total time. They argue that with every observation, notes are made in terms of a critical analysis (ask why five times). A paper Kaizen is prepared in order to simulate the effect of the reduced cycle time on the process. With the process of changing from the current state value stream to the future state, process and set-up times are reduced with effective method changes. By breaking the work into elements, wasteful tasks are exposed for Kaizen (Rother & Harris, 2001).

With people development and teamwork playing such an important part of the research, this technique was closely examined to determine ways for cultivating appropriate organisational behaviours. In the W01 case most shop floor team members interviewed expressed the view that this method was often used by team members when idea generation was being considered in team meetings. In the W01 case, team members were

so empowered that they changed the frequency of furnace loads to smaller, more frequent loads, leading to increased throughput and efficiency (refer to Table 6.3. pattern WSP2P7.)

3.5.10 One-piece flow

One-piece flow is the ideal flow if one is to achieve true just-in-time production (Dolcemascolo, 2008). Ōhno (1988), Shingō (1989), Dolcemascolo (2008) and Womack and Jones (2010) believe that the one-piece flow makes JIT manufacturing possible and that in its simplest form, work is moved from facility to facility without work in progress. Dolcemascolo (2008) uses an example of a functional layout changed to a flow layout to explain the principle. He states that, for one-piece flow to be possible, processes should consistently produce non-defective work, facility times should be more or less the same otherwise work in progress build up will occur, and facilities and processes should be 100% reliable. He also states that process times should be less than TAKT time, the customer demand rate. One-piece flow together with SMED proved vital in the formulation of a more effective organisational structure as it was proved to support the flow process and to focus on an ideal structural state for the organisation. This technique received focus in both the F01 and W01 organisations, but more in the context of make to order approaches to reduce the complexity of scheduling work through the developed manufacturing cells.

3.5.11 Heijunka or level scheduling and line balancing

Coleman and Vaghefi (1994) see Heijunka as the key to Toyota's success. Womack and Jones (2003) explain the principle, Rother and Harris (2001) apply it with value stream mapping and cellular manufacturing and Jones (2006) utilises the Toyota Kanban box to explain the method. It would appear that in order to implement Heijunka, all the lean techniques and disciplines of lean thinking should be achieved: value stream mapping concluded; facilities laid as for single piece flow in a U layout; all set-ups below ten minutes; one-piece flow is possible; manufacturing to TAKT time is possible; cycle times have been balanced from one operation to the next; Kanban pull is fully functioning with the manufacturing cells; and a flexible work team operates cell as and when required for continuous flow to occur. TAKT time accuracy and line balancing are emphasised as key to lean implementation (Bertoncelj & Kavcic, 2012). These authors found that with lean implementation unbalanced, manufacturing cells experienced major delays, causing severe customer dissatisfaction and disruptions. This aspect proved to be of importance to the fieldwork since the analysis of studies of organisational structures covering the last

ten years, indicated that the format of structure may either benefit or place a constraint on lean effectiveness and accuracy. This proved to be a vital factor in the research. Heijunka manifested itself effectively in the W01 organisation where the decision to make to order has reaped amazing performance benefits, with team members scheduling practically and simply, one order to the next in perfect pace with the customer demand requirements.

3.5.12 Cellular manufacturing

Rother and Harris (2001), Dolcemascolo (2008), Womack and Jones (2010) and Hyer and Wemmerlov (2004) are all advocates of cellular manufacturing. The technique combines all the disciplines of lean flow and requires value stream mapping, SMED, cycle time reduction, TAKT and Heijunka scheduling to operate effectively (Rother and Harris, 2001). In addition, Hyer and Wemmerlov (2004) and Rother and Harris (2001) believe that in cellular manufacturing, the focus is on product families and the complete value stream, close clustering of cell equipment, the ability to produce one at a time and the ease of moving material and labour between processes. Haug (2012) identifies organisational structures that appear to have elements of a cellular organisational structure, and this observation required further detailed fieldwork. In both the F01 and W01 organisations, cellular manufacturing was considered as key to lean success. In the W01 organisation, the total flow that had been achieved proved remarkable and pointed the way to how the organisational structure should be designed along with manufacturing cell development. Emerging patterns from the research indicated that self-directed teams under the leadership of highly skilled manufacturing cell managers (referred to as first-line managers by W01), formed the basis of an effective discrete lean organisation.

3.5.13 Kanban

Quarterman (2007) and Nicholas (2011) did detailed work on Kanban systems. They explain that Kanban means signal, card, location and/or area. In the simplest form, an area or container can be regarded as a Kanban. When a stock point or Kanban area is emptied of its Inventory, the zero stock serves as a signal to the immediate upstream location to fill the area with inventory from that location. Nicholas (2011) explains Kanban control systems when containers are used in buffers. He observes that when bins are used for Kanbans, the number of bins can serve as the reorder point control signal. Quarterman (2008) explains that the Kanban scheduling systems operate like supermarkets. A small stock of every item is stored in a dedicated location with a fixed space allocation. In the best systems, operators or teams schedule their own work. They have current and accurate information of downstream production needs. He argues, as

does Nicholas (2011), that the scheduling bucket is rarely larger than a day and in some systems, it may be only minutes. Quarterman (2008) explains that, in practice, most designers use a combination of boundary analysis, factor analysis and trial and error. As indicated before per Section 2.2.1, the expectation was that teamwork with Kanban would play a significant role in the development of more effective lean organisational structures, and this was proved to be so in the fieldwork. Kanban proved thus to be an opportunity for the field research to determine how organisational behaviours were cultivated in order to achieve more effective lean implementations. In the W01 case in particular, effective visual area Kanbans in the form of skips had been established to assist the flow and pull process. Team members had acquired a natural affinity to deliver into and pull from the skipped equipped areas, and it was the team members who made this flow effective and efficient.

3.5.14 Poka-yoke or mistake proofing and Jidoka

Shingō (1989) argues that eliminating the source of defects eliminates the need for inspections. Instead of inspecting for quality after the process, Poka-yoke and Jidoka activities focus on building quality into the process and correcting the root causes of quality problems (Nicholas, 2011). Jidoka is a Japanese term meaning automation. Jidoka is also a management planning and control system, according to which the machine operator is empowered and fully authorised to stop the flow line if and when a defect occurs (Nicholas, 2011). Poka-yoke is a Japanese phrase meaning mistake avoidance and is also a design management system that dictates the design and development of the process to ensure that mistakes cannot occur (Nicholas, 2011).

The development of people and teamwork to apply Poka-yoke and Jidoka techniques with lean thinking and total employee involvement is fundamental and proved critical to the research in the field, highlighting the importance of quality and the need to involve the total organisation. This aspect dictated the cultivation of organisational behaviours and served to provide direction for the development of a more effective organisational structure, substantiated by the emerging patterns from the qualitative study.

3.5.15 Design for quality and Taguchi

Although the Taguchi (1989) methods are mathematical and complex, Todd (1995) provides valuable insight regarding the technique. He states that at the heart of the Taguchi methods is the simple principle that the quality of a product resides in its design. This researcher provides a simple example of a bush that has to fit into a cylinder. If the tolerance of the bush is sensible, the bush and cylinder will be easily machined and fitted

to each other, with low cost and major benefits to the user. If the tolerances are too tight, machine fitting problems will be experienced in the manufacturing stage, resulting in unnecessarily high costs to the user. Todd (1995) identifies three methods of significance: the quadratic loss function; the parameter design concept; and design of experiments. All these methods may, unfortunately, be mathematically complex and difficult for people working in lean transformations who are not technical or not from an engineering background to understand. This observation provides an opportunity for future research. Regarding this issue, Thomas and Antony (2005) propose that organisations consider utilising the Shainin method for design in place of the Taguchi method of design of experiments. The fieldwork was approached sensitively in this regard owing to the expected total employee involvement that highlighted attributes that pointed to more effective organisational structures. It appeared from the research findings that this technique was definitely unfamiliar to shop floor teams, and that specialists from both organisations were struggling with this technique as a further refinement to improve quality and throughput. In the F01 organisation, the technique did prove to cultivate behaviours of respect and appreciation when shop floor and engineering design employees worked together to improve the product and the process. W01 has achieved effective refinement with a similar technique to Taguchi and this has served to match customer requirements effectively with shop floor capability; however, even in this organisation a current focus area is product quality and lean champions, and first-line managers and their members are working hard to improve on this performance category.

3.5.16 Total productive maintenance (TPM)

Nicholas (2011) explains that TPM is a management planning and control system that has as its purpose the overall care of plant, equipment and services, with the main objective being zero downtime for whatever reason owing to the condition of such plant, equipment and services. Nicolas (2011) explains that these reasons have to do with not always being able to achieve standard output, achieving zero defects as a result of facilities, achieving 100% machine reliability and capacity better than new. Another major objective of TPM is to markedly increase production while at the same time increasing employee morale and job satisfaction. With TPM, the total involvement of all workers in taking care of plant equipment and services as if they were their own is ultimately achieved. The process of TPM involves the total organisation and in this research it was an important technique that was studied in terms of finding new behaviours and routines that indicated guidelines and disciplines for more effective lean organisational structures. Indeed, in the W01

organisation this technique was used effectively, with team members working closely with maintenance specialists who had been permanently allocated to the respective work teams (referred to as mini business teams in the W01 organisation).

3.5.17 Policy deployment

Womack and Jones (2003), discuss the policy deployment process to maintain and sustain the lean implementation process. They also elaborate on the need for focus on areas that will provide the best results for the organisation in terms of lean thinking. Their proposal includes the selection of a few goals, the selection of a few projects to achieve these goals, the designation of people and resources to complete projects and drawing up stringent action plans that will make this happen. Although Womack and Jones (2003) refer to Hoshin Kanri in their book as policy deployment, analysis of the literature suggests that this refers to coordinating lean initiatives, whereas Hoshin Kanri involves both strategy and policy deployment. The fieldwork took cognisance of this observation when the organisational behaviour and structure was considered relative to teamwork and employee involvement. In the case of the W01 organisation, the technique manifested itself effectively in the application of the 20 keys (Kobayashi, 1995) technique of teamwork and objectives. The role of lean champions also pointed to the structure and behaviour required for an effective lean organisation, with lean champions ensuring that organisational goals and objectives were properly abided by and communicated to each work team (referred to as mini business teams in the W01 organisation).

3.5.18 Hoshin kanri

Jusko (2007) discusses Hoshin Kanri, a technique developed by Toyota that involves the effective deployment of Toyota's strategic plan. She believes that there is a misunderstanding among many manufacturers trying to emulate Toyota's success that simply deploying lean tools will reap the rewards similar to those enjoyed by the Japanese automotive giant. She explains that this is not the case, as so many organisations have already discovered. Some, she believes, have also suggested that Toyota's accomplishments in the automotive sector derive primarily from a lack of a legacy of costs that hinder and frustrate U.S. competitors General Motors, Ford and Chrysler (known as the Detroit Three), and that there is nothing fundamentally better about the way Toyota makes cars; it is merely the burden of extra health care, environmental and labour expenses that is hampering the Detroit Three. In reality, she argues, Toyota's success is derived largely from its planning and execution system. In this regard, she refers to Dennis

(2006) who has studied Toyota's strategic planning system. Dennis (2006) based his analysis on the work of Akao (2004), the originator of Hoshin Kanri.

Dennis (2006) explains that with Hoshin Kanri, people at all job levels constantly act on the plans, and evaluate, study, and provide feedback results as a part of a continued improvement process. Everybody is aware of their and management's Critical Success Factors (CSFs) and Key Performance Indicators (KPIs). Departments do not compete against each other and projects run to successful conclusions. Business is seen as a set of coordinated processes. In essence, Dennis (2006) describes the system as simply being based on the PDCA approach using the A3 problem-solving method.

Yang and Su (2007) explain that Hoshin refers to long-term strategic focus, while Kanri refers to the control system required to implement the long-term plan. They describe the process as closed-loop management planning, objectives deployment, and an operational review process. They regard Hoshin Kanri as an integrated control system that ensures that the long-term plan is implemented, and the goals and objectives are cascaded throughout the organisation according to a two-way communication system (catch ball). The PDCA cycle, Yang and Su (2007) believe, is a five to 10-year vision, translated into three to five year objectives, broken down to short-term objectives that are action planned and reviewed regularly to update the strategic plan.

When Hoshin Kanri is applied, the total organisation should be involved and the fieldwork took this into account. As was expected, the techniques did assist with the cultivation of behaviours that lead to more effective organisational structures. Again, teamwork proved to play a vital role in the process, as was demonstrated by the green area meetings in the F01 organisation and the mini business team meetings in the W01 organisation.

3.5.19 Teamwork and total employee involvement

Teamwork and total employee involvement are mentioned in virtually all lean thinking literature dealing with lean implementation and features prominently in the basic theory (Ōhno, 1988; Shingō, 1989; Womack & Jones, 2010; Liker, 2004).

Grütter, Field and Faull (2002) studied three organisations that declared themselves committed to the implementation of teamwork. All cases were judged as successful examples of work team implementation. The aim was to understand, despite the differences among these teams, which common characteristics could help in understanding the successes. Over a period of one year, the study revealed remarkable improvement in productivity and defects reduction. Consequently, this study was

considered useful to this study in terms of its rich contribution to the area of interest. This aspect of shop floor team performance has high relevance in terms of this research and the findings are recorded for an account in the intended fieldwork. It was also noted that early credibility building with work teams results in early wins in terms of the applicable measures and the systems in place. Another significant aspect for this research is the study by Kent (2006), who found that well-developed, self-directed work teams developed remarkable skills that replaced many organisational functions usually associated with individuals in a designated function.

The aspect of cross-functional and self-directed teamwork proved to be a major factor in terms of organisational behaviour and structure, indicating the way forward on how to develop a new organisational structure that would optimise the lean organisation. As expected, this aspect formed a vital part in the formulation of new disciplines for lean thinking as was indicated in the development of the propositions for this research and which were adequately supported from the patterns that had emerged from the analysis of data from the two cases.

3.5.20 Standard work

Nicholas (2011) refers to standard work as standard operating practices or procedures. Standard operating procedures (SOPs) define the key processes of the business and identify who is responsible for various aspects of their implementation. They identify what is to be done and when. A SOP, Nicholas (2011) explains, is an agreed description of a stage or part of a process, which gives sufficient information for an existing or new staff member to understand what steps should be taken, what inputs or supporting documents are required, and what outputs should be produced. After a method has been finalised in terms of a study, or if these methods are current state, good lean thinking demands standardising these particular methods, tasks or procedures. Nicholas (2011) argues that standard operating procedures contain all the information required to perform a task consistently correctly every time.

This technique had high relevance in the fieldwork since it was revealed that teams could develop their own SOPs in the case of W01, and these served as an additional discipline and guide to assist the organisation in establishing a more effective organisational structure.

3.5.21 Observations related to the research area – Section 2.6

Other than the most commonly used lean techniques that involve employees, that is, total productive maintenance (TPM) and teamwork and employee involvement, a thorough literature search revealed very little regarding the influence of the implementation of lean techniques on organisational structure and behaviour. This provided further support for the notion that there was a gap in the literature in this regard.

Most literature dealing with TPM and teamwork indicates simply that teamwork is required; however, there are a number of studies that explain the success of teamwork. Kent (2006) goes a step further and elaborates on the skills required for self-directed teamwork. His findings are especially significant to this research since he indicates the degree to which teams can become competent, even to the extent of sourcing personnel. This particular skill was countered by a law promulgated by the Clinton administration. As the creation of continuous flow is central to lean implementation, the analysis of all the techniques associated with this lean principle is conceptualised as consisting of: design for quality (Taguchi); TAKT; Cycle time reduction; SMED; Poka-yoke and Jidoka; Kanban Heijunka; and five S in terms of workplace organisation and ergonomics; and finally, cellular manufacturing.

Using the observations made above, the fieldwork was carried out to assess the influence of these particular techniques on the organisational structure and behaviour, techniques that together created flow and culminated in a reorganisation into cellular manufacturing. Haug (2012) has identified the significant influence that cellular manufacturing can have on the organisational structure, but has not elaborated on organisational behaviour. The outcome of the research provided new insights into how and why the lean structures depicted by Haug (2012) not only provided both an effective organisational structure for lean process, but also that such structures assisted significantly in the process of cultivating behaviours conducive to the effective implementation of lean thinking.

3.6 SUMMARY

The analysis of the literature dealing with lean thinking and organisational structure and behaviour was done in detail in order to determine its relevance in relation to the problem and research area, and to determine the relevance of the conceptual framework.

An analysis of the literature identified communication, horizontal integration, attitude and commitment as prominent organisational variables. Commitment in particular played a major role in terms of alignment to the goals of a rapidly and radically transformed

organisation, and this was confirmed in the research in both case studies when positive attitudes and affective commitment from employees were observed. This observation assisted the fieldwork investigating the cultivation of organisational behaviour. Organisational cultures that are innovative and creative are strongly aligned to affective commitment and behaviour and did require further research regarding the cultivation of appropriate behaviours in lean implementation.

Factors leading to lean success and failure proved useful in the field when this research was conducted, highlighting new methods for cultivating effective behaviours for lean implementation. The use of value stream mapping also proved useful in the case study work, pointing to lean champions as key to an effective lean structure.

In cases of radical organisational transformation, the factor of constructive leadership emerged. In the implementation of lean thinking, a lack of strong, determined leadership results in failure and disillusionment. Bottom-up initiatives in lean transformations fail since leaders implement other initiatives that compete with lean initiatives. This proved to be a sensitive area in the field research and required a careful approach in eliciting new insights regarding the cultivation of appropriate organisational behaviours.

Organisational behaviour theory and literature may be challenged by the fact that the business may perceive few benefits from its application (Hosie & Smith, 2009). Significant deviations exist, such as the case of a highly successful organisation (Semco) that has seemingly abandoned traditional thinking and has implemented organisational structures and behaviours that deviate completely from the norm. This observation proved highly significant when the fieldwork was conducted, especially in terms of new disciplines for lean thinking which emerged, as well as new insights into the cultivation of appropriate behaviours. The approach of self-directed teams emerged strongly from the field research and indicated the way forward for organisational design.

The analysis of the literature on lean techniques indicates that technical details dominate and that limited literature exists that provides insights into how, why and when these techniques affect organisational behaviour and structure. However, as expected, the field research revealed that flow was the prime mover for organisational change with lean thinking.

The techniques of dealing with problem-solving, Kaizen, five S, TPM, the seven wastes and identifying value and visual management, did provide opportunities in the field research to identify methods for cultivating organisational behaviours to achieve more effective lean implementations. As expected, these techniques were incorporated with

self-directed and cross-functional teamwork, and further opportunities were provided from the field research regarding how lean structures could be formatted to aid this process.

The techniques of Taguchi, value stream mapping, SMED, cycle time reduction, Kanban, Poka-yoke and Jidoka, one-piece flow, cellular manufacturing and Heijunka all appeared to be related to the creation of flow and had relevance to the development of new disciplines for lean organisational structures and behaviours. These techniques could also be linked to self-directed and cross-functional teams that identified methods of cultivating appropriate behaviours for new lean organisational structures. It appeared in addition that value stream mapping was often used to analyse the current state of organisations and a future value stream map was useful in bringing about organisational transformation. This phenomenon was taken into account in the case study research together with other methods utilised to create flow.

As was expected from the field research, the techniques of policy deployment and Hoshin Kanri provided an opportunity for effective horizontal and vertical integration and coordination in the organisation and played a major role in the development of new disciplines for the design of lean organisational structures.

The techniques of standard work and teamwork provided further insights into how employees and work teams function and added to the development of new disciplines for lean thinking. It was also confirmed that teamwork was a major driver in cultivating organisational behaviours conducive to organisational transformation in terms of lean thinking. Cross-functional and self-directed teamwork can completely transform the organisational structure and behaviour and therefore challenge the traditional paradigms associated with functionality (Jumara, 2005). This observation proved significant in the field.

In the next chapter, the statement of the problem is explained in more detail. The review of basic theory discussed in Chapter 2 and in the literature review in this chapter are applied to the formulation of the problem of the identified gap in the literature.

CHAPTER FOUR: STATEMENT OF THE PROBLEM, HYPOTHESES AND PROPOSITIONS

4.1 INTRODUCTION

How is the organisation affected by a lean transformation (Haug, 2012)? This crucial question is often asked by chief executives (Jumara, 2005) of organisations wishing to adopt lean thinking as a way for redefining and realigning their respective businesses. In discrete manufacturing organisations in particular, restructuring for lean implementation remains a complex issue. Why is this so? The answer lies in the complexity of creating flow and pull (Rother & Shook, 2003), dealing with issues of cultural change (Tress & Espinoza, 2012) and other factors such as stumbling through Kaizen events (Quarterman, 2007) and involving the total organisation in the process (Pineiro, 2010). Using the same facilities to process different products, or product families, requires lateral thinking and is often a complex issue to resolve (Bhasin, 2011). Falling back into old habits such as batching (Brown *et al.*, 2006) to isolate the production facility (Thompson, 1967) often appears to be the only way to go about things. Keeping to traditional functional structures (Brown *et al.*, 2006) also provides an outlet for dealing with the problem, but tragically leads to failure in implement lean thinking (Hines *et al.*, 2004; Cooper, 2011).

Why then the need for lean thinking? The answer may be found in the fact that failing to adopt a lean transformational strategy will severely limit organisations' global competitiveness (Haug, 2012).

How the discrete manufacturing organisation will be affected by lean thinking will include issues specifically connected to organisational structure (Nahm *et al.*, 2003; Haug, 2012) and behaviour (Cooper, 2011); however, despite an extensive theory and literature research, the questions of how and why the organisational structure will be influenced remain in contention. Although much has been written about the question of organisational behaviour with lean thinking (Gagnon, 2004; Sawhney & Chason, 2005; Harris, 2007; Pineiro, 2011) the crucial questions of how to cultivate behaviours conducive to lean implementation also remain unanswered. Even more contentious is the question regarding why specific behaviours should be cultivated to assist with lean implementation.

The discussion of the problem, hypotheses and propositions are covered in terms of the literature covering the last ten years, and the gap in this literature. The chapter sections are discussed as follows: in Section 4.2 the identified research regarding the problem area is discussed; Section 4.3 considers the gap in the literature; the detailed statement of the problem is covered in Section 4.4, leading to Section 4.5 where the detailed hypotheses

and propositions for the research are defined. The chapter is concluded with a summary of the discussion of the problem statement.

4.2 NOTED RESEARCH REGARDING THE PROBLEM AREA

Probably the most noted research in the area of structural change with lean thinking has been conducted by Haug (2012). In discussions he had with James Womack (Haug, 2012), Womack had indicated to him that he and Dan Jones held the view that the question of lean organisational structures had still not been successfully addressed (Haug, 2012). Haug (2012) published case studies of two electronic organisations that had adopted a lean transformation. These show clearly that cellular manufacturing is considered as being part of the structure. Work by O'Carroll (2004) is particularly useful as he saw the solution to lean structures in the form of self-directed teams. However, O'Carroll (2004) at the time was not in top management and no further information is available on how his superiors would have experienced his vision in the context of his department. Jumara (2005) investigated the question of organisational structure in the Semco organisation. Specific mention is made of the fact that Ricardo Semler, the chief executive of Semco, did not wish to consider Japanese methods for improved manufacturing. Semler saw the empowerment of people working in self-directed teams and sharing in the gains of the organisation as key to the organisation's remarkable success record (Jumara, 2005). Valuable work on organisational structures with time-based manufacturing (lean as an example) have been done by Nahm *et al.* (2003), who considered the constructs of organisational structure influencing time-based manufacturing.

The research covering the last ten years regarding organisational behaviour and lean thinking is varied and surprisingly does not refer to organisational structure as an issue when specific research areas are discussed. The most noted research relevant to this research area deals with commitment (Angelis *et al.*, 2011), attitudes (Tress & Espinoza, 2012) and empowerment (Pinheiro 2010). Although Losonci *et al.* (2011) point to the fact that, with lean thinking employee commitment is linked to lean work methods, they do not specify how and why this is the case.

4.3 THE GAP IN THE THEORY AND THE LITERATURE

The gap in the theory is evident in early concerns expressed by Shingō (1989) regarding the integration of sales into manufacturing, although he does not provide the details of how and why this is to be achieved. The work by Womack and Jones (2003) appears vague in their interpretation of what a lean structure should look like. In their book, they

indicate that lean structures should evolve as matrix organisational structures, but neglect to comment on how and why this should be so.

The gap in the literature regarding structures is evident in the work by Haug (2012), who indicates that cellular manufacturing emerges as part of the structure for two electronics organisations; however, he does not state how and why this has occurred. Another observation regarding this particular research study is that other departments appear to be functional and not part of the manufacturing cells indicated. It is also unclear how these functions would interact with the total organisation in a particular lean implementation. Important research regarding lean structures by Nahm *et al.* (2003) points to lean structures being flat, having a low locus of decision-making, being effectively horizontally integrated and highly interactive in communications; however, their research does not reveal how and why this should be so. Nowhere in the important research done on lean structures by both Nahm *et al.* (2003) and Haug (2012) is it indicated how and why lean principles and techniques would specifically affect the organisational structure. No comments are made in this research on how and why behaviours would change, if at all, or how and why behaviours should be cultivated to aid lean implementation.

Literature regarding the research on organisational behaviour and lean thinking (Sawhney & Chason, 2005; Angelis *et al.*, 2011; Losonci *et al.*, 2011; Pinheiro, 2011; Tress & Espinoza, 2012) provides insights into aspects of commitment, attitudes and empowerment, although the gap is evident in that none of this research provides information on how and why behaviours should be cultivated to aid the lean transformation, nor does this particular research provide insights into the questions of how and why the organisational structure will be influenced by lean transformation. None of the behavioural research provides information on the extent of lean implementation or on which lean disciplines and techniques featured prominently in the studies.

A general overview of the literature indicates that, with lean implementation, organisations should restructure along the value streams of the organisation (Jones *et al.*, 1999; Nahm *et al.*, 2003; O'Carroll, 2004; Brown *et al.*, 2006; Worley & Doolen, 2006; Hettler, 2008; Haug, 2012). However, the content does not cover what type of restructuring should take place or how this should be done. A further observation is that the identified literature studies, after careful analysis, do not provide insights into the interrelationship between organisational structure and organisational behaviour in lean transformation.

4.4 STATEMENT OF THE PROBLEM

Based on the question of how an organisation will be affected by a lean transformation, the problem is that with lean thinking, organisational changes will be significant (Haug, 2012). Currently, uncertainty prevails in the area of how the organisational structure and behaviour should be re-aligned to cope with the significant changes that will follow lean implementation. Current literature does not provide answers regarding this significant change process that leads to what appear to be flatter organisational structures (Nahm *et al.*, 2003), or how these will evolve (Haug, 2012). Although the literature does provide guidelines regarding the expected behaviours associated with lean performance (Sawhney & Chason, 2005; Angelis *et al.*, 2011; Losonci *et al.*, 2011; Pinheiro, 2011; Tress & Espinoza, 2012) there is a lack of literature on how to cultivate behaviours that will support the change in organisational structure.

The problem is further highlighted by Haug (2012) who argues that successfully applied lean principles and techniques lead to a significant improvement in global competitiveness of manufacturing organisations. He adds that a systematic lean strategy contributes to improved quality, cost and inventory reduction, and improved delivery performance; however, a lean organisation should undergo key changes in organisational structure and the roles and responsibilities of its senior, middle, and lower management levels. In order to achieve this, Haug (2012) observes that, with lean implementation, restructuring of the organisation should be characterised by the implementation of flat, responsive structures organised along the value stream. He notes that in a discussion with James Womack, Womack had admitted to him that what the lean organisational structure should look like remains an issue (Haug, 2012).

Although Haug (2012) provides empirical evidence from two case studies regarding what a lean organisational structure should be, his findings do not reflect how or why the respective organisations derived their so-called lean organisational structures. Jones *et al.* (1999) contrast traditional manufacturing with lean organisations, noting that where lean organisations are process oriented, traditional manufacturing organisations are functionally structured. Elaborating on people behaviour, they argue that frontline workers are highly motivated in lean organisations as a result of their involvement in decision-making and continuous improvement, or Kaizen. In traditional manufacturing organisations, morale and job satisfaction are low because of repetitiveness and the inability of people to see the relationship of their contribution to the whole product. These

authors do not elaborate on how a lean organisational structure should evolve, how it will work, or what it should look like, however.

The difficulties associated with lean implementation and organisational structure and behaviour are further highlighted by Brown *et al.* (2006) who observe that per their findings, structures are based on departmentalisation and that human processes create intangible barriers that block communications. Their study does not provide a solution to the identified issue, but discusses the technical steps that should be taken to move from batch to lean manufacturing, evading the issue of restructuring the organisation in a lean implementation.

In a study involving information sources for lean success, Boyle *et al.* (2011) remark that the organisational climate should be innovative and open and that they believe that the organisational structure should support functional integration if lean thinking is to succeed. Unfortunately, their research does not provide information on how the organisational structure will change and what organisational behaviours, other than those identified, will lead to a successful lean implementation.

Focusing only on the behavioural problems associated with lean implementation, Sawhney and Chason (2005) note that addressing an organisation's culture and behaviour patterns is a critical component in the implementation and maintenance of lean thinking. Although they provide a measure for organisational behaviour with lean implementation, the issue of organisational structure is not addressed in their research.

Although not directly linked to lean thinking, the work by Nahm *et al.* (2003), involving time-based manufacturing organisations and organisational structures, best describes the difficulty caused by the fact that the organisational structure can either hinder or facilitate radical organisational innovations, such as the implementation of lean thinking. Their study reveals that organisational structures that facilitate radical change have few layers to enable decision-making to be pushed down the organisation, have a high level of horizontal integration and have levels of communication that are fast, easy and abundant. However, their work does not explain how organisational structure should be designed after radical innovation implementations.

O'Carroll (2004) took it upon himself to implement significant change in the organisation he was working for. The method employed was the implementation of self-directed work teams, reducing the number of organisational levels from three to one. He states that what is required is that organisations with steep hierarchies, rigidly divided functions and evolved bureaucracies, should be replaced with new organisations that are lean and

flexible, designed to motivate and energise their employees. He adds that the problem has always been how to change the organisation.

4.5 HYPOTHESES AND PROPOSITIONS

The following sections provide the hypotheses and propositions of the research that have been derived from the conceptual framework, the constructs discussed in Chapter 1, the theoretical review, the literature review and the identified gap in the literature.

4.5.1 The hypotheses

Based on the concept, context, research problem, literature study and the conceptual framework, the main hypothesis is stated as:

- The implementation of lean thinking will transform the organisation and influence organisational structure and behaviour.

The null hypothesis states that:

- The implementation of lean thinking will not affect organisational structure and behaviour.

Based on the conceptual framework, the following hypotheses supporting the main hypothesis are designated as “**HYP**”, identified by dependent variable category “**S**” for organisational structure and “**B**” for organisational behaviour and numbered in sequence:

HYP S1 The degree of horizontal integration will increase as progress is made in lean implementation.

HYP S1.1 The degree of horizontal integration will improve with the introduction of more complex lean techniques such as Taguchi, cycle time reduction, value stream mapping, SMED, one-piece flow, Kanban, cellular manufacturing and Heijunka.

HYP S1.2 The higher the level of horizontal integration, the higher the level of teamwork and employee involvement will be.

HYP S2 The number of organisational levels will decrease as cross-functional teams work more actively and frequently to change continuous flow into manufacturing cells.

HYP S2.1 The number of organisational levels will decrease as employees become more involved, increasing their lean skills.

HYP S3 The locus of decision-making will decrease as more cross-functional teams achieve effective flow through SMED and cellular manufacturing.

HYP4 The formalisation will be characterised by detailed work instructions building to effective standard operating procedures, but changed, updated and improved by empowered work teams.

HYP5 The levels of communication will improve in speed and accuracy as lean implementation progresses towards effective flow through cellular manufacturing.

HYP6 The organisation will achieve a complete transformation to a cellular format with full lean implementation, reducing the number of organisational levels to fewer than two.

HYPB1 The awareness of vision, values, mission, goals and objectives will increase with an awareness and understanding of problem-solving, Kaizen, five S, Hoshin Kanri and policy deployment.

HYPB2 Employee participation will increase with more emphasis on flow creation through cycle time reduction, SMED, value stream mapping, one-piece flow, Kanban and Heijunka.

HYPB3 Communications will improve with frequency and clarity of lean process.

HYPB4 Leadership will be challenged as more lean techniques are introduced.

HYPB5 Roles and responsibilities will be clarified with the lean implementations of standard work, waste elimination, five S, Kaizen, problem-solving and with flow creation in particular.

HYPB6 Employees will feel more respected through teamwork and participation in finding solutions to implement flow.

HYPB7 Knowledge of lean will increase with experience, training and development of employees.

HYPB8 Attitudes will be challenged by lean implementation but will improve with lean successes.

HYPB9 Commitments will be challenged by lean implementation, but will improve with employee involvement, teamwork and lean successes.

4.5.2 The propositions

The research propositions are derived by expressing the research questions as how and why questions, as proposed by Yin (2014) and discussed in Chapter 1.

4.5.2.1 Expressing the research questions as how and why questions

Using the framework for case study research by Yin (2014), which is discussed in the next Chapter, the rewording of the research questions was carefully considered in order to derive comprehensive research propositions that would fully account for the conceptual framework depicted in Figure 1.1 and result in effective exploratory case-study research. Taking full account of this thought process, and from the original wording regarding the research questions, Table 4.1 indicates the reworded how and why questions for the research area.

Table 4.1 Rewording of research questions as how and why questions for the research area

Research Question	Original wording	Reworded how question	Reworded why question
Main Question	What are the significant influences of lean thinking on the organisational structure and behaviour?	How is the organisational structure and behaviour significantly influenced by lean thinking when implemented?	Why is the organisational structure and behaviour significantly influenced by lean thinking when implemented?
Sub-question 1	How will lean thinking affect the organisational structure and behaviour?	As above	As above
Sub-question 2	What changes in organisational structure can be expected with lean thinking implementation and why will these be required?	How will the organisational structure change with the implementation of lean thinking?	Why will specific organisational changes be required in lean thinking implementation?
Sub-question 3	What changes in organisational behaviour can be	How will the organisational behaviour change	Why will the organisational behaviour change

Research Question	Original wording	Reworded how question	Reworded why question
	expected with implementation of lean thinking and why will these occur?	with implementation of lean thinking?	with implementation of lean thinking?
Sub-question 4	What organisational designs will lead to optimal implementation of all the applicable lean thinking techniques and disciplines?	How can the organisational structure be best redesigned to optimise the use of all lean thinking techniques and disciplines?	Why should the organisational structure be redesigned to accommodate the use of all lean thinking techniques and disciplines?

Table 4.1 indicates the changes that had to be made to the original research questions in Section 1.6 so that they could be read as how and why questions. The table shows that sub-question two is covered by the how and why questions of the main research question, whereas all the other sub-questions were reworded to accommodate the thought processes associated with case study research design.

4.5.2.2 The propositions

The research propositions were derived from the literature review and the research questions and directed the content of what should be researched using Yin's (2014) case study methodology design. As outlined in the conceptual framework in Figure 1.1, the lean disciplines were covered with the full implementation of the identified lean techniques and the propositions were derived according to the implementation of these techniques. Table 4.2 defines the research propositions in terms of the conceptual framework, the research how and why questions, the literature review, the research hypotheses and the units of the research area.

Table 4. 2 Propositions for the research area

Research question how/why	Research propositions
Main research propositions	
How is organisational structure and behaviour significantly influenced by lean thinking when implemented?	MP1 The implementation of lean thinking will significantly influence the organisational structure and behaviour and will compel the organisation to undergo significant changes regarding structural and behavioural characteristics. These characteristics may be determined by analysing and testing the identified hypotheses of the research area per Section 4.5 and by pattern matching.
Why is organisational structure and behaviour significantly influenced by lean thinking when implemented?	MP2 The implementation of lean thinking will significantly influence the organisational structure and behaviour as a result of the requirements of the lean disciplines and techniques that lead to: total employee involvement and employees having to work in cross-functional and work teams, leading to self-directed work teams to implement these techniques; the empowerment of employees to implement specific lean techniques that will influence the organisational leadership, structure and behaviour.
Sub research propositions	
How will the organisational structure change with the implementation of lean thinking?	SP1 The organisational structure will change fully to accommodate flow and pull, which will lead to organisational structures that will accommodate customer requirements in the form of manufacturing cells. This means that: lean techniques leading to flow and pull (refer to Figure 5.2) will be implemented using, at the outset, cross-functional teams to establish effective and efficient manufacturing cells; once established, self-directed work teams will follow Kaizen routines in order to optimise manufacturing cell effectiveness and efficiency; organisational functions required to accommodate the environment and to fulfil organisational operational requirements will be covered by self-directed work teams within the established manufacturing cells; the number of hierarchical levels will drop significantly in order to accommodate a low locus of decision-making, Hoshin Kanri and to service self-directed work teams; and

Research question how/why	Research propositions
	within the manufacturing cells, self-directed work teams will implement the lean techniques that will assist with manufacturing cell optimisation.
Why will specific organisational changes be required in lean thinking implementation?	SP2 Specific organisational changes identified per proposition SP1 will be implemented primarily to improve the competitive performance of the organisation in terms of the performance constructs identified in Section 5.2.1.3 and continuously to improve on the lean transformation process in order to: facilitate cross-functional team and eventually self-directed work teams; empower employees to implement the lean techniques; reduce functional and leadership impediments that block lean transformation; and cultivate new organisational behaviours that will lead to improved lean performance and to a creative and constructive lean culture.
How will the organisational behaviour change with implementation of lean thinking?	SP3.1 The organisational behaviour will, at the outset of the transformation process, be characterised by a high degree of uncertainty, speculative communications, and a lack of commitment, negative attitudes, and leaders who are reluctant to relinquish power. SP3.2 After the lean process and the lean strategy have been thoroughly discussed by the leaders of the organisation and after thorough development and training has been implemented with total employee involvement, the organisational behaviours will change as follows: commitment will become more affective, with a major portion of the employee complement committing to organisational vision, mission, goals and objectives; perception of leadership will improve from disillusionment to understanding why the lean process is required; participation and involvement will improve, with employees providing creative and effective solutions to achieve flow and pull in the organisation and continuously to improve on routines and standardised work; roles and responsibilities will change, with employees displaying a willingness to take on more than their respective original functions and job descriptions; knowledge of lean process will improve to a total understanding and appreciation of how full implementation of all the lean techniques

Research question how/why	Research propositions
	leads to ever-increasing organisational performance; attitudes will change from passive to active participation and involvement in finding solutions rather than creating problems; respect will improve with employees being recognised and rewarded for both their individual and team contributions.
Why will the organisational behaviour change with implementation of lean thinking?	SP4 As employees and leadership become more familiar with the lean transformation process organisational behaviour will change, with the inevitable change in organisational culture and the necessary organisational structural changes. New learning will take place in terms of the work teams implementing the lean techniques identified in process Figure 5.2.
How can the organisational structure, best be redesigned to optimise the utilisation of all the lean techniques and disciplines?	<p>SP5.1 the best organisational structure will lead to the optimisation of self-directed teamwork and the elimination of functional and leadership impediments to lean implementation. Self-directed work teams will be maximally empowered to fulfil a major portion of the required roles and responsibilities for the day-to-day running of the organisation.</p> <p>SP5.2 The best organisational structure will fully accommodate a cellular format, with fully empowered self-directed work teams, well able to implement all the identified lean disciplines and techniques.</p>
Why should the organisational structure be redesigned to accommodate the use of all lean thinking techniques and disciplines?	SP6 The organisation will have to undergo the redesign as indicated per SP5.1 and SP5.2 in order to accommodate effective lean implementation in terms of Hoshin Kanri and policy deployment and value stream mapping developed between leader and employees, enabling quick and effective communications that will lead to a competitive global organisation, implementing and continuously improving the lean techniques by way of empowered self-directed teamwork engaged in: problem-solving; Kaizen; distinguishing value; reducing the seven wastes; five S; TPM; visual management; standard work; and the same self-directed work teams operating manufacturing cells engaged in: Taguchi; cycle time reduction; one-piece flow; Kanban; SMED; Poka-yoke and Jidoka; and Heijunka.

Table 4.2 contains the propositions derived for the case-study research. The analysis highlighted the need for the quantitative work that was done in conjunction with the qualitative work, and pointed to new guidelines for lean implementation and a theoretical contribution similar to that of Whetten (1989). The propositions also identified the sub-units that were focused on in the case-study research design, discussed in the following chapter.

4.6 SUMMARY

The statement of the problem was articulated in terms of the current literature and the gap in this literature. The statement of the problem highlights the fact that when discrete manufacturing organisations embark on a lean journey, significant misgivings and uncertainties are experienced regarding how and why the organisational structure will change in the lean thinking process.

The gap in the literature illustrates that although there are some guidelines regarding the shape of organisational structure (Haug, 2012; Nahm *et al.* 2003), there is no concrete evidence that provides adequate information regarding the detail of how and why organisational structure and behaviour will change.

When considering the conceptual framework developed for this study together with the dependent and independent variables derived as constructs for the research, the hypotheses indicate that there were six structural and nine behavioural statements. Further detailed analyses, using Yin's (2014) thought processes and methodology, and considering the how and why questions, resulted in six detailed propositions for the study.

The hypotheses and propositions were further elaborated on in terms of the research methodology that was adopted for this study; this is discussed in the following chapter.

CHAPTER FIVE: RESEARCH METHODOLOGY

5.1 INTRODUCTION

This chapter deals with the research methodology in some detail. Much thought went into the process as there were limitations caused by the number of organisations that have implemented lean thinking in South Africa (Vermaak, 2008), and the question of lean success (Cooper, 2011).

Various methodology options were considered for the study. One option was using quantitative methods, with the realisation that the sample size had to be representative of organisations either claiming to have implemented lean thinking or that were in the process of implementing lean thinking, selected from a population of all discrete manufacturing organisations in South Africa. However, realising the limitations of such a methodology in the South African context, a second option was to use a qualitative method, using the research questions discussed Chapter 1, with the purpose of identifying whether a semi-structured interview approach would lead to answers to the research questions and consequently the achievement of the empirical research objectives.

A third emerged from the literature review: it was found that the methodologies used by Grütter *et al.* (2002), Lander (2007), Kucner (2008) and Haug (2012) were based on a case study approach. In addition, as was discussed in Chapter 1, the work by Meredith (1998) promotes case study research, since it assists the researcher in understanding the principles underpinning events and mechanisms that can be identified by quantitative as well as qualitative methods during the study period.

King, Keohane and Verba (1994) argue that most research does not fit clearly into one category or another and that the most effective approaches often combine features of several methods. They explain that some data may be best analysed using statistical analysis while other equally significant data may require another approach such as qualitative methods. This researcher found relevance in all the above approaches and therefore chose an exploratory mixed-method methodology as the most appropriate approach for this study.

The process of the study is discussed as follows: the research options in Section 5.2 include: quantitative methods utilising multiple linear regression and case study methods; The approach for this research is elaborated on in Section 5.3 and this is followed in Section 5.4 by a discussion on multiple case study research, which was applicable to this research, The research design is explained in Section 5.5, followed by the analysis of data

in Section 5.6, testing for validity in Section 5.7 and the research protocol in Section 5.8. A summary of the research design is provided in Section 5.9.

5.2 RESEARCH METHODOLOGY OPTIONS FOR A MIXED METHOD CASE STUDY APPROACH

The options considered for this study are discussed in more detail in the following sub-sections, commencing with considerations regarding a quantitative approach, followed by a discussion of qualitative and case study methods, based on the logic of inference (King *et al.*, 1994) of the quantitative approach meaning that the quantitative analysis of the research may be used to clarify the qualitative analysis. As quantitative logic was applied in the case study, quantitative methodology is discussed in the next section.

5.2.1 Quantitative methodology

This section deals with the question of applying a quantitative method in this study based on a case study approach. The first sub-section will consider the sample, selected using purposive sampling of discrete manufacturing organisations that have adopted a lean transformational strategy. Appendices A, B and C contain examples of the questionnaires used in this phase of the study. In the second sub-section the application of the multiple regression technique is discussed as a means of determining the relationships between the lean thinking independent variables and the dependent organisational variables.

5.2.1.1 Considerations regarding the selection of the sample

In a purely quantitative approach, the selection of a random sample would be the ideal. However, this presented difficulties since the selection would have to be made on the basis of a random sample from the population consisting of all the discrete manufacturing organisations in South Africa. Organisations that have not adopted a lean transformational strategy would have to be discounted from the research. As has also been observed in the introduction Section 1.1, Vermaak (2008) has remarked on the limited number of organisations in South Africa that have adopted a lean strategy and this has been further substantiated by Roberts (2011). This indicates that the population would be the number of discrete manufacturing organisations in South Africa that have adopted a lean transformational strategy and this information was not available in any survey at the time of the study. Appendix A contains an audit that was conducted to establish the extent of lean thinking implementation by organisations that claimed to be lean or organisations that had decided to embark on a lean transformation, and this may further limit the adoption of quantitative techniques. However, as anticipated, the selection process provided

significant information in terms of correlations between the extent of lean thinking implementations determined from the independent variables and the organisational behaviour and organisational structure dependent variables in Appendices B and C. With two cases of lean organisations emerging from this audit, it calculated that there would be between 130 and 140 interviews with top and middle management and non-management. This was partially confirmed prior to the research undertaking as indicated in the matrix simulation model for functionally structured organisations below (Figure 5.1). For the sake of simplicity, the model anticipated a seven to one ratio for first reports to the chief executive officer.

Figure 5.1 Simulation to determine the sample size using a typical manufacturing organisational structure

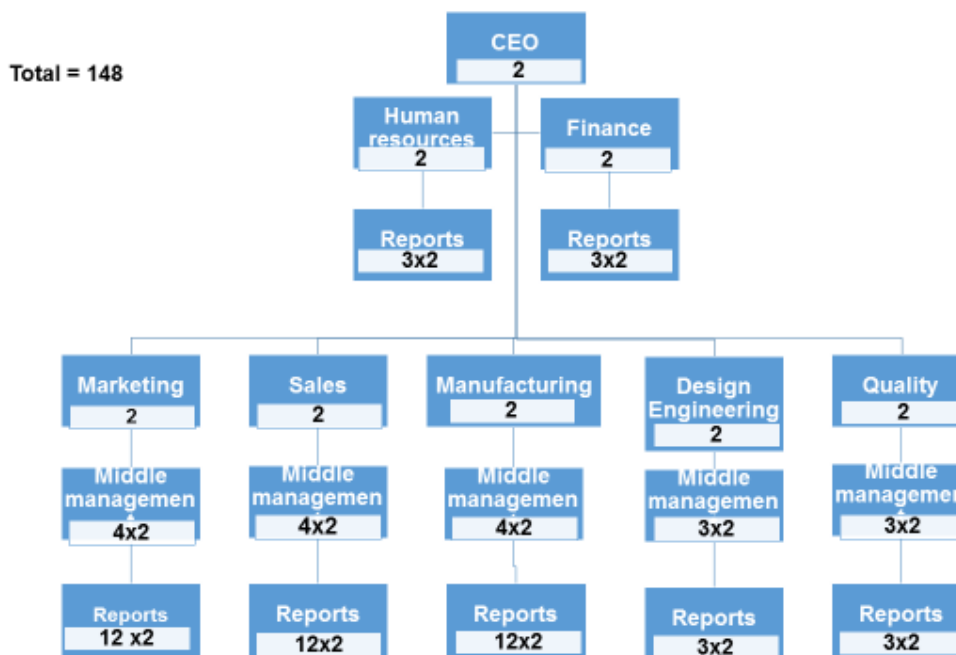


Figure 5.1 illustrates that, with the selection of two compelling purposive cases of organisations adopting a lean transformational strategy, it was reasonable to assume that as many as 148 detailed interviews could be conducted. However, the question of literacy was a factor in the actual research and 136 questionnaires were able to be filled in with the detailed interviews. This was expected to provide a sampling error of between eight and ten percent at the 95% confidence level (De Vaus, 2002a; De Vaus, 2002b; Collie & Rine, 2009) in the quantitative analysis. However, it was acknowledged that the sample was purposive and not random and therefore the quantitative aspect of the study might not be significant but simply supportive of the qualitative method, as discussed in Section

5.2.2. In this study, this approach was followed in the main to determine the construct validity of the qualitative methods.

This discussion provided further motivation for the decision to consider a multiple case study approach, which would provide opportunities for a qualitative approach, as well as a quantitative approach (Meredith 1998). With the intention of finding purposive cases of organisations that had adopted a lean transformational strategy, it was anticipated that the conceptual framework in Figure 1.1 applied to both a qualitative and a quantitative approach and it was used when the lean assessment in Appendix A was conducted with the measurement of the dependent organisational structural variables and the organisational structure and behaviour dependent variables (see Appendix B and C respectively). The conceptual framework was also used in the qualitative part of the study, and this aspect is discussed in Section 5.2.2.

5.2.1.2 *Statistical techniques for the analysis of quantitative data*

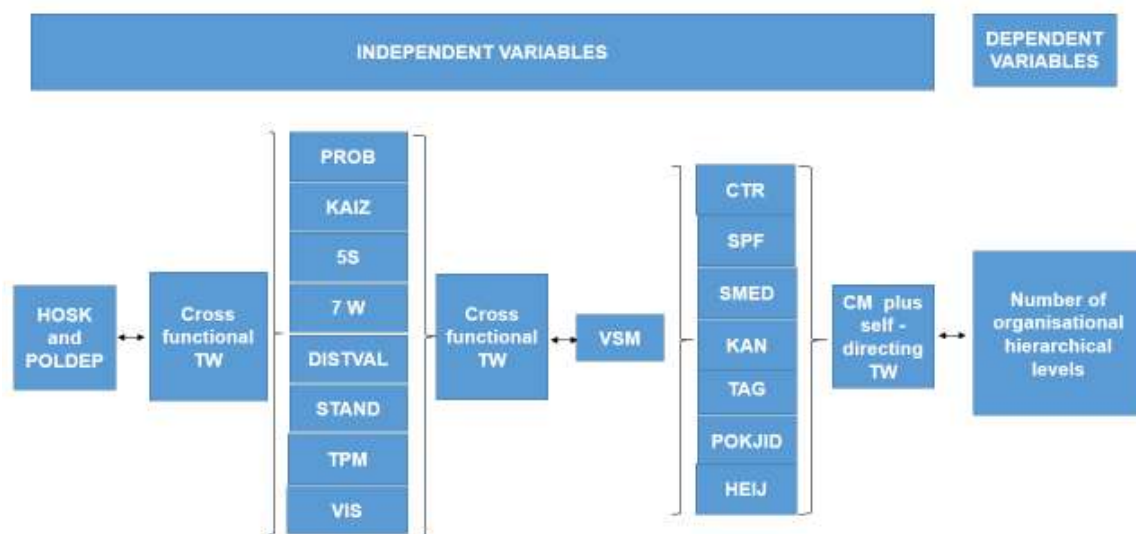
As explained above, using the questionnaires (Appendices A, B and C) together with interviews at the appropriate organisational level and the performance of the respective organisation where the interviews were conducted, an appropriate approach was the use of the business systems multiple regression technique (Pennington 2014), which is explained by Aguinis (1995) and Pallant (2010) to explain mathematically the identified hypotheses derived from the conceptual framework (see Section 1.9). In the actual selection of organisations that had adopted a lean transformational strategy, the study was able to verify the hypotheses and to establish new relationships that had not been considered or found in these hypotheses.

The literature review revealed that the gap in the literature was also identifiable from the lack of detail regarding lean techniques, and how these techniques affected the behaviour and structure of organisations adopting a lean transformational strategy. Therefore, the utilisation of the lean techniques as the independent variables, assessed in terms of the dependent organisational and behaviour and structure variables with a multiple regression technique, provided significant findings regarding the body of knowledge of lean thinking. The organisation of variables for the anticipated regression analysis, was arranged per Figure 5.2, using the example of an organisational structure variable described as the number of hierarchical levels of the organisation as the dependent variable, and the lean techniques as independent variables. In multiple regression (Aguinis, 1995), the outcome of the dependent variable is estimated in terms of the dependent variables. It was also acknowledged that variables may be entered either with all the independent variables or

that these may be added in steps to improve the accuracy of the estimate or prediction of the dependent variable. Based on the theory, for example, the number of hierarchical levels of the organisation proved to decrease with lean implementation and the stepwise multiple regression technique proved useful to determine why and how this occurred.

Figure 5.2 illustrates the organisation of the lean thinking techniques as the independent variables affecting a specified dependent variable of organisational structure described as the number of hierarchical layers of the organisation.

Figure 5.2: Example of organisation of independent variables in terms of a dependent variable, i.e. the number of hierarchical levels



In Figure 5.2, the organisation of the variables from the less, to the more complex lean techniques, was deliberate and based on logic and the practical knowledge of the researcher of cross-functional teamwork, or cross-trained teams, as identified by Nahm (2003), Liker (2004), Dennis (2006) and Lander (2007). This teamwork technique is identified with Hoshin Kanri and policy deployment techniques (Dennis, 2006; Lander, 2007; Tsung-Ming & Chao-Ton Su, 2007) affecting eight variables: problem-solving; Kaizen; five S; seven wastes; distinguishing value; standard work; total productive maintenance; and visual management. All these techniques require that individuals work in groups and teams (Nahm et al., 2003; Liker 2003; Lander, 2007; O'Carroll, 2004) and that there is total employee involvement. Keeping this in mind, it was anticipated that teams of individuals would be participating in the value stream mapping process that is identifiable with the lean principles, in order to establish flow and pull (Ōhno, 1988;

Shingō, 1989; Womack & Jones, 1990; Rother & Harris, 2001; Rother & Shook, 2003; Dolcemascolo, 2010) and that this would require the implementation of seven variables: cycle time reduction; single-piece flow; single-minute exchange of die; Kanban; Taguchi; Poka Yoke and Jidoka; and Heijunka. These particular flow and pull variables eventually make it possible for an organisation to implement cellular manufacturing (Rother & Harris 2001; Hyer & Wemmerlov, 2004), which in turn will have an impact on the organisational structure and behaviour of the organisation (Haug, 2012). All this means that the hypotheses identified in Chapter 1 following this line of reasoning was vetted by way of multiple regression analysis as well as the qualitative analysis discussed under case study research. Using the dependent and independent variable codes in Table 1.1, the process followed for the gathering of quantitative data is discussed next.

5.2.1.2.1 Gathering of quantitative data

The gathering of data for the quantitative component of this research involved fact-finding through questionnaires (see Appendices A, B and C). It should be noted that, in the specific cases that were studied, facts were gathered in terms of job description and organisational level of authority, organisational performance and the extent of lean implementation. The extent of lean implementation was measured by way of a detailed audit (see Appendix A) and an analysis of organisational performance, including specifically: on-time delivery or service level; inventory turns; margin; profit before interest and tax as a ratio of sales; rejects including scrap and rework as a percentage of cost of sales; cash flow; and current ratio. In each case, the organisational structure in design and description was expanded on in detail and in this way the researcher gathered information on how the structures could best be sketched, drawn and/or described by other means. This requirement was accommodated by the qualitative methodology, discussed in the next section.

5.2.1.3 Interpretation, validity and reliability of the quantitative data

The business systems software multiple regression programme (Pennington 2014), clarified by Aguinis (1995) and Pallant (2010) and similar to SPSS multiple regression, was used in the interpretation of the quantitative data, the linear equations generated from the quantitative data and in the testing of the hypotheses (see Section 1.9.2). As explained by Aguinis (1995), the interpretation was made based on the sign of the b coefficients of the variables and the regression results obtained, as well as tests for significance. For each dependent variable, a potential hypothesis was developed on the basis of the

multiple regression equations, generated from the dependent and independent coding matrices as follows.

5.2.1.3.1 Organisational structure equations

$$\text{NOHL} = b_0 + b_1 \text{ HOSHK} + b_2 \text{ PROB} + b_3 \text{ KAIZ} + b_4 \text{ 5S} + b_5 \text{ 7W} + b_6 \text{ DISTVAL} + b_7 \text{ STAND} + b_8 \text{ VIS} + b_9 \text{ TPM} + b_{10} \text{ TW} + b_{11} \text{ VSM} + b_{12} \text{ CTR} + b_{13} \text{ SPF} + b_{14} \text{ SMED} + b_{15} \text{ KAN} + b_{16} \text{ TAG} + b_{17} \text{ POKJID} + b_{18} \text{ HEIJ} + b_{19} \text{ CM}$$

$$\text{LHINT} = b_0 + b_1 \text{ HOSHK} + b_2 \text{ PROB} + b_3 \text{ KAIZ} + b_4 \text{ 5S} + b_5 \text{ 7W} + b_6 \text{ DISTVAL} + b_7 \text{ STAND} + b_8 \text{ VIS} + b_9 \text{ TPM} + b_{10} \text{ TW} + b_{11} \text{ VSM} + b_{12} \text{ CTR} + b_{13} \text{ SPF} + b_{14} \text{ SMED} + b_{15} \text{ KAN} + b_{16} \text{ TAG} + b_{17} \text{ POKJID} + b_{18} \text{ HEIJ} + b_{19} \text{ CM}$$

$$\text{LOCDM} = b_0 + b_1 \text{ HOSHK} + b_2 \text{ PROB} + b_3 \text{ KAIZ} + b_4 \text{ 5S} + b_5 \text{ 7W} + b_6 \text{ DISTVAL} + b_7 \text{ STAND} + b_8 \text{ VIS} + b_9 \text{ TPM} + b_{10} \text{ TW} + b_{11} \text{ VSM} + b_{12} \text{ CTR} + b_{13} \text{ SPF} + b_{14} \text{ SMED} + b_{15} \text{ KAN} + b_{16} \text{ TAG} + b_{17} \text{ POKJID} + b_{18} \text{ HEIJ} + b_{19} \text{ CM}$$

$$\text{LCOM} = b_0 + b_1 \text{ HOSHK} + b_2 \text{ PROB} + b_3 \text{ KAIZ} + b_4 \text{ 5S} + b_5 \text{ 7W} + b_6 \text{ DISTVAL} + b_7 \text{ STAND} + b_8 \text{ VIS} + b_9 \text{ TPM} + b_{10} \text{ TW} + b_{11} \text{ VSM} + b_{12} \text{ CTR} + b_{13} \text{ SPF} + b_{14} \text{ SMED} + b_{15} \text{ KAN} + b_{16} \text{ TAG} + b_{17} \text{ POKJID} + b_{18} \text{ HEIJ} + b_{19} \text{ CM}$$

$$\text{CELFM} = b_0 + b_1 \text{ HOSHK} + b_2 \text{ PROB} + b_3 \text{ KAIZ} + b_4 \text{ 5S} + b_5 \text{ 7W} + b_6 \text{ DISTVAL} + b_7 \text{ STAND} + b_8 \text{ VIS} + b_9 \text{ TPM} + b_{10} \text{ TW} + b_{11} \text{ VSM} + b_{12} \text{ CTR} + b_{13} \text{ SPF} + b_{14} \text{ SMED} + b_{15} \text{ KAN} + b_{16} \text{ TAG} + b_{17} \text{ POKJID} + b_{18} \text{ HEIJ} + b_{19} \text{ CM}$$

5.2.1.3.2 Organisational behaviour equations

$$\text{ALVMG} = b_0 + b_1 \text{ HOSHK} + b_2 \text{ PROB} + b_3 \text{ KAIZ} + b_4 \text{ 5S} + b_5 \text{ 7W} + b_6 \text{ DISTVAL} + b_7 \text{ STAND} + b_8 \text{ VIS} + b_9 \text{ TPM} + b_{10} \text{ TW} + b_{11} \text{ VSM} + b_{12} \text{ CTR} + b_{13} \text{ SPF} + b_{14} \text{ SMED} + b_{15} \text{ KAN} + b_{16} \text{ TAG} + b_{17} \text{ POKJID} + b_{18} \text{ HEIJ} + b_{19} \text{ CM}$$

$$\text{PERCL} = b_0 + b_1 \text{ HOSHK} + b_2 \text{ PROB} + b_3 \text{ KAIZ} + b_4 \text{ 5S} + b_5 \text{ 7W} + b_6 \text{ DISTVAL} + b_7 \text{ STAND} + b_8 \text{ VIS} + b_9 \text{ TPM} + b_{10} \text{ TW} + b_{11} \text{ VSM} + b_{12} \text{ CTR} + b_{13} \text{ SPF} + b_{14} \text{ SMED} + b_{15} \text{ KAN} + b_{16} \text{ TAG} + b_{17} \text{ POKJID} + b_{18} \text{ HEIJ} + b_{19} \text{ CM}$$

$$\text{PARTINV} = b_0 + b_1 \text{ HOSHK} + b_2 \text{ PROB} + b_3 \text{ KAIZ} + b_4 \text{ 5S} + b_5 \text{ 7W} + b_6 \text{ DISTVAL} + b_7 \text{ STAND} + b_8 \text{ VIS} + b_9 \text{ TPM} + b_{10} \text{ TW} + b_{11} \text{ VSM} + b_{12} \text{ CTR} + b_{13} \text{ SPF} + b_{14} \text{ SMED} + b_{15} \text{ KAN} + b_{16} \text{ TAG} + b_{17} \text{ POKJID} + b_{18} \text{ HEIJ} + b_{19} \text{ CM}$$

$$\text{RLSRESP} = b_0 + b_1 \text{ HOSHK} + b_2 \text{ PROB} + b_3 \text{ KAIZ} + b_4 \text{ 5S} + b_5 \text{ 7W} + b_6 \text{ DISTVAL} + b_7 \text{ STAND} + b_8 \text{ VIS} + b_9 \text{ TPM} + b_{10} \text{ TW} \\ + b_{11} \text{ VSM} + b_{12} \text{ CTR} + b_{13} \text{ SPF} + b_{14} \text{ SMED} + b_{15} \text{ KAN} + b_{16} \text{ TAG} + b_{17} \text{ POKJID} + b_{18} \text{ HEIJ} + b_{19} \text{ CM}$$

$$\text{KNOWL P} = b_0 + b_1 \text{ HOSHK} + b_2 \text{ PROB} + b_3 \text{ KAIZ} + b_4 \text{ 5S} + b_5 \text{ 7W} + b_6 \text{ DISTVAL} + b_7 \text{ STAND} + b_8 \text{ VIS} + b_9 \text{ TPM} + b_{10} \text{ TW} \\ + b_{11} \text{ VSM} + b_{12} \text{ CTR} + b_{13} \text{ SPF} + b_{14} \text{ SMED} + b_{15} \text{ KAN} + b_{16} \text{ TAG} + b_{17} \text{ POKJID} + b_{18} \text{ HEIJ} + b_{19} \text{ CM}$$

$$\text{COMM} = b_0 + b_1 \text{ HOSHK} + b_2 \text{ PROB} + b_3 \text{ KAIZ} + b_4 \text{ 5S} + b_5 \text{ 7W} + b_6 \text{ DISTVAL} + b_7 \text{ STAND} + b_8 \text{ VIS} + b_9 \text{ TPM} + b_{10} \text{ TW} \\ + b_{11} \text{ VSM} + b_{12} \text{ CTR} + b_{13} \text{ SPF} + b_{14} \text{ SMED} + b_{15} \text{ KAN} + b_{16} \text{ TAG} + b_{17} \text{ POKJID} + b_{18} \text{ HEIJ} + b_{19} \text{ CM}$$

$$\text{ATT} = b_0 + b_1 \text{ HOSHK} + b_2 \text{ PROB} + b_3 \text{ KAIZ} + b_4 \text{ 5S} + b_5 \text{ 7W} + b_6 \text{ DISTVAL} + b_7 \text{ STAND} + b_8 \text{ VIS} + b_9 \text{ TPM} + b_{10} \text{ TW} + b_{11} \text{ VSM} \\ + b_{12} \text{ CTR} + b_{13} \text{ SPF} + b_{14} \text{ SMED} + b_{15} \text{ KAN} + b_{16} \text{ TAG} + b_{17} \text{ POKJID} + b_{18} \text{ HEIJ} + b_{19} \text{ CM}$$

$$\text{RESP} = b_0 + b_1 \text{ HOSHK} + b_2 \text{ PROB} + b_3 \text{ KAIZ} + b_4 \text{ 5S} + b_5 \text{ 7W} + b_6 \text{ DISTVAL} + b_7 \text{ STAND} + b_8 \text{ VIS} + b_9 \text{ TPM} + b_{10} \text{ TW} \\ + b_{11} \text{ VSM} + b_{12} \text{ CTR} + b_{13} \text{ SPF} + b_{14} \text{ SMED} + b_{15} \text{ KAN} + b_{16} \text{ TAG} + b_{17} \text{ POKJID} + b_{18} \text{ HEIJ} + b_{19} \text{ CM}$$

Utilising Business systems regression (Pennington, 2014) yielded: R the correlation coefficient; R² standard error of estimate; statistics for the b values; and an F statistic for the whole regression; leverage values; path coefficient and so on. In each equation, b₀ refers to the Y intercept and each b dependent variable coefficient, proved unique to the specific equation, for which separate regressions were run. The findings of these regression runs are discussed in the next chapter.

5.2.2 Qualitative methodology

As indicated per Section 5.2, King *et al.* (1994) state that the same logic of inference should be used in both quantitative and qualitative approaches. They explain that this type of logic would normally apply to quantitative research and provide an effective framework for this type of research; however, if qualitative research is approached from a similar mindset, the framework will be as effective. They do distinguish between quantitative and qualitative research, stating that, in contrast, qualitative research covers a wide range of approaches, although by definition, none of these approaches relies on numerical measurements. They explain that qualitative research will normally utilise one or a small number of cases, but that the area of focus will be a rounded or comprehensive account of some event or unit. They also remark that one of the benefits of qualitative research is that a substantial amount of data can be generated using questions and interviews concerning a specific unit or event as identified by the research area. King *et al.* (1994) believe that case study research is an appropriate qualitative methodology.

Therefore, this researcher focused on the conceptual framework for the study and logic of inference. The framework in Figure 1.1 was also used in order to explain the primary difference between propositions and hypotheses. Whetten (1989) argues that the difference lies in the process of gathering either quantitative or qualitative data, which is most certainly applicable to this study. He explains that the primary difference is that propositions involve concepts, whereas hypotheses require measures. The concepts embedded in the propositions are stated in Section 4.5.2.

As far as the inclusion of the generation of propositions along with the generation of hypotheses is concerned, Yin (2014) emphasises the fact that case studies may also include quantitative evidence, such as will be gathered in this study (see Section 5.2.1). Facts pertaining to the lean thinking transformation case under study were gathered, the history of the development was included in the fact-finding mission, and this included qualitative as well as quantitative data.

5.2.3 Case study methodology

Careful consideration led to the use of case study methodology as discussed above. Prominent researchers such as Good and Scates (1954), Meredith (1988), King *et al.* (1994) and Yin (2014) all subscribe to the value of case study methodology when dealing with organisational or human behaviour research. Good *et al.* (1954) and King, *et al.* (1994) refer to the case study as appropriate when complex situations involving factors of behaviour are studied to determine the existing or current state of a situation that involves

factors relating to the entire life process of a unit, individual, family, a group or a community. This was relevant to this study as it concerned an identified gap in the literature and specific further research was required regarding the application of lean techniques and how these techniques influenced the structure and behaviour of an organisation.

Furthermore, Yin (2014) states that how and why questions can be answered effectively using case study research. These questions apply to the case studies by Haug (2012), regarding the apparent restructuring of an organisation to cellular structures; however, the questions of how and why such structures evolved appeared not to have been clearly answered in Haug's study.

5.3 DEVELOPING AN APPROACH MODEL FOR THE RESEARCH METHODOLOGY

Realising the advantages of a mixed-method approach, Figure 5.3 illustrates the thought and implementation processes envisioned for this study. The development of the model in Figure 5.3, which includes the thought processes (see Section 5.2) and detailed discussions of the motivation for a mixed-method approach, resulted in a case study methodology being adopted. It should be noted that the quantitative and qualitative data was obtained from the specific cases included in the study on the basis of a purposive, compelling selection of two organisations as the cases.

Figure 5.3 Mixed-method approach used in the research study

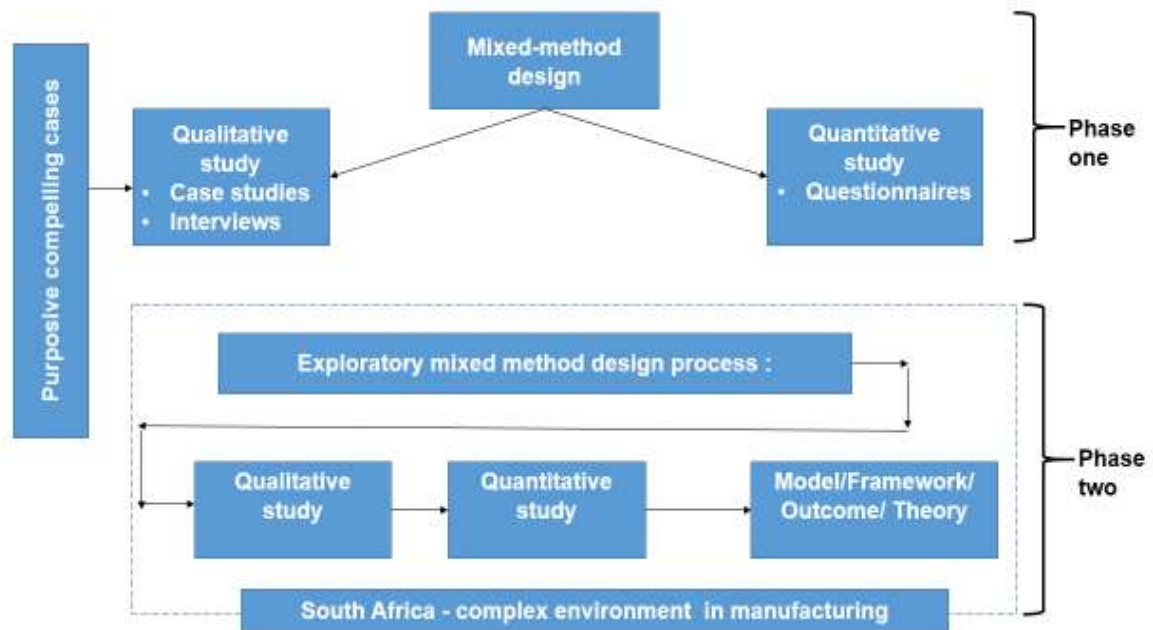


Figure 5.3 shows that the first phase of the thought process commences with a mixed-method design approach, driven by a selection of purposive compelling cases of organisations that have adopted lean thinking for their respective organisational transformations. Having identified compelling cases, the approach moves to phase two, indicating the flow process of the study. Phase two shows that the qualitative study will be followed by a comprehensive quantitative study, using questionnaires (Appendices A, B and C) and detailed observations of organisational performance (see Chapter one). The qualitative study identified two steps, namely interviews with individuals, and focus groups, and a detailed analysis of the selected case studies utilising the framework developed by Yin (2014), discussed in the following section which covers the research design. In the actual study the sequential process was followed to the letter, as will be elaborated on in the next chapter.

5.4 CHOICE OF MULTIPLE CASE STUDIES AS THE RESEARCH METHODOLOGY

The choice of a multiple case study approach for this research was based on the analogy of Yin (2014), involving the study of schools adopting a new curriculum and selecting respective schools as cases to be studied, using a multiple case study approach. Another primary motivation was that replication may be a criterion for the study. This aspect is based on the observation by Yin (2014) that, from one case study to the next, the outcomes are either replicated or contrasted with reasons, or that there is a strong

resemblance between the propositions and the actual conclusions in each case, based on the analysis of data. Yin (2014) makes the point that the logic in analysis is based on the fact that each case predicts similar results or that each case predicts contrasting results, but for reasons that can be anticipated.

Yin (2014) believes that replications should reflect some theoretical interests. In this research, the theory used to derive the propositions was briefly summarised in terms of: the focus on flow and pull (Womack & Jones, 2010), the utilisation of value stream mapping (Lander, 2007), reduced hierarchical level restructuring along the value stream (Jones *et al.*, 1999; Nahm *et al.*, 2003; O'Carroll, 2004; Brown *et al.*, 2006; Worley & Doolen, 2006; Hettler, 2008; Haug, 2012); improved communications utilising cross-functional teams (Nahm *et al.*, 2003); self-directed work teams taking over major portions of organisational functions (Kent, 2006); and lattice organisational structures through empowered teamwork with the example of the Semler organisation (Jumara, 2005). Organisational behaviour literature reflected in the propositions are: the work done on commitment and discretionary behaviour by Harris (2007); Angelis *et al.* (2011) and Losonci *et al.* (2011); strategy shared with employees resulting in positive attitudes (Gagnon, 2004); empowered employees (Poppendieck, 2002; Pinheiro, 2010); and positive attitudes based on cognitive, creative behaviour and willingness to participate in lean implementations (Tress and Espinoza, 2012). Based on this, a procedure for a multiple case study approach was followed, as proposed by Yin (2014). This procedure is illustrated in Figure 5.4

Figure 5.4 Multiple case study procedure (Yin, 2014)

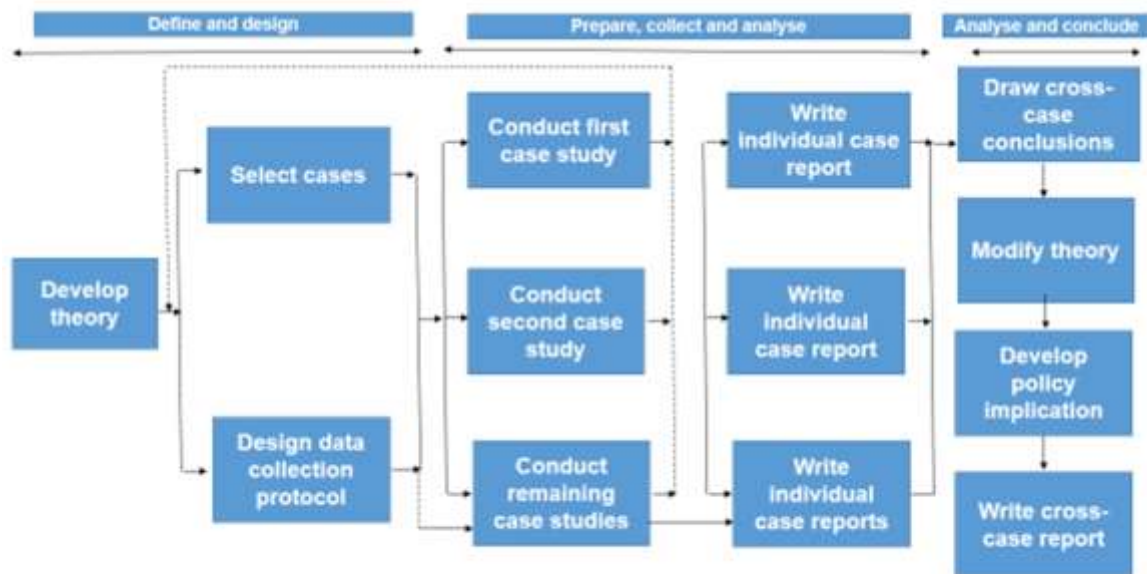


Figure 5.4 is from Yin (2014) and the COSMOS corporation framework for multiple case study research. The procedure identifies four phases in the research process namely: defining and designing the cases; preparing for the research; collecting and analysing the data; and analysing and concluding the results, based on cross-case analysis.

5.5 DESIGN OF THE RESEARCH METHODOLOGY

The research design required some additional thought processes and as Yin (2014) has indicated, the generalisable observations from the literature review and the expression of the research questions as how and why questions is a primary prerequisite for further review in terms of the research methodology design process. Specifically, Yin (2014) considers the following components of a research design that involves a case-study approach: the research questions reworded as how and why questions; the development of propositions based on what relationships should be researched that will lead to answers to the research questions; the unit/s to be researched, which for this research area will be the organisations as cases that have adopted a lean transformational strategy; the logic of linking data to the stated propositions; and the criteria for interpreting the findings.

5.5.1 The research units for case study research

The research units were derived, as explained by Yin (2014) and Good *et al.* (1954), and for this study the main units consisted of the organisations selected as cases. These organisations were selected on the basis of claims that they were undergoing a lean

transformation process or that lean transformation had occurred and that the organisation had achieved or was achieving global levels of competitiveness equal or better than its significant rivals. As indicated above, the organisations that were selected for the study were audited to determine the extent of lean implementation (see Appendix A).

As discussed, the main unit for the research was thus identified as: ***the organisation undergoing lean transformation*** and careful analysis of the propositions revealed the sub-units in each organisation to be researched as: ***leaders and/managers; employees; employee groups and/or teams; manufacturing cells; tools, plant and equipment; materials, products and processes and control systems.***

5.5.2 Linking data to propositions – gathering qualitative data for the case-study research

This section will deal with the process of gathering the qualitative data for the case-study research according to the propositions discussed in Section 4.5.1, Based on Yin's (2014) analogy, the consistency of interviews and observations in the survey had to be established from the outset. The process therefore consisted of interviews utilising semi-structured questionnaires, drawing or obtaining value stream maps, and drawing organisational structures for each of the organisations being studied. The history of lean thinking implementation was gathered for each of the organisations by way of observations or analysis of the administration and documentation of the lean implementation process.

5.5.2.1 The structure for the gathering of data in each case-study

In deciding what data to collect, the method proposed by Yin (2014) was followed and an appropriate structure for this study was developed. This is indicated in Table 5.1.

Table 5.1 Data to be collected from identified case study unit or units

Units identified	Data to be collected			
	Observations	Interviews with	Value stream mapping	Lean disciplines and techniques
<p>Main unit is the organisation which has adopted a lean transformational strategy</p>	<ul style="list-style-type: none"> a. Manufacturing technology and products b. Organisational culture c. Leadership behaviour d. Organisational performance before lean and current state e. Training of lean f. Strategic plan, policy and procedures/ utilisation of Hoshin Kanri and policy deployment g. Vision, mission, goals and objectives h. Organograms for organisational structure, before lean, interim and current state 	<p>CEO and top management group</p>	<ul style="list-style-type: none"> a. Flow of documentation and materials and work in progress. b. Wastes identified c. Cellular manufacturing, SMED, Poka-yoke, Heijunka, Kanban d. History of value stream maps before, interim and current state 	<ul style="list-style-type: none"> a. Knowledge of lean. b. Utilise lean audit and individual and focus group questionnaires. c. Utilise the quantitative research to determine the influences of lean on organisational structure and behaviour

Units identified	Data to be collected			
	Observations	Interviews with	Value stream mapping	Lean disciplines and techniques
	i. Five S and visual management			
Subunits of the employees of the organisation, including groups and teams	<ul style="list-style-type: none"> a. Organisational culture b. Knowledge of organisational performance c. Teamwork cross-functional and self-directing d. organisational behaviour 	<ul style="list-style-type: none"> a. Middle management individuals and focus group b. Supervisors and team leaders c. Operators and tradesmen d. Unskilled people 	<ul style="list-style-type: none"> a. Participation in value stream mapping process 	<ul style="list-style-type: none"> a. Participation with the implementation of lean techniques, commencing with Hoshin Kanri and policy deployment b. Check knowledge of lean, utilising individual and focus group questionnaires
Subunits of materials, Products and processes	<ul style="list-style-type: none"> e. Check for manufacturing technology –should be discrete manufacturing. 	<ul style="list-style-type: none"> a. CEO and top management b. Industrial engineering/ manufacturing engineering/ production engineering management. 	<ul style="list-style-type: none"> a. Methods and time studies for cycle time b. Methods of design and matching with customer requirements c. Check whether Taguchi or similar approach is being utilised, 	<ul style="list-style-type: none"> a. Check for utilisation of Taguchi, SMED, Poka-yoke and Jidoka, cycle time reduction, one-piece flow and Kanban utilisation within manufacturing cells

Units identified	Data to be collected			
	Observations	Interviews with	Value stream mapping	Lean disciplines and techniques
			d. Check how products are made with or without manufacturing cells.	
Subunit of tools, plant and equipment	As above	As above	As above	As above
Sub unit of control systems	As above and excluding organisations subscribing to materials requirement planning systems	As above	a. Hoshin Kanri and policy deployment utilised for strategic planning process b. Check Kanban and Heijunka, or similar process of control.	As above

Table 5.1 reflects the main and sub-units for the case study research. The structure was utilised as a check list for the requirements for consistency. The structure was tested by conducting a pilot study, together with the quantitative study, individual questionnaires, focus group and/or teamwork questionnaires as well as the observations outlined in the structure.

5.5.2.2 The development of questionnaires for interviews – Case-study qualitative work

Two types of questionnaires were designed for the case study research: a questionnaire for individual interviews; and a questionnaire for focus group interviews. Deriving the questions for the interview of individuals was achieved by way of Appendix D, according to which the propositions are cross-referenced to appropriate questions.

When interviews were conducted, it was absolutely essential to eliminate bias from the data collection process. Therefore the questionnaire (Appendix E) excluded the proposition statements so that the interview process only dealt with the specific questions.

The focus group questionnaires were based on the assumption that organisations adopting lean transformation would be working towards total employee involvement and teamwork and that lean thinking is perceived as a total transformational strategy for an organisation. A process such as Hoshin Kanri, with policy deployment, was an essential part of the formulation of a lean transformational strategy and these techniques were taken into account when selecting the particular exploratory cases used in this study.

With the selection process completed, focus group work selections were considered from each case, such as: the top executive group; a cross-functional group chosen by the organisation to implement the lean strategy; or an active self-directing team, working within a manufacturing cell, meeting customer requirements using the lean principles of flow and pull and the lean techniques. In the actual research, the top management groups in both case organisations expressed their willingness to act as focus groups to be interviewed for the research. This proved beneficial to the study as it provided an opportunity for the top teams to vet the research process and the individual views that had been expressed in the questionnaires. The focus group questionnaire was based on the propositions reflected in Table 5.4 (see Appendix F). Appendix G shows only the questions derived from Appendix F that were utilised during the focus group interviews.

5.5.2.3 Gathering of facts and making observations for the case study research

The gathering of facts and observations was achieved by way of the drawing of, or obtaining of value stream maps or maps for each of the organisations that were studied, similar to methods that were used by Lander (2007). Organisational structures were prepared by drawing organogram charts using MS word shapes and “smart art”. As far as possible, history was elicited from the interviews and the documentation provided by the two organisations. Observations were also made on the basis of the structure in Table 5.4. It was found that this structure did not require review after the first case was studied as no significant deviations were experienced during this process of taking account of Table 5.4 and the derived questionnaires, Appendices C, E and G.

All the detailed interviews and gathering and recording of data were completed by the researcher himself and he also transcribed the data and recorded it electronically. Where expert opinions were used in terms of structures, methods of asking questions and conducting interviews, full recognition to such individuals is provided in this thesis. Individual and focus group interviews commenced after written permission had been obtained from the respective organisational CEOs or those delegated and authorised to provide such permission. Permission was obtained to record responses from interviewees as far as was possible, using detailed notes that were kept by the organisations and by individual and focus groups to ensure detailed and complete data capture. In order to facilitate planning and decision-making, trial runs were conducted to analyse the agenda and time required for the respective interviews. Results and outcomes of interviews were shared openly with the CEOs or their delegates.

5.5.2.4 Ensuring that all the sources of evidence were utilised during the gathering of data for the multiple case study research

Yin (2014) identifies six sources of evidence that have to be considered during the research process and for this study. Table 5.2 identifies the particular coverage envisaged in this research area.

Table 5.2 Sources of evidence (Yin 2014) considered in gathering of data phase

Source of evidence	In this research covered by:
Documentation	The gathering of documentation indicating lean strategy and the applications of lean techniques and disciplines per the literature review, Chapter 2 The gathering or recording of lean strategy formulations, visions, goals and objectives The gathering of lean story board/s before and after report/s The gathering of policy, procedure and standard work schedules
Archival records	The same as above, but reviewing the organisation's archives in terms of the history of the lean implementation process
Interviews	The interviews according to the quantitative and qualitative questionnaires per Appendix A, B, C, E and F The questions that were asked during the data gathering phase and that were recorded in writing and/or electronically by the researcher
Direct observations	The drawing of value stream maps, organograms and other means such as photographs or recording in writing and/or electronically, observations of lean technique applications
Participant observation	The recording of how participants behaved and acted during interview sessions and during sessions on the shop floor or in the offices of the organisation
Physical artefacts	The recording of the facilities in use technically for the manufacturing operations

Table 5.2 reflects the sources of evidence and how these were covered by the researcher, using multiple case studies as the chosen design methodology. The next section will deal with the process that was followed in the analysis of the data.

5.6 ANALYSIS OF DATA

In the main, analysis of data was based on pattern matching, replication logic and explanation building of the data gathered according to Table 5.5. A comparison of this data to the derived hypotheses and propositions led to the official findings. The use of time series analysis was done on site when lean story boards were analysed using before and after value stream maps, and before and after lean technique implementations. However, when the data was gathered, other trends, patterns, and information emerged in other forms. Further analysis included the development and/or review of propositions, logic

models and/or guidelines. In the following sections details regarding pattern matching and explanation building are discussed in terms of the research questions.

5.6.1 Pattern matching, replication and rival explanations

The analysis of data in this study made use of pattern matching, replication and rival explanations when cross-case analysis was done, and was carried out in terms of the lean techniques implementation model illustrated in Figure 5.2 and the propositions in Table 5.3. Considerations regarding the quantitative approach were linked to pattern matching and resultant replications, and were considered after this phase of the research had been concluded, in the analysis of the qualitative data. Rival explanations were considered when deviations from the propositions or the model in Figure 5.2 were evident and these were considered for the amendment of the stated propositions; however, the patterns that emerged served to confirm the hypotheses and propositions and countered rival explanations.

With the lean implementations evaluated, pattern matching was done by comparing organisational structures, organisational behaviours, value stream maps and the extent of lean technique implementations in the two cases.

5.6.1.1 Considerations in coding of data

For each case, the working on data from the ground up was focused on by following a coding discipline using the techniques identified by Corbin and Straus (2008). This was mainly in accordance with the identified dependent and independent variables, coded in text, instead of in quantitative terms. In this way, open coding was used to review the data for categories in terms of behaviours and executions of lean techniques and disciplines. From this exercise, axial coding was followed with non-hierarchical and hierarchical analysis similar to the model depicted in Figure 5.2. Eventually, the coded work was summarised as categories and/or themes, and compared with the stated propositions.

5.6.2 Explanation building

Much of the explanation building was done for this research by analysing the theoretical propositions in Table 5.3. The qualitative work was therefore utilised to consider alternative explanations to those provided or to enhance the explanations of significant findings regarding phenomena emanating from the fieldwork. In accordance with Yin (2014), the explanation of phenomena was best achieved when critically examining and explaining the causal links to the how and why questions derived for this research.

Specific to this study, the explanation building process included the steps recommended by Yin (2014) which are: making a theoretical statement or explanatory proposition (Table 5.3); comparing the findings per case with the statement or proposition; revising the proposition; comparing other details of the case against the revision; and repeating the process as many times as needed (Yin, 2014). It is further emphasised that the data analysis processes form a collective whole with the validation of data process, which in this study occurred simultaneously with the tests for validity, described in the next section.

5.7 TESTS FOR DETERMINING THE VALIDITY OF THE CASE STUDY RESEARCH

Apart from the significant analysis of cross-case work that was done in the form of replication, the following tests of validity (Yin 2014) were applied to the case study research methodology, as explained in Table 5.3.

Table 5.3 Tests of validity for case study research based on Yin (2014)

TESTS	Case study tactic	Phase of research in which the tactic occurs
Construct validity	<ul style="list-style-type: none"> • Use multiple sources of evidence • Establish chain of evidence • Have key informants review draft case study reports 	<ul style="list-style-type: none"> • When data is being collected • When data is being collected • When composition of the report is concluded
Internal validity	<ul style="list-style-type: none"> • Do pattern matching • Do explanation building • Address rival explanations • Use logic models 	<ul style="list-style-type: none"> • When data is being analysed • When data is being analysed • When data is being analysed • When data is being analysed
External validity	<ul style="list-style-type: none"> • Use replication logic for multiple-case studies 	<ul style="list-style-type: none"> • With research design
Reliability	<ul style="list-style-type: none"> • Use case study protocol 	<ul style="list-style-type: none"> • When data is being collected • When data is being analysed, and generalisations are evident

Table 5.3 shows five tests of validity (Yin, 2014), compared with the case-study tactic/s and the corresponding phase when the tests were conducted, recorded and/or motivated. This process was followed in detail and is elaborated on in the last section of the next chapter.

5.7.1 Validity applications

The following sections consider the applications of types of validity as analysed by Yin (2014), Shenton (2004) and Rowley (2002).

5.7.2 Construct validity

Yin (2014) and Rowley (2002) explain that construct validity is the identification of the correct operational measures for the concepts being studied. These concepts have been well-defined in the conceptual framework, depicted in Figure 5.3 and the coding of the variables in Table 1.1 and Table 5.1. In the quantitative study, Likert scales (Appendix A, B and C) were used to measure how respondents saw the progress of the independent and dependent variables, and in the qualitative component these same variables were measured by semi-structured questionnaires and through observations of lean progress, as well as by how same related to organisational structure and behaviour. Construct validity was tested and reported on in Table 5.4.

5.7.3 Internal validity

In case study research, inferences without observation were sometimes made and therefore required testing for validity (Shenton 2004; Yin, 2014). The methods used are reflected in Table 5.4 (Yin 2014): pattern matching; explanation building; addressing rival explanations and using logic models. This process of validation was particularly relevant to cases studied in South Africa, since the formation of cellular structures that was covered in the propositions was unlikely to be observed and required detailed work in terms of pattern matching, motivations and addressing rival explanations. It was anticipated that reasons for functionality still prevailed as the dominant approach for organisational structure design in South African discrete manufacturing organisations. This was proven in the case of the F01 organisation that is discussed in the following chapter.

5.7.4 External validity

Tests for external validity, or transferability (Yin, 2014; Shenton, 2004) were related directly to the how and why questions, cross-referenced with the research propositions in Table 5.3. Using this test, the replication of findings and observations from one case study

to the next was identified, in order to determine whether the study's findings were generalisable in the context of the propositions and total analysis.

5.7.5 Reliability

Reliability (also referred to as dependability by Shenton [2004]) was partially achieved with a detailed audit that was conducted by an external person informed in lean processes who vetted the pilot study, based on the case study protocol discussed next. After the audit, the researcher recorded the views gathered by the auditor and compared these with his own findings. An audit report by the case auditor concluded this particular exercise. One more audit was conducted using data from the second case study. Further reliability was supported by keeping a detailed file of all the data collected in the case studies and which provided an audit trail for the process in terms of sources of evidence, the units of research and the research protocol (Yin, 2014).

5.8 CASE STUDY METHODOLOGY RESEARCH PROTOCOL

Using Yin's (2014) framework for the case study protocol was regarded as essential for consistency, validity and reliability. This is provided in Table 5.4.

Table 5.4 Case study methodology research protocol

Protocol Section	Activity	Procedure
A	Scope of case study research communicated to the organisation/s to be approached	<ul style="list-style-type: none"> • Choose organisations to be studied with Lean Institute Africa and obtain services of a case auditor • Send letters of introduction to CEOs requesting permission to conduct the research • Letter of introduction will contain scope and reasons for the research in the form of the research objectives and how and why questions formulated • Arrange first visit with CEO or person delegated after permission is obtained • Explain the protocol and case study procedure • Discuss the protection of the organisation and the interviewees • Discuss and agree ethics and sign confidentiality agreement • Openly share details of questionnaires with reasons

Protocol Section	Activity	Procedure
		<ul style="list-style-type: none"> • Arrange visit days for interviews to suit interviewees' schedules
B	Data collection	<ul style="list-style-type: none"> • Schedule data collection activities for: • The drawing of value stream maps and organisation structures and obtaining in writing the utilisation of lean techniques • Interviews with CEO and team keeping written and/or electronically recorded minutes or recordings • Interviews with selected individuals keeping written and/or electronically recorded minutes or recordings • Interviews with focus groups keeping written and/or electronically recorded minutes or recordings • Obtaining or noting in writing documentation of lean projects and lean story boards and other significant projects and events • Obtaining photographs of Five S and visual management only with permission • Keeping notes or electronic recordings of Gemba visits with CEO if at all possible • Observing in writing and/or electronically records behaviours and relationships regarding lean techniques and how structure is utilised with its implementation
C	Data collection questions	<ul style="list-style-type: none"> • Ask questions about those to be interviewed regarding lean knowledge • Conduct interviews (refer to questionnaires, Appendices A, B, C, E and G) • Ask questions about observed patterns of organisational behaviour and structure of CEOs or delegates. Share details of data gathered and ask questions about things that may have been missed or that go beyond the organisation and case studied • Agree follow-through with CEO and team regarding utilisation of research findings and final thesis
D	Data analysis leading to	<ul style="list-style-type: none"> • Finalise report according to the following framework:

Protocol Section	Activity	Procedure
	findings covered in the case study report	<ul style="list-style-type: none"> • Background and introduction regarding the choices of organisations • This protocol discussed in detail per the procedure followed • The data gathered in terms of the six sources: documentation; archival records; interviews; direct observations; participant observation; and physical artefacts • Interpretation of data leading to findings by relating and comparing actual findings to propositions and hypotheses through the utilisation of validity tests • Reliability analysis by independent auditor • Findings, conclusions and recommendations

Table 5.4 indicates the case study protocol in terms of activities and procedure/s for the multiple case study methodology research. The protocol identified four phases: initial and upfront communications with chosen organisations; data collection; data collection questions; and data analysis covered in the detailed case study report.

5.9 SUMMARY

This chapter has covered the mixed methodology approach used in the study. An approach model based on quantitative logic of inference (King *et al.*, 1994) was developed to link the qualitative case study research to the quantitative research. This was done using multiple regression analysis.

Following the research design selection process, two organisations that had adopted a lean transformational strategy were selected as cases by using a purposive sampling process. The data collection process discussed in the next chapter followed the research methodology to the letter. Sources of data consisted of: documentation; archival records; Interviews; direct observations; participant observation; and physical artefacts.

Analysis of qualitative data as described in the research design resulted in the official findings of this component of the research, utilising: pattern matching and replication with hypotheses and propositions; explanation building; rival theory analysis; and logic models (Rowley, 2002; Yin, 2014), all part of the qualitative aspect of the study. A case study protocol was developed that covered the total research procedure that was followed, as

is discussed in the next chapter. Tests of validity and reliability (Rowley 2002; Shenton, 2004; Yin, 2014) prescribed by the case study design methodology were discussed. The case study protocol included the ethical considerations for the protection of organisations and employees and focus groups chosen for this research.

In the next chapter the research process, data collection and the findings in terms of the field study involving the two case studies are discussed. The chapter also covers the analysis of the data for the quantitative and qualitative phases of the study and identifies the results and findings in accordance with the research design.

CHAPTER SIX: DATA COLLECTION, ANALYSIS AND FINDINGS

6.1 INTRODUCTION

This Chapter will cover the details of data collection, analysis and interpretation of the findings obtained from the study of two case studies, taking into account both the quantitative work as well as the qualitative work as outlined in the research protocol. The data gathered for the research included an analysis of the quantitative study in parallel with the fieldwork done at the organisations that were chosen as cases for this study. Each organisation will be discussed in code as outlined per in the ethical proposal that was approved by UNISA's School of Business Leadership.

During the researcher's presentation of the research methodology (see Chapter 5), constructive feedback was provided by an eminent professor at the School of Business leadership who proposed that discourse analysis (Jørgensen & Phillips, 2002) should be to support the interviews and completion of questionnaires . This approach was followed, leading to the critical analysis of social constructs evident in the case organisations. An important point made by Jørgensen and Phillips (2002) was that, although structures exist at a point in time, their existence is always in a temporary and not necessarily a consistent state. This indication assisted in the understanding of changes to structure and how these affect organisational behavioural change, so important in the context of this research. In context, the word "poststructuralism" is defined by Jørgensen and Phillips, (2002) as a means of solving one of structuralism's traditional problems, that of change. Elaborating, they argue that structuralism's focus is on an underlying and fixed structure, which means that it is impossible to understand change. They believe that change will have to come from considering poststructuralism, in which the structure becomes changeable and the meanings of signs can shift in relation to one another.

In Section 6.2, the first case report is covered in detail and is discussed as the pilot study. The second case report is covered in Section 6.3, using the framework developed in the first case report. The quantitative analysis involving both case data sets is discussed in Section 6.4 and considers the multiple regression relationships between the dependent and independent variables. Section 6.5 deals with the cross-case analyses for the case studies and the resultant replication of patterns in the two cases, providing new principles for lean thinking and discrete manufacturing organisations. Section 6.6 delves further into the research findings to consider the hypotheses and the propositions, cross-referencing these with patterns that emerged. Having covered the qualitative findings in detail in terms of Yin (2014) and the quantitative findings, Section 6.7 provides motivation for case study

research in terms of construct validity, internal validity, external validity and reliability. The chapter is summarised in Section 6.8.

6.2 FIRST CASE REPORT – ORGANISATION F01

F01 is a (Pty) Ltd organisation that is part of a global organisation. As a company it is owned by a multinational corporation based in Indiana, USA. This organisation claims to be the world's largest manufacturer of submersible electric motors and a leading producer of electronic control systems. The USA parent organisation is an Original Equipment Manufacturer (OEM) and its customers use these products in a wide variety of residential, industrial, mining and municipal applications.

Since 1972, however, F01 has been a subsidiary of the global organisation, operated solely as a warehouse and distribution organisation, importing products from the parent organisation's facilities around the globe. The USA parent company is listed on the NASDAQ Stock Exchange and has approximately 2700 employees worldwide. Manufacturing and distribution facilities are situated in the USA, Germany, Czech Republic, Italy, Mexico, Australia, South Africa, China and Japan.

F01 was formed through a merger of three South African organisations, one of which was owned by an entrepreneur, and the other two being separate multinational organisations. All three of these organisations were pump manufacturers and merged to form one pump manufacturing organisation. This South African company was then purchased by the global Indiana-based organisation in 2007 and, with its distribution facility, it established a manufacturing organisation in South Africa, currently based on the East Rand. The South African organisation is essentially a pump manufacturing organisation that services various markets including mining, agriculture, petrochemical and municipal.

6.2.1 Data collected for state of lean of F01 from quantitative data

Appendix A was used in the lean assessment of F01 and this was based on detailed surveys of senior operational management, staff and workers. This questionnaire was also used to determine the state of knowledge of lean thinking among members of the organisation who were interviewed during the data collection phase.

6.2.1.1 State of lean audit-F01

The researcher performed a state of lean organisational audit on information provided in Appendix A. In this regard, he worked closely with the plant manager in order to obtain consensus and understanding. Figure 6.1 shows the state of lean in F01.

Figure 6.1 State of lean of organisation F01 - March 2014

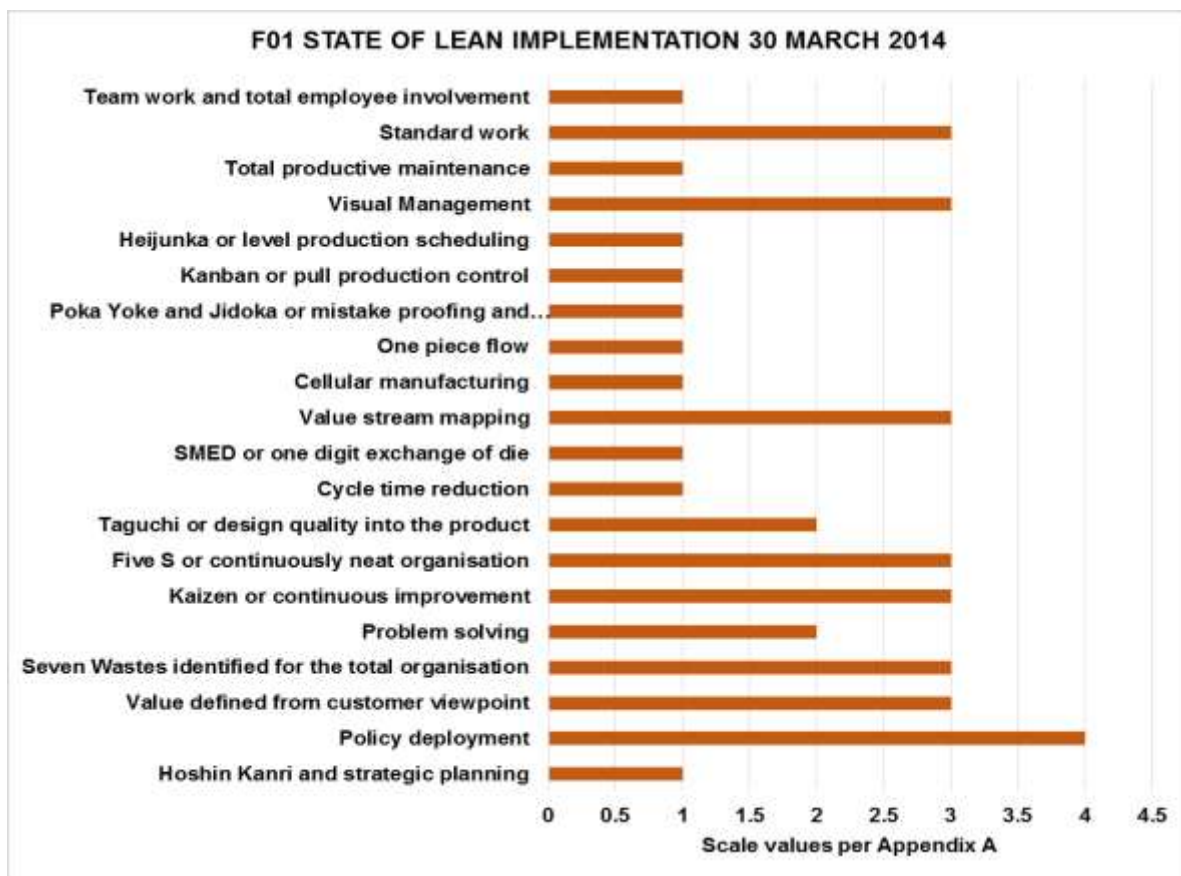


Figure 6.1 indicates that the current focus of the lean programme is on policy deployment, from the customer’s perception of value, seven wastes Kaizen, five S, visual management and value stream mapping and standard work. There were, therefore, nine out of 20 areas where F01 had made significant progress in lean implementation. Detailed interviews indicated that apart from manufacturing, other staff knew very little about the lean process. Some people had participated in cross-functional teams and had become aware of some lean techniques by example. The interview process served as training for most of the organisation and without exception interviewees expressed an appreciation of the opportunity to participate in the research.

6.2.2 Data gathered – qualitative

The qualitative data was collected mainly from questionnaires (Appendices A, B, C, E and G). Appendices E and G were changed to read as line questions and each participant’s responses were written down by the researcher during the sessions. Section 3.5, which covered the lean techniques, was used to explain lean to all those who expressed a wish to know more. When questions about commitment were addressed, the researcher used examples to distinguish between affective, normative and continuance commitment.

When questions regarding attitude were discussed, the researcher requested that interviewees provide examples of positive or negative attitudes.

6.2.2.1 Construct validity for case F01

During the data gathering phase, the following case study tactic illustrated in Table 6.1 was utilised to support construct validity in the first case study.

Table 6.1 Case study tactic utilised for case study F01 construct validity

Case study tactic-F01
<ul style="list-style-type: none">• use multiple sources of evidence• establish chain of evidence• have key informants review draft case study reports

Table 6.1 provides a guideline for the construct validity process that was followed in case F01. The multiple sources were the organisational organograms, the questionnaires coupled with critical evaluation, the lean story boards that were used in Kaizen presentations and the value stream maps that had been prepared by production and quality assurance staff.

The chain of evidence was identified in the main data gathering items and is discussed in the next Section.

6.2.2.2 Organisational structure

Currently, the organisational structure has a matrix format, as shown in the Figure 6.2.

Figure 6.2 F01 Organisational structure

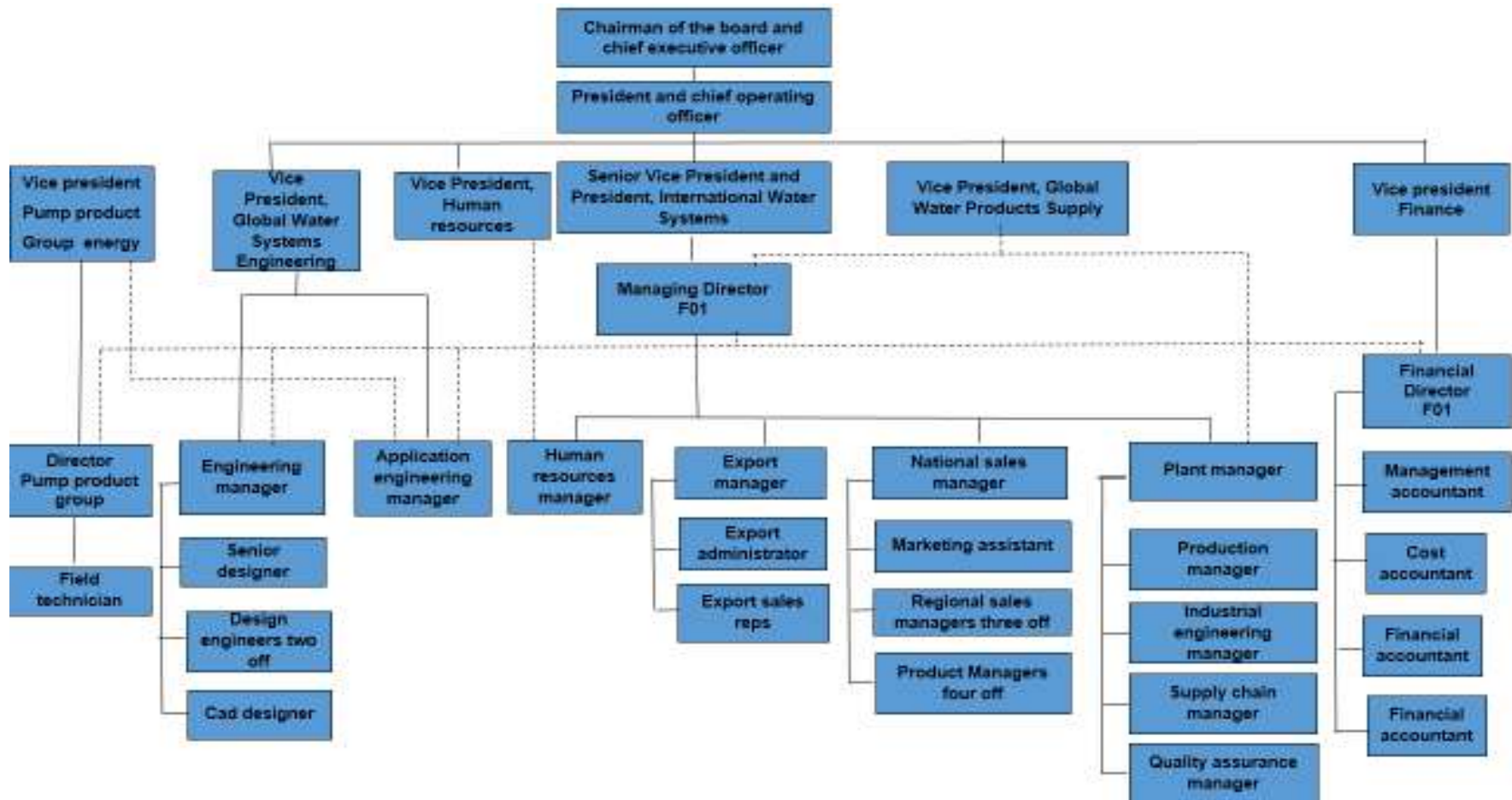


Figure 6.2 shows senior management level up to middle management level of F01. The detailed plant management structure is shown in Figure 6.3

Figure 6.3 Detailed organisational structure of the Plant manager F01

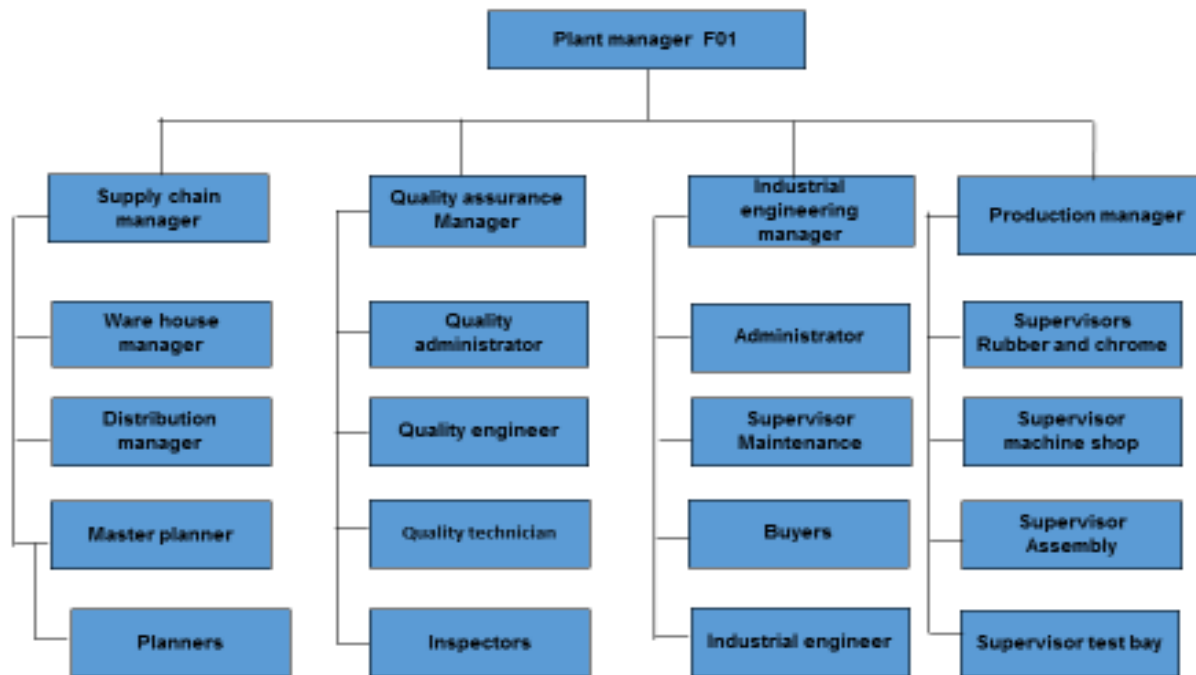


Figure 6.3 shows the organisational structure for the plant manager up to the supervisor or first report level. The F01 current organisational structure is recognised as a matrix type structure by all the senior managers of F01. The managing director reports to the senior vice-president international water systems and the plant manager has a solid line to the managing director of F01 and a dotted line to the vice-president of global water supply, as does the managing director. The vice-president international has personally assumed responsibility for the group Kaizen programme, and there is a Kaizen team established at head office in Indiana who oversees the roll out of Kaizens throughout the world. The design engineering manager reports directly to the vice-president engineering in Indiana and has a dotted line to the F01 managing director. The applications engineering manager has a dotted line to the vice-president engineering, a dotted line to the F01 managing director and a solid line to the vice-president of a product group to do with energy systems. The financial director has a solid line reporting directly to the vice-president finance in the USA with a dotted line to the managing director. A director who was also a previous managing director of the pump company prior to takeover by the Indiana based organisation has a solid line reporting to the vice-president of the energy systems product group with a dotted line to the managing director.

6.2.2.3 Introduction of lean to the organisation

From the analysis, it appeared that the knowledge of lean thinking was limited mainly to the manufacturing staff up to supervisory level, although some senior managers had a good working knowledge of lean thinking. Individuals in exports were aware of lean thinking, having worked in a Kaizen team to improve distribution. The design engineering team had a good working knowledge of lean thinking, and their involvement was evident in terms of the work done on various Kaizens and on configuration management, and in the generation of standard operating procedures. People in accounts had received no training in lean thinking; however, the costing manager displayed a good working knowledge, having worked closely with the plant manager on various measurements and controls. Owing to the matrix structure, the finance department had a direct line to the vice-president finance in the USA and it was explained by the plant manager that their function was very much one of auditing regarding the control of the South African business. Sales staff had an understanding of the lean process from observations of the change in plant conditions but lacked information regarding the principles and techniques of lean thinking. Human resources personnel had no understanding of the lean process

but appreciated the efforts of the plant manager and the Kaizen projects that had been implemented.

Almost 80% of the staff indicated to the researcher that the process had clarified much regarding the lean process. More than 98% of the participants pledged their support to the process and these participants were also more than willing to get more involved in it.

The managing director remarked that lean thinking was viewed by the corporate organisation as being an integral part of total organisational strategy. He said that his superior, a senior vice-president for business outside of North America, had the group Kaizen team reporting to him, and it was this team that was driving the Kaizen initiative throughout the group.

Referring to the Kanban questions in Appendix A, the managing director who had considerable lean experience with the Nissan organisation observed that Kanban as a system needed further consideration and reflection as he believed it destroyed suppliers in the South African context. He had experience of the use of Kanban in Japan and although it worked very well there, he felt that local suppliers were still not sophisticated enough to accommodate such a system.

The plant manager stated that he was aware that lean thinking had not been fully implemented and expressed his determination to introduce the total lean package to F01. He explained that the corporate Kaizen team had been used in specific projects such as reorganising the distribution department and creating a cell for a pump product line to pump water to release methane gas. He indicated that at the outset workers had resisted the changes to the organisation. He also referred to some additional changes made by moving the purchasing function from the supply chain manager to the industrial engineering manager to improve the flow of materials to production. Supply chain staff had not agreed with this change although, in context, it had had to be made to improve supplier performance.

A senior manager observed that there was an issue with senior management buy-in regarding the lean process. He stated that understanding lean thinking presented a definite difficulty for the organisation.

Based on the questionnaire (Appendix E), a senior manager indicated that lean thinking was first introduced to the current organisation in the form of lean six sigma in 2010 by the then CEO in the USA, who have since retired from the group. Since this time F01 had had three changes in the managing director position. Currently, lean thinking had received new

focus from the managing director and the plant manager who joined in August 2012 and September 2012 respectively, in terms of Kaizen events that had been arranged with corporate Indiana. Kaizen events had included a pump rotor cell, distribution flow and an assembly cell.

Of the seven senior managers interviewed, six acknowledged that the transformation on the shop floor had been remarkable in terms of better housekeeping and improved service.

6.2.2.4 Organisational structure changes

As far as changes to the organisational structure were concerned, the researcher had to take a period view regarding how these had evolved in F01. This approach was followed because of the significance of history and the fact that the current changes leading to lean thinking were fairly recent, as was observed from the responses to the questionnaire (Appendix E).

6.2.2.4.1 Functional to matrix changes

While being interviewed (Appendix E), an engineering manager explained that the organisation had changed since the take-over by the Indiana organisation, from a functional traditional structure to the current matrix structure. He set the period effective from circa 2006 to the current date. He was also of the opinion that the matrix had evolved even more throughout this period.

6.2.2.4.2 The view of the managing director

During the interview, the managing director stated that the matrix organisation presented challenges in terms of dotted line interactions, a view that was supported by all the senior managers of the F01 organisation who were interviewed. All regarded cross-functional communications and cooperation as vital for growth and continuous improvement.

6.2.2.4.3 Senior management comments

Senior management at F01 indicated that it had been complex to coordinate within such a structure. The managing director observed that for this reason it had been agreed that the plant manager would report directly to him with a dotted line to the vice-president operations in the USA. One of the senior managers said that the matrix was de-leaning the organisation because of the complexity in balancing what corporate in the USA desired with what was required by F01. Another senior manager stated that the matrix structure had created silos and that this had made it difficult for senior managers to coordinate with each other effectively. The managing director indicated that it would be a good move to

appoint a lean thinking champion who, on a cross-functional basis, could roll out the lean process to the total organisation.

In summary, with the exception of the financial director who could not be interviewed, the current matrix structure evoked similar comments from all the senior managers:

- The matrix structure is a challenge for the total F01 organisation
- A lean champion would help to coordinate the lean programme.
- Corporate should drive through a lean strategy.
- The matrix structure is de-leaning the organisation.
- The matrix structure causes mixed commitments.
- The matrix structure causes silos, and blocks cross-functional integration.
- The matrix structure gives people the responsibility but, not the authority.
- The senior management team at F01 should restructure the organisation within the matrix to ensure the implementation of lean thinking.

6.2.2.4.4 Significant current organisational changes

A temporary change to the manufacturing structure had been initiated by the plant manager. This change required purchasing to report directly to the industrial engineering manager and was considered necessary to improve both the supply of materials to the manufacturing facility and on-time delivery to customers. This change has resulted in some apprehension from people in the supply chain department. However, purchasing staff were pleased that they had been given the authority by the industrial engineering manager to find new suppliers.

6.2.2.4.5 Proposals from the engineering team

Staff in the engineering department, who had been closely involved in some of the cellular Kaizens, commented on the current organisational structure and indicated that more cross-functional teamwork was necessary to assist lean thinking implementation. One of the engineers thought that a flatter structure would be more suitable to the lean process because of the current complexity of vertical and horizontal coordination. However, he did understand that this type of structure was highly unlikely within the confines of the current matrix organisational structure.

6.2.3 Organisational behaviour

The section below provides a summary of data gathered from the questionnaires in appendices A, B, C and E. Where information from the quantitative analysis did not

compare with the data recorded in the qualitative questionnaires (Appendices B and C) and interviews, clarification was sought from the participants. This exercise provided triangulation in the data gathering process.

6.2.3.1 Attitudes of employees

Attitudes were generally found to be positive among interviewees using Appendix E, however there were examples of negative attitudes regarding structural changes and because participants felt that they had not been involved in the lean thinking process.

Perceptual differences existed regarding resistance to change, as a senior manager stated that workers saw all changes as being detrimental to their future. A second senior manager indicated that the workers were a closed book regarding the changes.

6.2.3.1.1 Comments in general

With four exceptions, all 64 F01 employees interviewed displayed a positive, supportive attitude towards the lean initiative and towards the implementation of specific techniques. While initially apprehensive, people had become more supportive and helpful since September 2012. When asked for reasons for attitudinal change, employees indicated that lean changes had shown the benefits of a cleaner plant, improved working climate and understanding supportive leadership. Production supervisors indicated that their leader had changed from being dictatorial to one who was willing to listen and work with them rather than insisting on what should be done.

Four people expressed negative attitudes: one was a manager who indicated that production performance was not up to scratch and that on-time delivery plagued the organisation. However he did express interest in the lean thinking process and said that he was willing to learn more; a planner stated that he had never been involved in the lean process. He believed that people should be careful since they were disciplined if they stepped over the line. He cited a case where a packer who had refused to pack a painted part that was still wet had been disciplined for refusing to follow instructions; two people displayed negative attitudes towards the lean process since they felt that they had not been consulted and had not been involved.

6.2.3.1.2 Comments from engineering staff

Engineering staff responded as a team that the workload was overwhelming as a result of the nature of the business; a large proportion of the work was the configuration of pump sets before these could be processed through planning and eventually through the plant. In a sense, these engineers often burdened with expediting work because requests for

progress would be directed to them through the engineering manager. The purchase of technical requirements also added to their stress because there was a lack of downstream skills to comply with requests for costs and prices. This team indicated a strong affinity with and appreciation for the lean thinking process and expressed their willingness to actively participate in the process.

6.2.3.1.3 *Comments from managers in sales*

One product manager observed in a private conversation that people had become increasingly negative about the situation over the last five months. He believed that the reason for this was that they felt uninvolved. He suggested that more feedback was necessary regarding the future direction and why certain organisational changes had occurred within the sales department.

Product managers, although positive about the lean programme, expressed a concern regarding service from the factory and indicated that they had not observed any real improvements since lean implementation some eighteen months ago. Having gone through the questionnaires with the researcher they indicated that they would be willing to participate in the lean process. Regional sales staff expressed an appreciation for the visible improvements in manufacturing although they had concerns about service delivery, Product managers and the regional manager assured their full support for the lean thinking programme.

Export staff was positive about lean thinking. It appears that the department had a positive attitude, and all those interviewed expressed appreciation for the leadership of the organisation. Staff in this department also showed an appreciation for teamwork and expressed their appreciation at being able to contribute creatively to the success of the organisation

6.2.3.1.4 *Comments from supply chain staff*

Supply chain staff exhibited a limited knowledge of the lean thinking process. They did, however, comment on the visible improvements and indicated that service delivery was improving. There was some apprehension regarding the temporary structural change that had recently occurred, with the purchasing department now reporting to the industrial engineering manager.

6.2.3.2 *Communications with management and workers*

From the responses to questionnaires in appendices B and C and E it appeared that communications were free flowing among managers and workers at all levels. Virtually all

those interviewed remarked that it was easy to communicate vertically and cross-functionally. At the lower levels in the organisation, some reservations were expressed regarding the flow of communications.

6.2.3.2.1 *The managing director's view*

The managing director indicated that workers had misinterpreted progress, as was illustrated in the experience of the organisation acquiring a Rand multi-million plant. After this expansion and implementation, employees questioned why this had been done and argued that the money involved should have been used to benefit workers.

6.2.3.2.2 *Managing director initiatives – Gemba and tank talks*

The managing director stated that the weekly Gemba walks through the plant had significantly improved involvement of workers. On his own initiative, he had introduced a quarterly tank talk for the whole organisation regarding organisational prospects, growth and progress.

6.2.3.2.3 *Green areas*

The plant manager had introduced green areas in the manufacturing section and together with some excellent visibility work, workers were becoming more involved in the lean implementation process. During the researcher's interviews with the shop stewards, their appreciation for the green areas initiative was evident.

6.2.3.3 *Employee commitment and involvement*

Regarding commitment, the researcher consistently explained to interviewees that affective commitment had to do with a person being totally aligned with the organisation to that the point where such a person would be willing to go beyond his normal duties should the need arise. Other types of commitment were described as being committed because of having a job or feeling committed as a result of service and job security. Most people interviewed saw themselves as being committed to their job by going to work and doing the best they could.

Without exception, all senior managers stated that they were highly committed to the organisation and, with only one exception pledged their commitment to the lean thinking process. This was confirmed from the data obtained from the other questionnaires (see Appendices A, B and C) that indicated a high level of commitment from all senior managers.

6.2.3.3.1 Shop floor commitment

Both the human resources manager and the industrial engineering manager commented in their responses to Appendix E on the initiative of a forklift driver who felt obliged to report to the human resources manager that production was making parts that had excessive stock available. Both the human resources manager and the industrial engineering manager had responded to the forklift driver's initiative and had taken appropriate action to correct the situation. The industrial engineering manager explained the disadvantages of materials requirement planning, stating that the system would have generated a purchase order for the materials that had been issued to production, had the intervention not have taken place.

6.2.3.3.2 NUMSA shop stewards

In a meeting with three National Union of Metal Workers (NUMSA) shop stewards on 2 April 2014, the researcher was impressed with the maturity and concern they expressed. The three employees had been invited to participate in a session involving the questionnaires in Appendices A, B, C and E. Although they were aware of the changes at F01, they expressed a desire to learn more about the lean thinking process and the researcher explained the concepts, using examples from the literature. At the end of this session, the following comments and proposals were noted: a machine that had required a shaving removal conveyor had been removed by maintenance some four months ago and not yet been replaced. It was remarked that the conveyor was causing delays and downtime as a result of constant stoppages required to remove the shavings; a second comment was made about trolleys that had been purchased for Kaizen exercise. Workers had asked management to look into their suitability and to repair damaged trolleys; steel pallets with spikes had been purchased, causing work in progress to fall off during forklift handling. It was proposed that these be modified or replaced with more suitable pallets; it was proposed that management initiate a detailed stocktake and that obsolescence be detailed with a view to recovering parts to be sold as parts currently in demand. Re-rubber lining rotors were used as an example of how parts could be recovered to form part of current demand items. Concerns were raised regarding unreasonable disciplinary action against a worker who had refused to pack a pump on which the paint was still wet. The shop stewards left the session with an offer to participate in the research. Interest was positively expressed in employees working together with management and supervisors to assist in the lean thinking process.

6.2.3.3.3 Sales staff and commitment

Sales clerk CM01, who had actively participated in the reorganisation of the distribution area, expressed a keen interest in the lean process and was extremely motivated by being invited to participate in the cross-functional team that had succeeded in what appeared to be the very effective layout of the area. This had led to improved service in the F01 organisation. She nonetheless expressed her disappointment that she had not been invited to the feedback session with management after completion of the Kaizen.

An export administrator observed that her department had worked effectively as a team when they were waiting for the export manager's position to be filled. She was of the opinion that the team had continued to keep to the expected targets but that the pressure had been considerable. With the management position having been filled, she felt confident in her superior and stated that the team was performing well and meeting its targets. She indicated that her manager was a constructive and positive leader who allowed free discussion and analysis. She emphasised that he was a person who welcomed ideas for innovation and trial runs. Regarding commitment from the shop floor, she referred to an RM2.4 order that could not be processed because of its poor quality. She felt that the shop floor was not committed to meeting the requirements of quality standards. As far as lean thinking was concerned, she explained that she had participated in the Kaizen initiative to improve dispatch and had learned much from the exercise. She felt that the more involved people were, the more committed they would become to the lean initiatives.

A product manager responded that his commitment was to support the company. He felt that his future was with the organisation and he expressed a wish to stay with the organisation until his retirement. He indicated that most people were committed to coming to work and just doing their work. On the question of affective commitment, he noted that two senior managers were willing to go out of their way for the organisation.

6.2.3.4 Empowerment and teamwork

Although there was no direct evidence of purposeful empowerment of workers at shop floor level regarding the lean initiative, there were pockets of evidence where workers were taking the initiative to management. This was demonstrated by the forklift driver's reaction to overproduction and the packer's refusal to pack a wet pump.

Further evidence of empowerment was witnessed in the input received from a sales order clerk who reported that she had interacted cross-functionally with people in internal sales,

planning and the warehouse to complete a task and get an order processed for a customer.

An employee in finance who was interviewed using Appendix E remarked that although she had not received any lean thinking training, she had empowered two cleaners to work on the finance system. Both these employees made remarkable progress and were eventually promoted, one to the position of debtor collections clerk and the other of receptionist. She explained that she had achieved this remarkable turnaround through the effective utilisation of people working at this F01 remote facility situated in a Southern African country by means of teamwork and following through on involvement and initiatives from team members.

There were no evidence of cross-functional teamwork driving the lean thinking programme; however, Kaizen initiatives had been driven by the corporate Kaizen team, as could be seen in lean story board evidence from a pump product cell and the development of an improved flow line for the distribution department.

The shop stewards' meeting revealed that a setter programmer felt empowered since his supervisor had given him total freedom to alter, change and improve computerised numerical control programmes for his machining centre.

6.2.3.5 Cellular manufacturing

An exercise using the questionnaire (Appendix E) yielded specific views regarding manufacturing cells in the context of F01's work in lean development. The F01 engineering group had played a prominent role and the team had involved Kaizen corporate individuals visiting the F01 facility. It appeared that a well-developed manufacturing cell had been implemented, complete with flow and pull techniques. However, the cell had not been able to function effectively owing to supplier issues and the inability of cell members to comprehend the concept fully. The plant manager stated that at the moment, manufacturing cell designs were being considered by a cross-functional team consisting of production, engineering, industrial engineering, quality and maintenance managers as well as supervisors.

The manufacturing cells that had been developed were carrying out pull production on the shop floor although the control planning system was still a push system. The comment made by the plant manager in which he stated that MRP had not been switched on was an issue in deciding on push versus pull production; however, the plant manager clarified

this by indicating that the intended system contained good elements that the organisation would be able to use in pull production.

A visit to the factory confirmed that the layouts were being focused on in order to achieve maximum flow benefits from cellular manufacturing within the confines of current supplier issues.

6.2.4 Focus group session at F01

With F01's senior management team assuming the role of a cross-functional team for lean implementation, the researcher met with them at 8h30 on Thursday 10 April 2014 in order to establish whether the individual data gathering sessions had been supported by data obtained from the focus group session.

In attendance was the vice-president engineering from corporate Indiana, USA, the managing director, the financial director, the plant manager, the engineering manager, the export manager and the national sales manager.

Triangulation was the motive for the session in terms of the research disciplines, however the session had another objective, namely to determine the extent of lean thinking in the F01 organisation. This approach was based on the fact that the data from Appendices A, C and E indicated a strong manufacturing focus in the F01 organisation.

6.2.4.1 Roles and responsibilities analysis of the F01 senior management team

Using the questions in Appendix H as the basis for the session, the interview process commenced with an analysis of how the senior management team saw their and responsibilities in the lean implementation process. The managing director indicated that lean thinking was part of organisational strategy and confirmed that the team was planning to roll out lean thinking to the total organisation and that each team member would be given a lean thinking key performance indicator. An example was provided by the export manager who confirmed a Kaizen project in progress with the establishment of a branch in a remote Southern African location. This Kaizen, the managing director explained, would involve all the organisational inputs obtained from, for example, the plant manager, the product managers, the human resources manager and other members of the senior management team as the Kaizen developed. He noted that the export manager had been appointed as project manager of this project, which had a lean element attached to it. In this sense the export manager would be leading the project with the whole senior management team involved. The national sales manager explained his role as one of providing accurate market and product information to assist the manufacturing effort to

achieve improved flow and on-time delivery. The engineering manager observed that his department was subconsciously applying the lean disciplines through their direct involvement in Kaizens and product development. He stated that it was his intention to roll out his department's work in conjunction with other departments, with greater focus on lean principles and disciplines. The plant manager explained that the senior management team was part of the whole and that cross-functional teamwork would be utilised with other organisational units such as, for example, plant employees working with sales employees to achieve the desired results. The human resources manager said that it was his role to support the various efforts of the organisation in terms of the lean programme. The vice-president engineering believed that Corporate saw lean as a journey, and it was a question of maturity whether lean disciplines would be well used throughout the group. He explained that he had been given a global KPO to apply lean thinking to the engineering product development process. He cited the example of a value stream map that had been done for engineering. The map had revealed major deficiencies that had had to be resolved. He explained that the F01 facility was a collection of various different organisations and that the F01 senior management team had made great strides over the past three years in the journey to lean thinking.

6.2.4.2 Senior management team perception of lean disciplines and techniques

in discussing how the senior management team perceived the lean disciplines in the context of F01, the managing director stated that all the basic lean principles were being applied although how they were being applied had not been formalised. As far as plant functionality was concerned, he believed that the best possible practises had been considered. As these practises were implemented, it was the intention to roll them out to the total organisation.

6.2.4.3 Senior management expectations of lean

The managing director stated that he expected the lean programme to achieve world class competitiveness. The export manager agreed with the managing director's viewpoint. On the question of how lean thinking would be applied to the total organisation, the priority of rolling out the plan to the plant was emphasised.

6.2.4.4 Senior management team's method of cross-functional activity regarding lean thinking

The managing director indicated that the team would focus cross-functionally, firstly on the factory, then on distribution, followed by product development. He stated that, the

organisation had an acceptable product currently, but that market expectation was such that costs would have to be reduced and therefore the focus would have to be on production if efficiency was to be improved. He added that the organisation had difficulties with profitability and it was therefore necessary to make production a priority. Regarding product development, the engineering manager stated that they were driven globally by requirement. In terms of how product development was executed according to lean principles and what to develop and speed up to market, the vice-president stated that it had proved difficult to obtain data regarding competitor focus and other factors. He said that there was an opportunistic approach to product development around the globe. Regarding lean thinking, he said that cross-functional value stream mapping had revealed the need for improved engineering and customer and market interface. The team agreed that the value stream mapping exercise applied cross-functionally was an effective method of identifying areas for improvement. However, the managing director emphasised that the South African portion of product input costs was only 40% and that the remainder consisted of imports in packaged form. He further noted that since competitor information on how to go to market was not available, the organisation had to rely on customer expectations and this was regarded as a high-risk situation for the organisation.

6.2.4.5 Organisational restructuring considerations by the senior management team

The managing director stated that according to the lean thinking roll out plan, the organisation would determine structures that worked well with the best practices being developed. He saw this development as taking place over the next three years but believed that was difficult to say how the structure would evolve at this point.

6.2.4.6 Senior management team's understanding of organisational behaviour in terms of lean thinking

The researcher provided feedback from his research findings that employees generally felt positive about the lean programme. Employees had experienced some benefits from lean thinking in terms of visible management and housekeeping and an openness on the part of the managing director to communicate. The plant manager stated that downwards communications would have filtered the lean process details and that the understanding was therefore still limited. The financial director observed that his impression was that there was still considerable resistance to change from the workforce. The managing director explained that resistance to change had led to the dismissal of three shop stewards and the whole workforce receiving a written warning. Since then, the situation

had improved with more negotiations taking place in the NUMSA management meetings, the Gemba walks and the quarterly tank talks. The managing director explained that taking the approach of negotiating proposals had resulted in concessions from both sides and that this had given rise to a climate of resolve rather than of confrontation. He believed that the fact that the shop stewards were willing to participate in the research was an example of their commitment to participating and resolving issues.

Considering organisational behaviour in terms of commitment of employees, the export manager stated that he believed that commitment in the organisation was very high. Regarding how to cultivate affective commitment, his experience had taught him to involve employees at the outset when issues were to be resolved. He said that this approach, together with obtaining input for solutions, encourages affective commitment. The managing director supported this viewpoint, adding that workers were essentially still motivated by money and that the organisation was considering sharing the proceeds from benefits with workers in the near future. He explained that this would entail a step-wise approach that would be assessed as more progress was made and more benefits gained. The plant manager said that involving workers cross-functionally in a team with sales staff and discussing customer expectations such as on-time delivery would lead to more affective commitment. The sales manager commented that his team, despite going through periods of low morale, had maintained their commitment through positive leadership, which had encouraged them to keep going and to achieve past high levels. The financial director observed that the organisation had made significant progress with lean thinking implementation but stressed that poor logistics were adding to the frustrations that had been experienced by the sales and senior management team. The managing director agreed, saying that the sales team was frustrated but had kept their morale high by showing excitement every time a significant sale was achieved. He stated that it was an operational requirement that the on-time delivery issue was resolved before any other improvement activities were considered for the plant.

6.2.4.7 Empowerment and teamwork at F01

Reacting to the question of how the senior management team saw empowerment of employees, the plant manager believed that the next step in the lean programme was to involve workers directly in cross-functional teams, in the same way that corporate was implementing their Kaizen initiatives. This proposal was identified by the researcher as an effective method for empowerment. The researcher provided an example of good teamwork experienced in his individual interviews, where employees in the export

department had expressed their appreciation of their manager's leadership style of involving them in problem-solving sessions. The example was confirmed by the export manager.

6.2.4.8 *The lean programme going forward from current state at F01*

The focus group session concluded with the team considering the lean roll out process. It appeared that lean thinking was regarded as separate issue from that of on-time delivery. The financial director referred to the switch-on of the new computerised management system as a positive step for the organisation, explaining that this system would go some way towards resolving current difficulties in on-time delivery. He also referred to deliveries from foundries that had been set at six weeks and that there was no way to change this. The managing director stated that the organisation had to integrate the lean thinking initiative with organisational structural issues at hand. Specifically, the purchasing, planning distribution and warehouse functions would be looked assessed in terms of possible restructuring within the matrix structure of the total organisation. These things would be looked at as lean thinking evolved but the first step was to get the on-time delivery issues resolved as a priority. The team was thanked by the researcher for their input and contribution to the study.

6.2.5 Interpretation and analysis of data for case F01

From Chapter 5, the following tactic illustrated in Table 6.2 was used in the analysis of data from the questionnaire (Appendix H):

Table 6.2 Internal validity tactic

Internal validity	<ul style="list-style-type: none">• Do pattern matching• Do explanation building• Address rival explanations• Use logic models	<ul style="list-style-type: none">• When data is being analysed• When data is being analysed• When data is being analysed• When data is being analysed
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Using Table 6.2 as a guideline, the detailed analysis of the questionnaires is summarised in Appendix J, which is a word analysis of each of the responses received from the participants. The data were analysed by means of pattern matching and explanation building following the method identified above.

6.2.5.1 Pattern matching

As discussed under research methodology, pattern matching was conducted based on the hypotheses and propositions and was concluded when the quantitative findings were presented in the form of the multiple regression analysis discussed in Chapter 5.

6.2.5.1.1 Pattern matching and explanation building in terms of the research propositions

During the research process and especially in the pilot case study at F01, the emerging patterns relative to the how and why questions kept occurring to the researcher mind as the research progressed. This aspect bred confidence in Yin's methodology (Yin, 2014) of using pattern matching with explanation building.

Using the propositions, the links identified in the questionnaires and the responses from the individual participants, the analysis was conducted and is presented in Table 6.3, which reflects a detailed explanation building of the identified patterns emerging from the questionnaires, the observations and the interview details.

Table 6.3 Pattern matching for organisation F01 in terms of the research questions and propositions

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Research question - How	How is the organisational structure and behaviour significantly influenced by lean thinking when implemented?	
Main research proposition MP1	MP1 The implementation of lean thinking will significantly influence the organisational structure and behaviour and will compel the organisation to undergo significant changes regarding structural and behavioural characteristics. These characteristics may be determined by analysing and testing the identified hypotheses of the research area per Section 4.5 and by pattern matching per this analysis.	
Pattern MP1P1	Structure – Since the commencement of lean implementation in September 2012, the organisation has begun to make structural changes to improve flow: the buyers are reporting to the industrial engineering manager; the plant manager is reporting to the managing director who reports to a vice president in the United States; positional changes have occurred with new employees who know more about lean processing and a service centre manager has been appointed.	MP1Q3.1.1; MP1Q3.1.2;
Pattern MP1P2	Structure – Some members of the senior management team find that the matrix structure is an issue, for example, that the structure is de-leaning the organisation; the structure allocates responsibility without authority; the matrix creates silos making cross-functional interaction complex.	MP1Q3.1.19; MP1Q3.2.1; MP2Q1.2.18; Paragraph: 6.2.2.4.3;
Pattern MP1P3	Structure – The senior management team has undertaken to implement a three-year plan to fully implement lean and to change the organisational structure to accommodate the lean implementation process.	Paragraph: 6.2.4.4; 6.2.4.7

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Pattern MP1P4	Behaviour – Since the introduction of lean in September 2012, employees, from initially being highly resistant, are becoming more accepting of the changes. Lean process has mainly involved manufacturing employees up to supervisory level; however, sales, engineering and export staff have had some exposure to the lean process regarding the participation in corporate initiated Kaizen projects and projects initiated by the plant manager.	MP1Q3.2.1 to MP1Q3.2.27
Pattern MP1P5	Attitudes – Have started to change with employees who were initially negative becoming more positive, owing to: employees being involved in Kaizen projects; healthy competition amongst production units with prompt feedback regarding performance against targets; employees finding that superiors are more open to their suggestions; the focus on achieving results; more teamwork and opportunities for employees to work together; employees experiencing new learning; employees being keen to learn; employees becoming more aware of the benefits from lean, for example a clean working environment achieved with five S, and employees responding positively to green area meetings, and problem-solving.	MP1Q3.4.1 to 28
Pattern MP1P6	Commitment – During the research period, employees were found to be mainly normatively committed to the organisation, seeking job stability and security; however, some workers are becoming more affectively committed: realising the benefits of lean process, for example a worker reporting the manufacturing of excess stock to senior management; more active participation in Kaizen events; goal alignment; experiencing improved organisational results; management responding to workers' initiatives; being empowered, for example remote Southern African facility where ordinary workers are running the financial system and employees are interacting cross-functionally to improve departmental performance.	MP1Q3.4.1 to MPQ3.4. 28

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Research question - Why	Why is the organisational structure and behaviour significantly influenced by lean thinking when implemented?	
Main research proposition - MP2	MP2 The implementation of lean thinking will significantly influence the organisational structure and behaviour as a result of the requirements of the lean disciplines and techniques that lead to: total employee involvement; employees having to work in cross-functional and work teams, leading to self-directed work teams to implement these techniques; the empowerment of employees to implement specific lean techniques that will influence the organisational leadership, structure and behaviour.	
Pattern MP2P1	Employee involvement – Since September 2012 employee involvement has occurred: through Kaizen projects with support from USA Kaizen team involving employees from engineering, manufacturing, industrial engineering, planning, distribution, warehouse, receiving, quality control and even some sales people; some formal training has been done by management and especially by the plant manager; the industrial engineering manager has been appointed to implement Kaizen for the organisation by the plant manager; the industrial engineering manager has been appointed to implement Kaizen; the cascading of objectives to individuals per Hoshin Kanri technique; involving workers in five S, visual management, and problem-solving.	MP2Q1.1.2 MP2Q1.2.2; MP2Q1.2.7; MP2Q1.3.1.2
Pattern MP2P2	Teamwork – Since September 2012, more internal team structures have been developing with: cross-functional teams and green areas teams in manufacturing, warehouse, distribution and receiving.	MP2Q1.3.1.21;
Pattern MP2P3	Empowerment – Since September 2012, workers have become more empowered with: supervisors being given signing authority on up to R5000; ideas sharing in green area meetings; workers making decisions previously reserved for supervisors, in the rotor cell; buyers being	SP2Q1.2.2 SP2Q1.2.5; SP2Q1.2.9;

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	empowered to make new supplier decisions and workers being allowed to interact directly with senior management without fear of reprisal.	SP2Q1.2.11; SP2Q1.4.6
Research Question - How	How will the organisational structure change with the implementation of lean thinking?	
Sub research proposition SP1	SP1 The organisational structure will change fully to accommodate flow and pull, which will lead to organisational structures that will accommodate customer requirements in the form of manufacturing cells. This means that: lean techniques leading to flow and pull (refer to Figure 5.2) will be implemented using, at the outset, cross-functional teams to establish effective and efficient manufacturing cells; once established, self-directed work teams will follow Kaizen routines in order to optimise manufacturing cell effectiveness and efficiency; organisational functions required to accommodate the environment and to fulfil organisational operational requirements will be covered by self-directed work teams within the established manufacturing cells; the number of hierarchical levels will drop significantly in order to accommodate a low locus of decision-making, Hoshin Kanri and to service self-directed work teams; and within the manufacturing cells, self-directed work teams will implement the lean techniques that will assist with manufacturing cell optimisation.	
Pattern SP1P1	Structure – Organisational structural changes are starting to occur with: buying moving to industrial engineering to improve flow from suppliers; a service centre manager has been appointed to improve customer service.	MP1Q3.1.2; MP1Q3.1.1; refer to MP1P1; SP1Q1.7.2; SP1Q1.7.5

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Pattern SP1P2	Structure – Corporate Kaizen team facilitates Kaizen projects for F01 in South Africa creating and working with cross-functional teams. For example, the design and implementation of the NPD manufacturing cell utilising lean techniques such as: value stream mapping; tact and TAKT; single piece flow, SMED and Kanban pull; workers recognising cellular manufacturing benefits.	SP1Q1.2; SP1Q1.3; SP1Q1.2; SP1Q1.3; SP1Q6.1.2; VSM per lean storyboard from CJ01SEN; SP2Q2.5.4
Pattern SP1P3	Structure and behaviour – Workers are aware of working in manufacturing cells and are contributing in green areas relative to specific manufacturing cells such as the rubber and rotor cells.	MP2Q1.3.1.10; SP1Q1.8; MP2Q1.1.11
Pattern SP1P4	Structure – The plant manager is working towards making teams in manufacturing cells self-directing. The assembly cell supervisor is achieving self-direction with her team.	SP6Q3.2; SP5.1Q 1.1.3;
Pattern SP1P5	Structure – An assembly cell has been established by the plant manager and his team, to deal with product configuration requirements. Configured assemblies are supplied to customer order.	SP1Q2.8
Pattern SP1P6	Structure – Engineering is working cross-functionally with industrial engineering, planning, and sales and manufacturing assembly to configure product data packs for product configurations.	SP1Q1.1.13; SP1Q7.8
Pattern SP1P7	Performance – Organisational changes in structure and teamwork are improving organisational performance. Productivity has improved from 40% to 76% and on-time delivery from 40% to 62%. A key supervisor has achieved success with manufacturing cells and has expressed his view that the total organisation should work like a manufacturing cell.	SP1Q7.1.2; SP1Q7.2.5 SP1Q7.1.15;

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Pattern SP1P8	Structure – Organisational structure changes that are proposed by employees point to: the appointment of a lean champion; establishing a flatter leaner structure; awareness of the advantages of teamwork and countering the effect of organisational silos with cross-functional teams; more integration of departments; complete cellular manufacturing with a cellular structure.	SP1Q8.3.7; SP1Q8.3.9; SP1Q8.3.10; SP1Q8.3.12; SP1Q8.3.15; SP1Q8.3.20
Research Question - Why	Why will specific organisational changes be required in lean thinking implementation?	
Sub proposition SP2	SP2 Specific organisational changes identified per proposition SP1 will be implemented primarily to improve the competitive performance of the organisation in terms of the performance constructs identified in Section 5.2.1.3 and continuously to improve on the lean transformation process in order to: facilitate cross-functional team and eventually self-directed work teams; empower employees to implement the lean techniques; reduce functional and leadership impediments that block lean transformation; and cultivate new organisational behaviours that will lead to improved lean performance and to a creative and constructive lean culture.	
Pattern SP2P1	Structure – During the research period (7 March to 10 April 2014): Senior management and middle management are working on Kaizen projects that involve cross-functional team members; the manufacturing supervisors had formed a team; the distribution department formed a team under the guidance of a new manager; open office floor plan to encourage teamwork has been implemented; export manager was replaced with a lean conscious manager and exports were working as an effective team.	SP2Q1.1.2; SP2Q1.1.3; SP2Q1.1.7 SP2Q1.1.12;

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Pattern SP2P2	Structure – Green area team meetings had been introduced, and workers were meeting every morning according to a set agenda.	SP2Q1.1.10
Pattern SP2P3	Behaviour – Empowerment – During the research period there was evidence of empowerment as follows: The plant manager was empowering workers, encouraging them to stop and mend things that cause manufacturing delays; selected employees in manufacturing have been trained to implement Kaizens; engineering designers have been empowered to provide design initiatives and operators are becoming more multi-skilled.	SP2Q1.2.2 SP2Q1.2.5; SP2Q1.2.9; SP2Q1.2.11; SP2Q1.4.6
Pattern SP2P4	Structure – Leadership – Significant to this research, the leadership changes identified were as follows: Early 2012, engineering manager was replaced by a manager who understands lean processes; since September 2012: Plant manager and managing director appointed with lean experience; Export manager replaced with a manager who understands lean process	SP2Q1.3.2
Pattern SP2P5	Behaviour – Communications in manufacturing improving with: green area meetings; managing director’s quarterly tank talk; point Kaizens with constant worker involvement; employee suggestion boxes; open door approach of managing director; more visits from senior management to the shop floor; signs and notice boards showing before and after improvements; more transparency and dialogue; more data regarding organisational performance being presented on information boards.	SP2Q2.1.2; SP2Q2.1.3; SP2Q2.21; SP2Q2.27
Pattern SP2P6	Behaviour – Respect – Although there were still some employee concerns: more, open door, interactive communications has led to improvements; there is more recognition of employee contributions; the new plant manager is behaving respectfully; more teaching, coaching and comprehension has resulted in earned respect; respect has improved with workers realising and appreciating the benefits gained from the changes.	SP2Q2.2.6; SP2Q2.2.8; SP2Q2.2.12; SP2Q2.2.16; SP2Q2.2.18

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Pattern SP2P7	Behaviour – leadership – Although there were still some employee concerns, leaders are less autocratic, more humble and are listening more to employees; leaders stick with standard operating procedures; workers are asking for more recognition in the lean process; workers have become more responsive; and managing director has an open door approach.	SP2Q2.3.2; SP2Q2.3.7; SP2Q2.3.10; SP2Q2.3.15
Pattern SP2P8	Behaviour – Attitudes – Since lean implementation, after September 2012, attitudes: were decidedly negative at the outset, resulting in disciplinary action and some dismissals but had improved significantly, with employees participating in the lean programme; more awareness, involvement and appreciation by workers.	SP2Q2.4.2; SP2Q2.4.4; SP2Q2.4.6
Research Question – How	How will the organisational behaviour change with implementation of lean thinking?	
Sub research proposition SP3.1	SP3.1 The organisational behaviour will, at the outset of the transformation process, be characterised by a high degree of uncertainty, speculative communications, and a lack of commitment, negative attitudes, and leaders who are reluctant to relinquish power.	
Pattern SP3.1P1	Behaviour – Attitudes – With the implementation of lean after September 2012: middle management was split for and against; employees felt uncertain about their future; job losses were experienced; people had mixed feelings; people were not consulted; workers were against changes; people reserved their feelings.	SP3Q.1.5 SP3Q1.1.6 SP3Q1.1.12 SP3Q11.1.17 SP3.1Q11.1.18 SP3.1Q11.1.19

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
<p>Sub research proposition SP3.2</p>	<p>SP3.2 After the lean process and the lean strategy have been thoroughly discussed by the leaders of the organisation and after thorough development and training has been implemented with total employee involvement, the organisational behaviours will change as follows: commitment will become more affective, with a major portion of the employee complement committing to organisational vision, mission, goals and objectives; perception of leadership will improve from disillusionment to understanding why the lean process is required; participation and involvement will improve, with employees providing creative and effective solutions to achieve flow and pull in the organisation and continuously to improve on routines and standardised work; roles and responsibilities will change, with employees displaying a willingness to take on more than their respective original functions and job descriptions; knowledge of lean process will improve to a total understanding and appreciation of how full implementation of all the lean techniques leads to ever-increasing organisational performance; attitudes will change from passive to active participation and involvement in finding solutions rather than creating problems; respect will improve with employees being recognised and rewarded for both their individual and team contributions.</p>	
<p>Pattern SP3.2P1</p>	<p>Commitment – Top to first-line management affectively committed with some evidence of affective commitment from workers: forklift driver reporting manufacture of excess stock; shop steward providing improvement ideas to researcher to replace a shaving conveyer, improved pallet designs; and a sales clerk who participated in a cross-functional distribution team contributed to improvement ideas.</p>	<p>Paragraph: 6.2.3.3.1; Paragraph: 6.2.3.3.2; Paragraph: 6.2.3.3.3</p>

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Pattern SP3.2P2	Perception of leadership – has improved since lean implementation, owing to leaders: being seen as helpful; involving the people; listening to the people; seen as knowing what they are doing; being held in high regard; more than 60% of employees supporting the leadership; providing confidence; clearly communicating; being accommodating; and having an open-door policy.	SP3.2Q1.1.2; SP3.2Q1.1.3; SP3.2Q1.1.9
Pattern SP3.2P3	Commitment – Improved commitment to the vision, mission, goals and objectives: Hoshin Kanri utilised with each worker having been allocated an objective; major portion of management, staff and workers accepting where organisation is going.	MP1Q3.5.2; MP1Q3.5.3
Pattern SP3.2P4	Teamwork – is increasing: new multi-functional teams and production monitoring upstream and downstream has been appreciated by the shop floor, and green areas teams are developing with employees responding favourably.	SP3.2Q1.2.2 MPQ3.3.11;
Pattern SP3.2P5	Roles and responsibilities – More role and responsibility changes: responsibility changes with operators being held personally responsible for their performance for output and quality; people have become more flexible and multi- skilled, sorting out their areas, being more pro-active and reliable; role changes for the supply chain and industrial engineering manager with buyers moving to industrial engineering; role changes for buyers selecting new suppliers; basic worker role changes when promoted to operator level; team leaders are being rotated.	SP3.2Q1.3.2; SP3.2Q1.3.4; SP3.2Q1.3.5; SP3.2Q1.3.6; SP3.2Q1.3.8; SP3.2Q1.3.10; SP3.2Q1.3.14.
Pattern SP3.2P6	Knowledge of lean – Increasing knowledge of lean process: workers keen to learn and improve with lean; mainly operations employees involved in lean up to supervisor level; workers have been involved in the standard operating procedures; employee exposure to lean in cross-functional teamwork initiated by corporate team per examples from receiving lean value stream	MP1Q3.3.6; MP2Q1,1,18 MP2Q1.1.9; MP2Q1.1.10;

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	map storyboard, NPD cell implementing workers' solutions leads to a complete mind-set change; and production employees involved in Hoshin kanri with measures, point Kaizens, five S, visual management, problem-solving, value-stream mapping, making sure work is done to standard operating procedures.	SP6Q2.2; MP2Q1.1.161; MP2Q2.1.2
Pattern SP3.2P7	Participation and involvement – in lean has increased: Most employees have accepted the changes to lean; people are participating since they understand what is expected of them; improving with five s and green areas and Kaizen participation; people are starting to participate; more learning results in greater participation; more participation and involvement due to five S; more participation due to green area meetings.	SP3.2Q1.2.1 SP3.2Q1.2.3 SP3.2Q1.2.4 SP3.2Q1.2.5 SP3.2Q1.2.6 SP3.2Q1.2.12 SP3.2Q1.2.19 Sp3.2Q1.2.20
Pattern SP3.2P8	Respect and attitude – has improved with lean implementation due to: a less autocratic leadership style; an open-door leadership style; people welcoming more communications and information sharing with leaders; appreciating sharing of ideas; having a direct line to managing director; managers' Gemba walks; and the managing director's quarterly tank talk.	SP3.2Q1.6.2; SP3.2Q1.6.3; SP3.2Q1.6.7; SP3.2Q1.6.12
Research Question - Why	Why will the organisational behaviour change with implementation of lean thinking?	
Sub research proposition SP4	SP4 As employees and leadership become more familiar with the lean transformation process organisational behaviour will change with the inevitable change in organisational culture and the necessary organisational structural changes. New learning will take place in terms of the work teams implementing the lean techniques identified in process Figure 5.2.	

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Pattern SP4P1	Roles and responsibilities – Organisational behaviour has changed and is changing due to: the awareness of senior management that there should be greater teamwork; employees accepting new roles and responsibilities, such as cleaning the workplace; leaders cultivating a participative culture; employees understanding the need for urgency and impact to get the customer orders processed; workers becoming more multi-skilled; the improvement of standard operating procedures; and employees becoming more accommodating.	SP4Q1.1; SP4Q1.2; SP4Q1.3; SP4Q1.4; SP4Q1.5;
Pattern SP4P2	Structure – Organisational structure is changing to improve lean and customer service with examples of: buyers transferred to industrial engineering to improve on supply; the appointment of managers with lean experience such as the managing director, the plant manager, the engineering manager and the export manager.	MP1Q3.1.2
Research Question - How	How can the organisational structure be best redesigned to optimise the use of all lean thinking techniques and disciplines?	
Sub research propositions SP5.1 and SP5.2	SP5.1 The best organisational structure will lead to the optimisation of self-directed teamwork and the elimination of functional and leadership impediments to lean implementation. Self-directed work teams will be maximally empowered to fulfil a major portion of the required roles and responsibilities for the day-to-day running of the organisation. SP5.2 The best organisational structure will fully accommodate a cellular format, with fully empowered self-directed work teams, well able to implement all the identified lean disciplines and techniques.	
Pattern SP5.1P1	Structure – Self-directed teamwork being focused on examples: plant manager being focused on developing self-directed teams for operations; the assembly supervisor being focused on developing her team to become self-directing; information's systems senior manager observing	SP5.1Q1.2; SP5.1Q1.4;

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	that self-directed teams are in the beginning stages; remote Southern African facility being an effective self-directed team; and on the core development project, the cross-functional team of engineering and production has been empowered to complete the core development project without management intervention.	SP5Q1.6; SP5.1Q1.7;
Pattern SP5.1P2	Structure – Structural changes to improve the flow have occurred, with buyers moving to industrial engineering and being empowered to select new and better suppliers, and industrial engineering manager has been appointed as the Kaizen champion.	MP2Q1.3.6; SP3.2Q 1.3.5;
Pattern SP5.1P3	Structure – Structural changes to improve the flow have occurred with effective rubber and rotor manufacturing cells implemented using value stream mapping technique, and work teams are running the cells.	MP1Q3.2.3; SP6Q2.1.10
Research question - Why	Why should the organisational structure be redesigned to accommodate the use of all lean thinking techniques and disciplines?	
Sub research proposition SP6	SP6 The organisation will have to undergo the redesign as indicated per SP5.1 and SP5.2 in order to accommodate effective lean implementation in terms of: Hoshin Kanri and policy deployment and value stream mapping developed between leader and employees, enabling quick and effective communications that will lead to a competitive global organisation, implementing and continuously improving the lean techniques, by way of empowered self-directed teamwork engaged in: problem-solving; Kaizen; distinguishing value; reducing the seven wastes; five S; TPM; visual management; standard work; and the same self-directed work teams operating manufacturing cells engaged in: Taguchi; cycle time reduction; one-piece flow; Kanban; SMED; Poka-yoke and Jidoka; and Heijunka.	

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Pattern SP6P1	Structure – Senior management has made the decision to have a three year plan to restructure within the matrix.	Paragraph 6.2.4.4
Pattern SP6P2	Structure – Teamwork is being developed in the organisation and empowered self-directed team are being focused on.	MP2Q1.2.6; MP2Q1.2.1.4; MP2Q1.2.1.5; MP2Q1.2.1.9; MP2Q1.2.11
Pattern SP6P3	Lean techniques – Increasingly being utilised by F01 such as: Hoshin kanri with measures; Point Kaizens; five S; visual management; problem-solving; value-stream mapping; making sure work is done to standard operating procedures; green areas; one-piece flow and set-up time and run time reduction and working extra shifts to deal with bottlenecks; teamwork and standard operating procedures; communications per green areas, Kaizen and problem-solving.	MP2Q1.2.1.2 MP2Q1.2.1.3 MP2Q1.2.1.4 MP2Q1.2.1.5

Table 6.3 shows the detailed patterns that emerged in the F01 organisation. The patterns address the research questions in terms of the generated propositions and confirm the propositions to a major extent. The confirmation of the propositions is further supported in the literature when emerging patterns are discussed in terms of the observations made from the literature review in Chapter 3 which referred to the specific research that had to be conducted to establish how lean thinking affected the organisational structure and behaviour.

6.2.5.1.2 Literature linked to patterns – F01

With the pattern development leading to a new approach to lean thinking, the literature linked to the patterns, distinguished between patterns indicating structural evolvment and patterns that lead to the cultivation of behaviours conducive to lean thinking. The following section analyses the theory links with structural evolvment, followed by the theory linked with organisational behaviour change.

6.2.5.1.2.1 Literature linked to the organisational structure patterns – F01

The analysis of how literature relates to the organisational structure patterns was done by way of sequentially selecting a pattern or patterns from Table 6.3 and relating these to the literature review. Where patterns were linked in terms of the literature references to other patterns down the list, these were linked to the originally identified pattern. The following discussion identifies the literature links by selected pattern.

F01 had commenced implementing new structures within the matrix according to the following patterns: MP1P1; MP2P2; SP1P1; SP1P2 and SP6P1 in order to improve the flow and to restructure along the value stream (Haug, 2012). How this might further develop within the matrix, present a future research opportunity. However, the building blocks of effective, empowered cross-functional and self-directed work teams had already taken root in patterns SP1P6 SP2P1; SP2P2; SP3.2P4; SP6P2 with manufacturing cell teams, new multi-functional teams and production monitoring upstream; cross-functional teamwork between manufacturing and engineering; and cross-functional teams of supervisors. The team formations are phenomena that were in line with research by Nahm *et al.* (2003) who emphasised the need for vertical and horizontal integration with time-based manufacturing, as well as the support for cross-functional teamwork expressed by Liker (2004), Quarterman, (2007) and Womack and Jones (2010). Structure formation was emerging in line with Haug (2012), with production manager and supervisors running more cells with teams. The focus group interviews with top management indicated a pronounced

awareness among senior management of the need to work together as a cross-functional team to resolve the complexity of the matrix, (pattern MP1P3). With patterns SP1P3, SP1P4, SP1P5, SP5.1P1, SP5.1P3 and SP5.1P2, cellular manufacturing was commencing with self-directed teamwork being encouraged by the plant manager, production manager and supervisors. This indicates a trend towards cellular structure (Haug, 2012) and the establishment of self-directed teams in structure (O'Carroll, 2004). Cells were being designed by utilising value stream mapping and, according to SP5.1P2, effective rubber, rotor cells and assembly cells had been established, coinciding with the guidelines of Rother and Harris (2001), Hyer and Wemmerlof (2004) and Lander (2007).

Literature that supported the findings regarding the complexity of the matrix and the development of silos was pointed out by Hettler (2008). Cooper (2011) also emphasises the need for management to work together to resolve cross-functional issues such as were experienced by F01 in pattern MP1P2. The patterns emerging in structure regarding a lean champion, or expert in lean process, such as proposed by Brown *et al.* (2006) are reflected in Corporate's Kaizen team working with cross-functional teams to improve low morale, and the managing director's wish to appoint a lean champion to expedite the lean thinking process. In pattern SP1P8 there was strong evidence of employees' wish for a flatter, more direct structure, as proposed by Nahm *et al.* (2003) and the establishment of a lean champion in structure similar to the views of the managing director and as proposed by Womack (2002) and Brown *et al.* (2006).

Structural changes in leadership were evident in pattern SP4P2, with the managing director, plant manager and export manager replacing previous managers in line with the change model for new competencies in Francis *et al.* (2003).

Applications of lean techniques (Womack and Jones, 2003; Quarterman, 2007) are summarised in the patterns coinciding with the research proposition SP6, which indicates the progress made by the F01 organisation in terms of pattern SP6P3:

- Hoshin Kanri (Dennis, 2006) in pattern SP6P1 with management addressing functional issues in strategy and in SP6P3 where every employee is given objectives supporting the organisational strategy, in line with practice according to Dennis (2006) and Womack and Jones (2010) and applications of Yang and Su (2007).
- Visibility in the workplace is evident in F01 in pattern MP1P5, with F01 using green areas, akin to the visible workplace referred to by Braden *et al.* (2012), to meet with teams in the presence of visible information and visible controls.

- Five S where the plant manager uses this technique as a stepping-stone to total organisational involvement (refer to SP3.2P7), similar to what was found by Suárez-Barraza and Ramis-Pujol (2012).
- Knowledge of the seven wastes (Ōhno, 1988; Womack and Jones, 2003) was confirmed by most of the interviewees (48 of 66 were aware) and was reflected in Kaizen lean storyboards (refer to pattern SP1P3), indicating improvements in flow for the rubber, rotor and assembly manufacturing cells.
- The awareness of standard work practises as in Womack and Jones (2003) and Nicholas (2011) was evident, and it was noted that one engineer had been allocated to this task. This individual had a good working knowledge of lean thinking, and he worked closely with production supervisors and quality assurance employees to develop very detailed and precise standard work instructions or sops (refer to SP3.2P6).
- Kaizen and problem-solving, as advocated by Ōhno (1988), Liker (2004), Manos (2007), Doolen (2008), Womack, and Jones (2010), Marksberry *et al.* (2011) and Nicolas (2011), showed a high level of awareness as a clearly entrenched behaviour among 58 of the 66 individuals interviewed, and one that was cultivated by the Corporate team's involvement in Kaizens (SP1P2; MP2P1), the industrial engineering manager having appointed a Kaizen champion, as in pattern MP2P1, and supervisors encouraging work teams to provide ideas for improvement (pattern MP1P5; MP1P4). An open door rule had been announced by the managing director to encourage ideas and idea-boxes around the organisation were linked directly to the managing director's office.
- Cellular manufacturing, the use of value stream mapping (Rother and Harris, 2001), SMED (Shingō, 1989), single piece flow (Womack and Jones, 2003) and cycle time reduction (Rother and Harris, 2001; Womack and Jones, 2003; Nicolas 2011) were techniques that had been applied in the rubber, rotor and assembly cells by the plant manager and by supervisors in the respective work areas (refer to patterns SP1P3; SP2P3; SP5.1P3).
- Performance in F01 had improved with lean thinking progress (pattern SP1P7), with productivity and service delivery improvements, such as is prescribed by Womack and Jones (2003) and as proved by Lander (2007) in his research.

As in the process followed in the previous section, the next section will review how the literature is linked to the patterns of organisational behaviour as outlined in Table 6.3.

6.2.5.1.2.2 Literature linked to the organisational behaviour patterns – F01

The following analysis links literature to the organisational patterns at F01 in terms of the behavioural constructs that were identified for this study:

- Behavioural resistance to lean thinking was found at the outset in F01 and is reflected in the patterns MP1P4 and MP1P5. This as was anticipated from the literature (Ōhno, 1988) and from negative responses identified by Hasle et al. (2012).
- Attitudes per patterns: MP1P5; SP2P8; SP3.2P8, SP3.1P1 were found to be negative from the outset of the lean process; however, attitudes changed to supportive of the lean implementation process with the green areas initiatives, and employees became more involved (SP3.2P7) in the process such as Kaizen events, the open door approach taken by managers, the Gemba walks by senior managers, the quarterly tank talk initiated by the managing director and the teamwork initiatives introduced by the plant manager and the supervisors. The experience at F01 is similar to observations by Doolen et al. (2008), who found varied responses, and similar to the findings of Tress and Espinoza (2012), who found attitudes which were conducive to lean thinking and similar to those experienced at F01.
- Commitment at F01, revealed in patterns MP1P6 and SP3.2P1, was found to be mainly normative. As employees became more involved in the lean process initiated by the green areas, team meetings, and Kaizen events, however, commitment was found to be more affective, such was reflected in the initiatives by staff workers participating in Kaizen events and shop stewards proposing unique improvements after being exposed to lean thinking training. These findings are similar to the research that was done by Angelis et al. (2011) who had anticipated affective commitment to be conducive to the lean thinking process but found instead that this was linked to the way lean was being introduced to the organisation, which required the skilful and sensitive application of lean work practices.
- With Hoshin Kanri being applied in pattern SP3.2P3, F01 experienced more affective commitment in the sharing of the organisational strategy at the quarterly tank talks by the managing director. This was also found by Gagnon (2004) when workers reacted positively when they were made aware of the organisational strategy.

- Leadership perception (patterns SP2P7 ;SP3.2P2) showed improvement, with leaders making an effort to realise the lean thinking initiative a reality by showing a helpful, open door supportive and participative style, such as was elicited from the interviews by the managing director with the plant manager and other senior management team members. The findings by Johnson (2009) and Testani and Ramakrishnan (2011) support these leadership characteristics reflected by the F01 management team.
- Roles and responsibilities (pattern SP3.2P5) can be expected to change for the management of an organisation undergoing a lean transformation, according to Haug (2012). He does not explain how or why this would be so, however, either for the workers or for management of the organisation. Specifically pattern SP3.2P5 points to definite role and responsibility changes for employees who were now expected to clean their areas and become more involved in teamwork and Kaizen activities. Through Hoshin Kanri workers were beginning to take more responsibility for their own output and quality. Pattern SP4P1 provides an answer to Haug's (2012) observation that management should achieve new skills to allow for more teamwork to develop cross-functionally in the running of manufacturing cells or flow lines, and to allow for more participation in cross-functional teams or to determine how to support teams.
- Empowerment in patterns MP2P3 and SP2P3 indicates more empowerment of supervisors and employees, which is expected to occur with leadership role changes and with leaders realising the need for employee empowerment and for them to get more involved in decision-making, as advocated by Poppendieck (2002), Nahm et al. (2003) and Pinheiro (2010).
- Respect in patterns SP2P6 and SP3.2P8 indicated some concerns among workers, however, this had improved with more learning and with leaders being less autocratic and more understanding, and with more interactive communications and listening (Czabke et al., 2008).
- Employee involvement in patterns MP2P1 and MP3.2P7 was occurring increasingly at F01, involving employees more in cross-functional teamwork and in work teams running manufacturing cells. This involvement process is emphasised by Ōhno (1988), Shingō (1989), Liker (2004) and Womack and Jones (2010) and refined by Afsar (2010), who proposed HR support for the process.
- Knowledge of lean process according to pattern SP3.2P6 was mainly found to be limited to F01 manufacturing employees. Other employees had been made aware

of the process through training, Kaizen teams and the five S programme that had involved the total organisation. Nahm et al. (2003) and Lander (2007) have also emphasised the point of organisations learning to learn with the lean thinking process and at F01 this aspect had been given close attention.

- Communications in pattern SP2P5 had improved with green area team meetings, the quarterly tank talk and Kaizens involving employees from all sections of F01. The Importance of shop floor involvement in communications is emphasised by Losonci et al. (2011).

6.2.5.2 Addressing rival explanations

A significant rival explanation to this research lies in the work done by Womack and Jones (2003), who proposed a prototype matrix type structure for lean thinking operations. From the F01 case analysis in Section 6.2.2.4.3, it would appear that a matrix structure presented complexities that limited the lean process in terms of cross-functional interactions and complex vertical as well as horizontal communications. Analysis of the F01 case study also indicated that functional departments were isolated from one another, making lean thinking implementation a one-sided manufacturing affair. This aspect alienates departments from one another, as was indicated in the F01 case where employees from the sales and export departments, for example, felt that lean thinking was only occurring in manufacturing and that as departments they had made no input in this process. Another example was that of a senior manager at F01 who remarked that the matrix had created functional silos, making cross-functional coordination complex and difficult. The development of functional silos was pointed out by Hettler (2008), who proposed using value stream mapping when considering the effectiveness of the information flows in an organisation.

6.2.5.3 Considerations regarding the use of logic models

Throughout the research when following the prescribed methodology, the models developed in Figure 5.2 and Figure 5.4 were utilised with the F01 case study. This was confirmed in both the generation and testing of the hypotheses and in the generation and testing of the propositions with matched explained patterns, as prescribed by Yin (2014).

6.3 SECOND CASE REPORT – ORGANISATION W01

W01 is an organisation owned by a prominent organisation listed on the Johannesburg Stock Exchange. The organisation is based on the East Rand and claims to be the largest aluminium extrusion organisation in Africa. Lean thinking in the form of 20 keys

(Kobayashi, 1995) was introduced to the organisation in 2002. The organisation manufactures most products that are extruded from aluminium, such as curtain tracks, shower cubicles, window frames, door frames and blinds. W01 was also involved in the Gautrain project, supplying door and window extrusions for the Gautrain coach units. The company continues to supply extrusions to various user industries in the aluminium market. W01 also extrudes specialised engineering profiles and conveyor system sections.

In terms of manufacturing capability, W01 aluminium is regarded as the leading aluminium extrusion company in South Africa and offers a one-stop-shop in the supply of mill finish, powder coated and anodised aluminium extrusions for various applications in a variety of industries such as building and construction, transport, energy, agriculture, general engineering, automotive and others. The manufacturing facility consists of four main operating units – billet casting, aluminium extrusion, surface finishing and aluminium systems development. W01 operates eight extrusion presses, six powder coating lines and three anodising lines at three different manufacturing sites in South Africa, with the manufacturing and distribution capability and capacity to meet market requirements. It strives to deliver excellent levels of quality, service and responsiveness, price competitiveness and technical support and employs around 1 000 people.

The introduction of a lean thinking initiative was initiated after the owners of W01 became seriously concerned about organisational performance in the late 1990s and embarked on an effective restructuring led by a newly appointed managing director who, with the assistance of management consultants, transformed mediocre performance in the late 1990s to world class performance levels at the time of this study. Part of the organisational change included the introduction of a lean thinking approach that was in the main based on the 20 keys (Kobayashi, 1995) process for workplace improvement.

Due to remarkable growth experienced over the past 13 years, a chief operating officer was appointed two years ago to take responsibility for all operating divisions connected to extrusion and system sales, including sales and marketing.

6.3.1 State of lean of W01 as determined from quantitative data

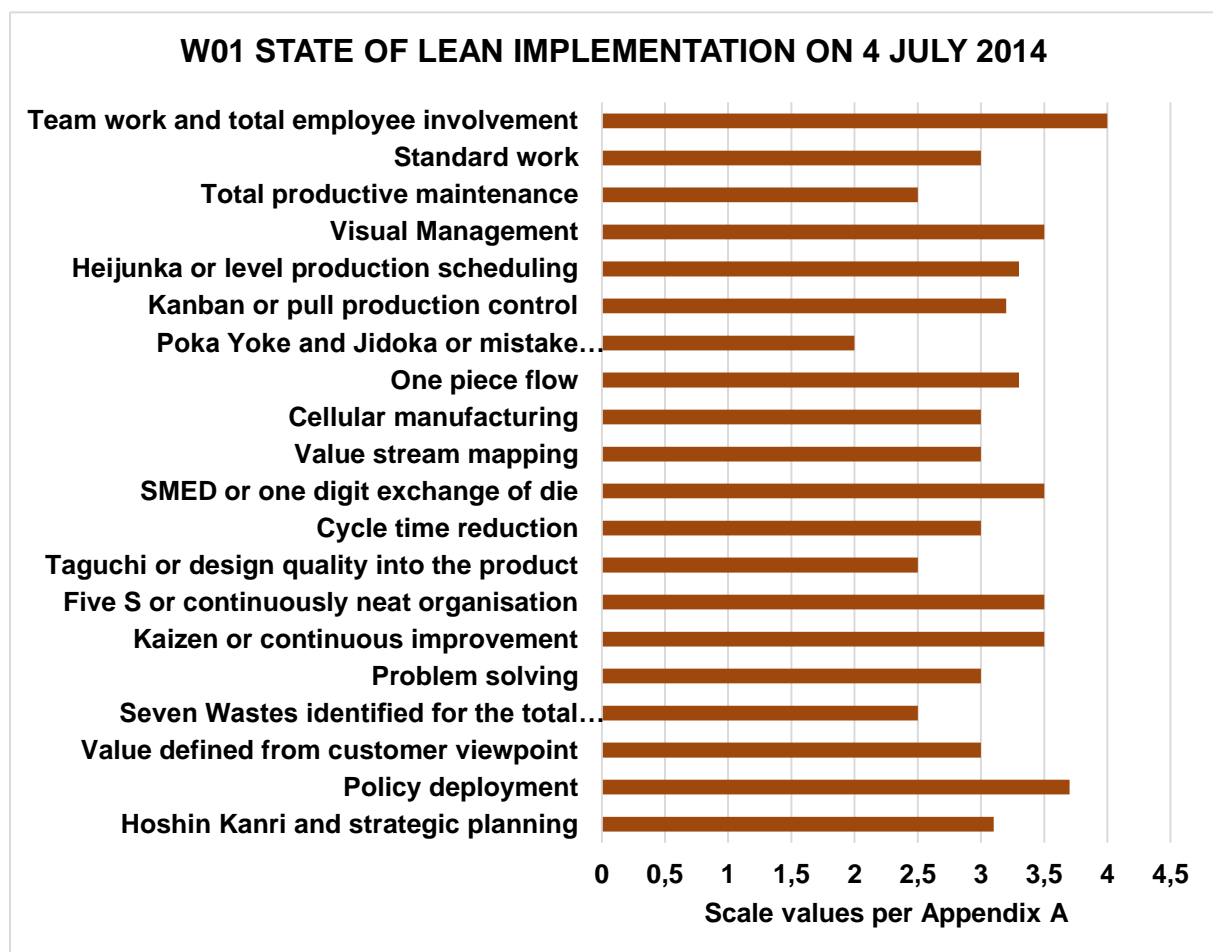
The researcher made the following analysis of the W01 organisation. This analysis was based on data gathered using Appendix A and from interviews conducted with the organisational development department responsible for driving the 20 keys (Kobayashi, 1995) process, as well as with senior management (that is, top management) in the manufacturing sector of the organisation.

As the organisation had used the 20 keys (Kobayashi, 1995) process, the Appendix A questionnaire sections were cross-referenced with the relevant 20 keys to accommodate the definitions of the independent variables in terms of these definitions (Kobayashi, 1995). This was found to be entirely valid as the content of the questions coincided with the descriptions of the 20 lean independent variables.

6.3.1.1 State of lean audit – W01

The researcher performed the state of lean organisation audit using detailed information obtained from Appendix A. In this regard, he worked closely with the managing director in order to obtain consensus and common understanding. This questionnaire was also used to determine the state of knowledge of lean thinking among the members of the organisation who were interviewed during the data gathering phase. Figure 6.4 depicts the state of lean in W01 as experienced during the research period.

Figure 6.4 State of lean thinking in W01 organisation



The analysis in Figure 6.4 shows that W01 had advanced effectively towards a mature implementation of their lean programme. Discussion with the managing director indicated,

however, that more needed to be done to extend the programme and that workers from the organisation needed to improve their understanding and application of lean thinking techniques.

6.3.2 Data gathered – qualitative

The qualitative data was gathered mainly from the questionnaires (Appendices A, B, C, E and G). Appendices E and G were changed to read as line questions and each participant’s responses were written down by the researcher during the sessions. Kobayashi’s book (Kobayashi, 1995) was used to relate the descriptions of the 20 keys to the descriptions of lean techniques in the questionnaire (Appendix A). Examples to distinguish between affective, normative and continuance commitment were used to encourage interviewees to provide their insights. When questions regarding attitude were discussed, the researcher requested that interviewees provide examples of positive and negative attitudes.

6.3.2.1 Construct validity for case study W01

During the data gathering phase, the following case study tactic (Yin, 2014) reflected in Table 6.4 was used to support the construct validity of the second case study. This was the same tactic used in the first case study.

Table 6.4 Case study tactic used for construct validity in case W01 (Yin, 2014)

Case study tactic – W01
<ul style="list-style-type: none"> • use multiple sources of evidence • establish chain of evidence • have key informants review draft case study reports

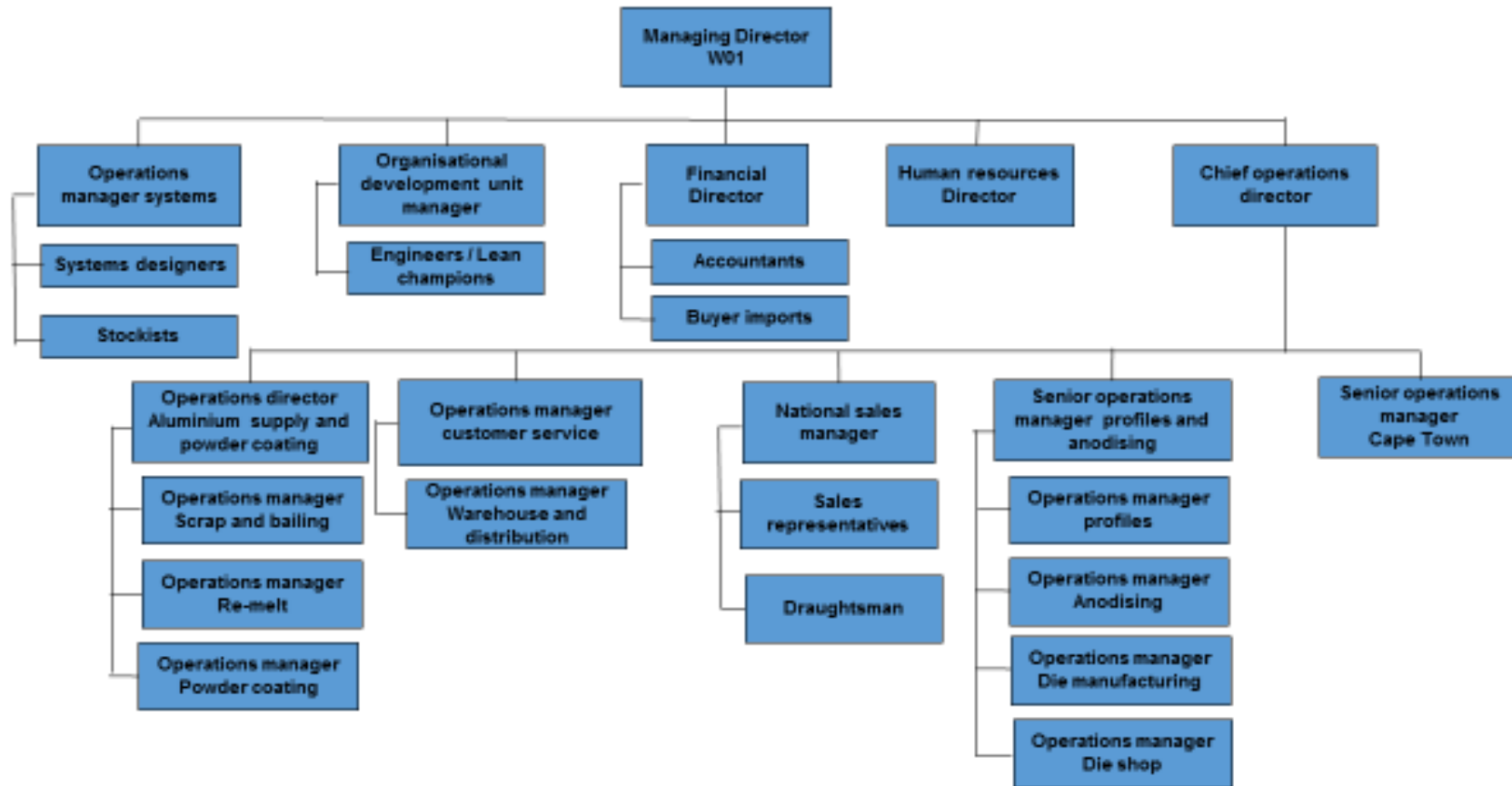
As for case F01, Table 6.4 provides the guideline for construct validity as it applies to case W01. The multiple sources were the organisational organograms, the questionnaires coupled with critical evaluation, the lean story boards that at W01 were covered by analysis of the team areas, the team meeting agendas and the value stream maps that had been prepared by university students who had done research into value stream mapping at W01. The chain of evidence is identified in the main data gathering items covered in the next section.

6.3.2.2 Organisational structure

An important part of the analysis of the current organisational structure in this study was the deliberate restructuring by the current and previous managing directors and their top management teams, focussing on manufacturing as a separate organisational entity. The

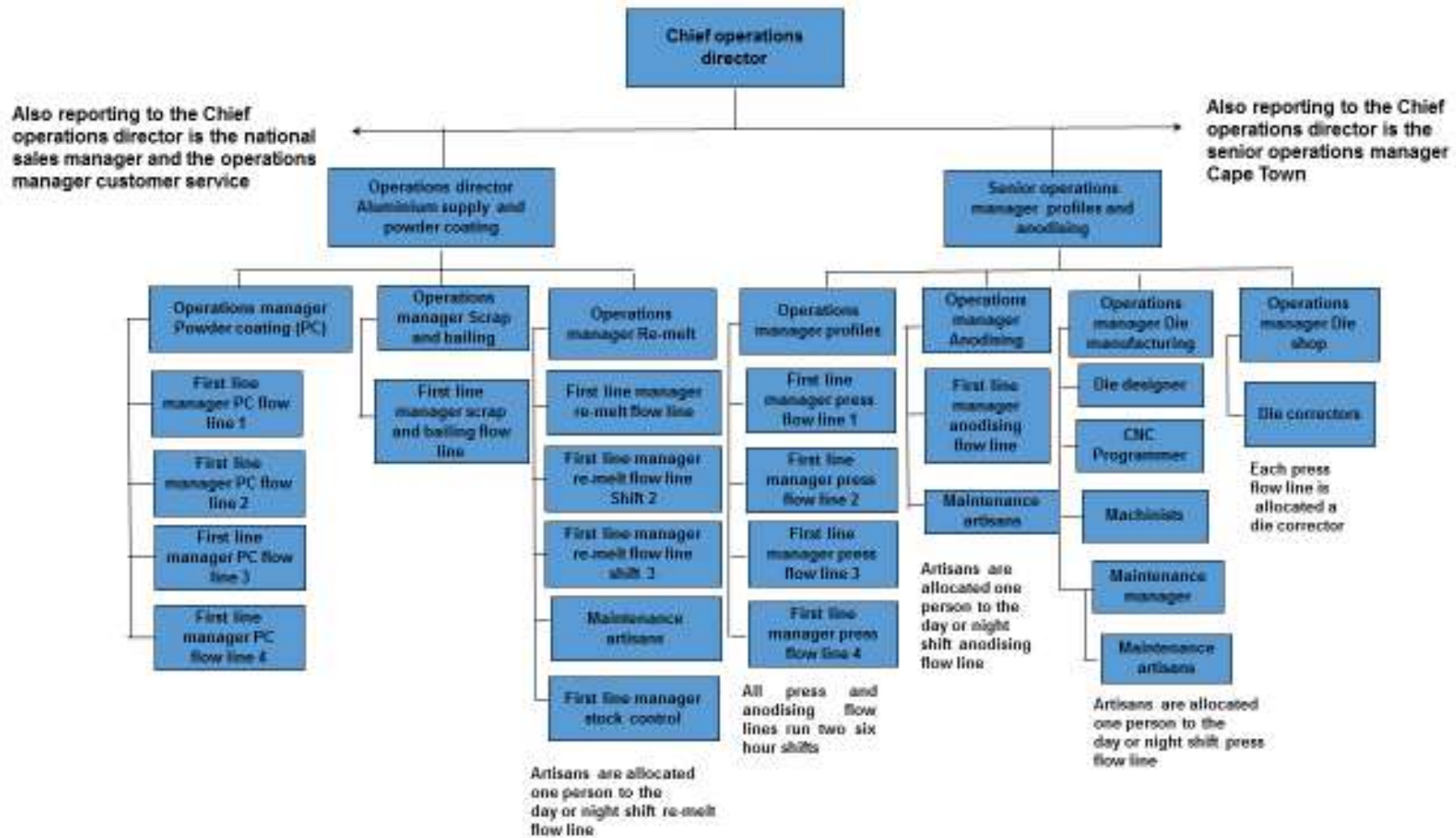
organisation had been involved in their lean initiative from about 2002. Another significant organisational change was the establishment of the organisational development unit, led by a unit manager who had been with the organisation since the major changes in the late 1990s. This unit was responsible for the implementation of the 20 keys throughout the organisation. A significant aspect of this unit was the remarkable work they had done in the development of first-line managers who directly covered all output functions of W01. At the time of this study, the W01 organisational structure was as shown in Figure 6.5.

Figure 6.5 W01 Organisational structure



The current organisational structure in Figure 6.5 shows the organisational levels from the managing director to the operations manager's level. A final level is that of the first-line managers who report into the operations or unit managers of the organisation and this is discussed in the next section. The manufacturing organisation reports to the chief operations director. The distribution organisation consists of three distinct organisations, namely: the Gauteng stockists; distribution organisation number one and distribution organisation number two. These organisations are separate companies that report through operations managers to the W01 managing director. The manufacturing and distribution organisations are serviced by human resources, systems, organisational development and the financial department. The manufacturing organisation's detailed structure is shown in the organogram in Figure 6.6.

Figure 6.6 Manufacturing organisational structure of W01



The structure in Figure 6.6 illustrates how W01 has structured its manufacturing organisation. The operations managers are responsible for a number of first-line managers who are in turn responsible for production output of a particular manufacturing flow line. Analysis of the organisation indicates further that these flow lines have been developed for the organisation over a period covering more than 20 years. Significantly for this study, the national sales manager also reports to the chief operation director, as does the customer service director. These functions are therefore deliberately integrated into the operations organisation of W01. Where manufacturing flow lines exist, it was observed that these are manned by mini business teams who report to the respective first-line managers.

Analysis of the flow lines in terms of the actual layouts indicates the emphasis on continuous flow, commencing with the scrap and bailing operations and moving through to the re-melt unit and the press extrusion lines that supply the anodising and powder coating units. Another significant observation is that all flow lines manned by mini business teams are run on sound mini business principles, and all the participants confirmed their focus on the fact that they operated as profit centres. It was further confirmed that manufacturing units operate as separate organisations each with their own profit and loss accounts. The overall performance of the organisation is remarkable, with a current overall PBIT ratio to sales of 16% after sharing gains with employees, and stock turns exceeding 10 turns per annum. Although the re-melt operation focuses on a minimum of at least two months of billet stock for the extrusion lines, the strategy is deliberate as a result of the scarcity of aluminium scrap supplies. The extrusion, powder coating and anodising operations all run on a make-to-order basis. This achievement has been made possible by the organisation's focus on achieving set-up times below 10 minutes for all its manufacturing facilities. In the case of the extrusion lines, set-up times are below three minutes, less than 20 minutes for powder coating and in anodising, the set-ups are measured in seconds.

6.3.3 Organisational behaviour

The section below is a summary of data gathered from the questionnaires in Appendices A, B and C. Where information from the quantitative analysis did not compare with the data recorded in the qualitative questionnaires (Appendices E and G) and interviews, clarification was obtained from the participants. This exercise provided triangulation (Yin 2014) in the data gathering process. The following section is based on the observations made from data that had a significant impact on the research proposals.

6.3.3.1 Attitudes of employees

Attitudes were generally found to be positive. Of the 71 individuals interviewed, only three participants expressed a negative view of the organisation with regard to leadership, union and grading issues. However, without exception all three of these particular individuals expressed their support for the lean programme in the form of the 20 keys (Kobayashi, 1995). The following discussion highlights specific observations that were made either during the interviews or during plant visits.

6.3.3.1.1 Comments in general

With three exceptions, all 71 W01 people interviewed displayed a positive, supportive attitude towards the lean initiative in the form of the 20 keys and towards specific techniques being implemented. Depending on length of service, attitudes, while initially apprehensive, had changed and people had become more supportive and helpful since the major changes that had occurred during the late 1990s and early 2000s. When asked for reasons for attitudinal change, people indicated that lean thinking had provided visible benefits of a cleaner plant, improved working climate and an understanding, supportive leadership. First-line managers and workers indicated that, since the change, top management had demonstrated their care and support for employees.

6.3.3.1.2 Comments from systems staff

Systems staff was involved in the design of aluminium systems for applications in the marketplace. Interviews with the unit manager and subordinates indicated highly creative employees with extensive experience in the aluminium extrusion applications market. These employees were responsible for the products that the organisation supplied to various industrial sectors in South Africa and as exports. The comments from staff regarding the 20 keys implementation indicated that they has some knowledge of these keys in terms of the manufacturing flow processes and the cleaning tasks, as well as of the organising and cleaning key, number one, of the 20 keys (Kobayashi, 1995) which is equivalent to the five S technique in lean terminology. The system team was aware of the manufacturing capability of the extrusion teams regarding quick changeovers achieved in under three minutes. The team was also highly supportive of the manufacturing organisation, expressing their appreciation for the improvements in quality and delivery.

6.3.3.1.3 Comments from employees in sales

The national sales manager had been with the organisation since 2001, joining shortly after it had undergone major restructuring. This manager was thoroughly familiar with the

considerable improvements in the manufacturing organisation, and he expressed his appreciation for improvements in on-time delivery. The manager indicated an awareness of the quick change-overs and he acknowledged the continuous improvements made by the manufacturing extrusion lines as effective lean or key techniques.

Discussing the details of lean implementations with a sales representative revealed the extent of empowerment achieved by these representatives, reflected in creative pricing strategies used by the sales team. An issue raised by a representative was the fact that South African customers were sometimes in competition with W01 for imports of aluminium extrusions from Near as well as Far East organisations.

A significant was the fact that the drawing office reported to the national sales manager and there was a direct link between the drawing office and manufacturing staff regarding incoming customer orders. A draughtswoman stated that although her interaction was in fact more frequent with the manufacturing dies and profiles departments, her position in sales had made it possible to link customer requirements directly with manufacturing capability.

A very effective cross-functional team existed, made up of this draughtswoman, the unit manager profiles and the operations managers from profiles and die manufacturing. Again, the draughtswoman had also been fully involved in the keys programme and was one of the few interviewees who expressed an awareness of the coupled manufacturing key (Kobayashi, 1995) that is the equivalent of the cellular manufacturing lean technique, the quick change-over technology equivalent to SMED and methods improvements that are equivalent to the lean technique of cycle time reduction (Öhno, 1988; Shingō, 1989).

6.3.3.1.4 *Comments from buyer imports*

The chief buyer imports reports directly into the financial director. The buyer displayed a thorough knowledge of the manufacturing activities as well as financial key performance indicators. More specifically, the buyer was conscious of the threat of imports by being able to compare import costs directly with manufacturing costs enabling W01 to compare itself effectively with the global market. It appeared that W01 acted in a highly competitive market when compared to Indian and Chinese suppliers, for instance. The buyer was familiar with the basic keys of cleaning and organising, teamwork and goal alignment. Analysis of import costs compared with W01 costs showed the extent of achievement of the W01 organisation in terms of being a truly global competitor.

6.3.3.1.5 Comments from finance staff

The finance department consists of financial staff administering and reporting financial performance, debtors' and creditors' control. Highly conscious of lean thinking, this department was able to produce pertinent financial information virtually online, with the ability to produce complete and detailed financial accounts within three days of month end. A significant observation was the allocation of an accountant to the relevant manufacturing units for the purpose of providing financial performance results, conversion costing information as well a detailed analysis of customer returns by reason category.

6.3.3.2 Communications with management and workers

From the questionnaires in appendices B, C and E it appeared that communications were free flowing among managers and workers at all levels. Almost all those interviewed stated that it was easy to communicate vertically and cross-functionally. At the lower levels of the organisation, some reservations were expressed by one interviewee regarding the flow of communications. Communications were regarded as very effective owing to the managing director's openness and his leadership style; every level of management making an effort to provide feedback from top management after weekly team meetings; meetings of mini business teams in team areas every morning; the team spirit that existed between workers from different departments on the shop floor; the joint leadership monthly meeting with invited workers and all management; the high regard in which first-line managers are held, by senior management and workers; the visible management system that measured performance against team targets on a continuous basis; the awareness of company performance in terms of incentive bonuses for attendance and productivity and profit sharing being paid out; the joint consultative meeting between management, Solidarity and NUMSA to discuss and resolve issues of organisational and union importance.

6.3.3.2.1 The managing director's view

The managing director expressed his belief in lean thinking and the 20 keys (Kobayashi, 1995) process. He saw these as integrated initiatives and quoted from lean related statements from Schonberger (2010). He indicated that he had been involved with the current W01 organisation since 1996 when he worked for a consulting organisation. He had worked with the previous managing director, who had come from a consulting organisation, to transform the W01 organisation.

He attributed the success of the transformation of the organisation to the basic keys of cleaning and organising, teamwork and goal alignment. Of particular interest to this study

was the fact that all these keys were also basic lean techniques identified in the study. The managing director made a very significant comment, observing that affective commitment was cultivated by mini business team activities, since team members stimulated one another to produce creative ideas for continuous improvement.

6.3.3.2.2 *Managing directors' initiatives*

A previous managing director was responsible for the effective restructuring of the organisation from an RM70 loss organisation in 1997 to an organisation that by 1998 was able to start paying out incentive bonuses to all employees. The current managing director, who took over from the previous managing director in 2007, has continued to drive the organisation's growth to its profitable state at the current time. The strategic initiatives for growth cover both manufacturing and distribution expansion strategies.

The current and previous managing directors have been responsible for implementing the 20 keys (Kobayashi, 1995) as a lean initiative in the whole W01 organisation. In terms of lean thinking, some of these key initiatives are: the introduction of a team structure in the organisation in 1998; the establishment of mini business teams within the team structure throughout the organisation, facilitated by highly developed and skilled first-line managers; the restructuring of the organisation to establish an organisational development department with a skilled unit manager who has implemented the keys throughout the organisation; the appointment of a chief operations director to ensure the continuous improvement of the W01 manufacturing organisation; the expansion of the organisation to bring manufacturing and distribution organisations closer to the customer; the backwards integration of scrap and bailing and the development of these into an effective flow line supplying the re-melt plant; the establishment of a virtually continuous flow line running throughout the plant from scrap and bailing to final anodising or powder coating; a joint leadership feedback meeting held monthly that provides feedback to all managers and some invited employees, and that welcomes comments and inputs from those attending; a cross-functional team consisting of top management and operations managers, meeting twice a week to discuss strategy, goals and performance and continuous improvement projects; a joint consultative team formed with Solidarity and NUMSA employees to discuss union and organisational issues and their resolution; the establishment of policy that allows for mini business teams and their first-line managers to implement, change and add to the organisation's standard operating procedures.

6.3.3.2.3 Mini business teams

The mini business team concept was introduced by the managing director who changed the organisation in 1997. Mini business team meetings at W01 take place in various rooms situated in the factory and elsewhere on the premises. The team areas provide visible management of the organisational goals by the teams and the actual performance against targets set. The team meetings take place after the first-line manager has met with the operations managers and senior operations managers of the respective unit. The frequency of meetings in the manufacturing organisation is daily whereas other organisational unit teams meet once to three times a week. System design teams are organised on an ad hoc basis, and the point was made that any designer may lead a team consisting of employees in any area of the organisation. The operations manager observed that team leaders are empowered even to call for the services of the operations manager on the particular project team working on a new development.

6.3.3.3 Employee commitment and involvement

During the interviews, it appeared that a number of employees had the impression that affective commitment (Angelis *et al.* 2011) was at a high level in the organisation. Normative commitment was often mentioned by interviewees as the second most common type of commitment, while no example of continuance commitment could be found.

6.3.3.3.1 Shop floor commitment

Data collected using Appendix E and visits to team meeting areas confirmed the dedication and commitment of workers and management to the 20 keys process (Kobayashi, 1995), in particular the initiative of developing first-line managers. In the majority of interviews with first-line managers, affective commitment was reflected in the managers' expression of detailed creative ideas that had been implemented in Kaizen projects or proposals that were being considered for future implementations.

6.3.3.3.2 A NUMSA shop steward

The researcher met with one NUMSA shop steward and it was clear that this individual supported the organisation's initiative regarding lean thinking in the form of the 20 keys. This individual also demonstrated affective commitment to the organisation in the way he responded creatively during the interview process as well his positive contributions to the resolution of managerial issues.

This particular interviewee expressed his confidence in top management of the organisation, claiming that his members all felt the same way. He did express some concerns, however, regarding the behaviour of a first-line manager who had slept on the night shift and had for this reason lost respect among his subordinates. He expressed his confidence in the organisation's grievance procedure and agreed with the researcher that this procedure should have been adopted by subordinates in order to resolve this poor performance on the part of the first-line manager.

The shop steward also pointed out that managers should avoid showing favouritism as affects the trust employees have in management. He pointed out that, in order for the keys to succeed, sound leadership behaviour was vital. A further important comment was that worker education was vital if W01 was to move ahead with the keys. He felt strongly that this would make a substantial difference to the organisation, cultivating more interest and participation in team meetings.

6.3.3.3 Sales staff and commitment

The commitment of sales staff appeared to be affective, with those interviewed showing both initiative and focus and effectively bridging customer requirements and manufacturing capability. Sales staff expressed their appreciation that manufacturing was able to deliver within three days of an order being placed. Affective commitment was demonstrated in the creative ways in which representatives did the pricing.

6.3.3.4 Unit managers in manufacturing

The unit managers in manufacturing were two key individuals who both had long service with the organisation. The commitment from these individuals was significant in terms of the many innovations and continuous improvement projects that had occurred during their period of management of re-melt and powder coating and profiling and anodising.

Affective commitment (Angelis *et al.*, 2011) was supported by many examples of Kaizen or continuous improvement projects involving: new technology for extrusion press controls and operation; upgraded heating systems and hydraulic pumps; layout changes that promoted continuous flow such as in line aging ovens and the implementation of detailed demarcations making visual controls of progress possible by mini business teams.

Support for these two individuals was expressed by the participants during the individual interviews because of their respect for first-line managers. Appreciation was expressed for the way these managers had conducted themselves and for their close monitoring of the mini business processes by the teams operating in the work areas. It appears that

these two individuals made a point of visiting teams and encouraging and supporting various activities.

6.3.3.4 Empowerment and teamwork

The collection of data (Appendix E) regarding empowerment at W01 provided significant evidence from both management and workers that training and development had contributed considerably to people's feelings of empowerment in: contributing to proposals for improvement; becoming multi-skilled; acting in the role of a superior; participating in the mini business team sessions to update performance tables and graphs; standing in for another when that individual was absent from the workplace; stopping production lines for unscheduled maintenance without having to ask for permission; not being reprimanded by management for initiatives, even if these initiatives resulted in mistakes; first-line managers being able to make high level business decisions, such as assisting a key customer without delaying other customers' orders.

6.3.3.5 Affective commitment analysis for the W01 organisation based on individual interviews

Using the questionnaire in Appendix F regarding the application of Kaizen lean thinking techniques, also covered in detail in key six of the 20 keys (Kobayashi, 1995), the following Table illustrates the level of awareness of idea generation among the 71 individuals interviewed. This was used by the researcher to assess the level of affective commitment among W01 employees.

Table 6.5 Analysis of affective commitment (Angelis et al., 2011) of employees at W01 in terms of Kaizen ideas (Womack and Jones, 2010) that have been successfully implemented at W01

Responses to the question SP1Q6: Since the implementation of manufacturing cells would you say that Kaizen as a lean technique is effectively being utilised? Could you expand on how it is being utilised and are you able to provide an example/s?	Grouped responses by organisational level				Total	Percent
	Senior	Middle	Operational	Non-management	Employees	%
Employees with Kaizen Ideas identified as utilised and implemented at W01	6	16	20	16	58	82.9%
Employees not aware of Kaizen techniques	1	6	1	5	13	17.1%
Total number of employees by category	7	22	21	21	71	100%

Table 6.5 shows that of the 71 employees interviewed, nearly 82% indicated that they had ideas and initiatives, or that they had an awareness of Kaizen as a technique with which to continuously improve the organisation. Noteworthy is the observation that non-management employees showed a high level of awareness of Kaizen as a technique to continuously improve the organisation.

6.3.3.6 Cellular manufacturing

In the case of W01, the collection of data regarding manufacturing cells (Hyer and Wemmerlov, 2004) consisted mainly of detailed discussions with manufacturing unit managers, operations managers and first-line managers. The organisation works closely with universities and makes use of the services of engineering students to do research into current and future flow lines. Value stream mapping (Rother & Harris, 2001) was found to be in constant use by the organisation. A detailed analysis indicated the following: the scrap and bailing operation was arranged as a flow line of sorting manually, bailing partially automatically and palletising and strapping using manual strapping devices; the re-melt department consists of four gas melting furnaces feeding a casting pit, followed by a heat treatment operation in one furnace and then the billet Kanban area; the press extrusion manufacturing operation is arranged as four separate flow extrusion lines, each with its own extrusion press followed by stretching, aging and packing; powder coating consists of one manual and three automatic coating lines. Analysis revealed that the lines had an effective continuous flow utilising an overhang conveyer jig on jig off system; the aluminium anodising flow line was a continuous line through a chemical bath that had a virtually perfect continuous flow with jig on and jig off operation taking only seconds.

The organisation regards its current flow processes as modular, and future manufacturing expansions imitate the existing plant layout experiences. There is a constant and daily focus in the mini business team meetings on the search for further improvements using the techniques of SMED or quick change-over technology (Ōhno, 1988; Shingō, 1989) in key five and Kaizen (Womack and Jones, 2010) as in key six.

6.3.4 Focus group session at W01

The detailed focus group session with the W01 top management team took place on 4 July at the W01 premises. It was attended by the chairperson, the managing director, the human resources director, the unit manager Gauteng stockists, the national sales manager, and the unit managers systems. Using the questions in Appendix G for focus group interviews as the basis for the session, Appendix J shows the data collected in this session.

6.3.4.1 Roles and responsibilities analysis of W01 top management team

The interview process commenced with an analysis of how the top management team saw their roles and responsibilities in the lean implementation process. It was agreed that these were in keeping with the current organisational structure and that a final analysis of

structure would follow the group session, together with further interviews with the managing director. The main role of the top team was to secure the future of the organisation through effective strategy formulations and plans. The organisational development department emerged from a strategic organisational transformation initiated in 2002. This unit oversees the 20 keys process and is also responsible for the determination of team goals by level. Goal alignment is viewed as one of the organisation's key success factors.

6.3.4.2 Top management team's perception of lean disciplines and techniques

It was evident that the total team had been involved in the lean implementation process in the form of the 20 keys (Kobayashi, 1995). An in-depth discussion regarding the progress of the 20 keys (Kobayashi, 1995) is attached (see Appendix J) and this covers the responses provided by the top management team. Although the total team was involved, it was observed that the organisational development team had been given the task of cross-functionally driving the keys programme throughout the organisation.

6.3.4.3 Top management expectations of lean

The managing director indicated that he expected the lean programme to achieve world class competitiveness. He stated that the keys programme was by no means fully implemented and much more had still to be done.

6.3.4.4 Top management team's method of cross-functional activity regarding lean

The managing director indicated that the top team held meetings twice a week with unit and operations managers. These meetings resolved cross-functional issues in terms of organisational key performance indicators. Any issues regarding the flow of orders were discussed and resolved by taking appropriate corrective action. Projects were identified for Kaizen activities (Womack and Jones, 2010). Unit managers worked closely with each other and resolved day to day issues as they occurred.

6.3.4.5 Organisational restructuring considerations by top management team

The managing director stated that in 1997, the then managing director (now chairman of the W01 board) had implemented the structure as it is reflected in the organograms discussed in Section 6.3.2.2.

6.3.4.6 Top management team's understanding of organisational behaviour in terms of lean thinking

The researcher provided feedback from his findings that employees generally felt positive about the lean programme. The top team acknowledged their full awareness of employee involvement and support for the lean programme in the form of the 20 keys (Kobayashi, 1995). It was also acknowledged that the top team would follow up on some of the proposal made by the researcher, namely: to utilise fully the lean Gemba principal (Womack & Jones, 2010) of the top team visiting and engaging more frequently with mini business teams operating in all the areas of the organisation; to consider the advancement of the lean programme by focusing more directly on developing all workers' use of the visuals provided by the 20 keys technique, on the basis that a picture paints a thousand words; and to consider some concerns raised by employees during the interview period, regarding leadership issues. Organisational grading appeared to be a thorny issue that required skilled intervention and resolution; however, that would serve to advance the lean thinking process even more.

6.3.4.7 Empowerment and teamwork at W01

Reacting to the question of how the senior management team saw empowerment of employees, it was agreed that the team shared the research experience: employees were up-skilled and multi-skilled through formal and on the job training; employees were given the opportunity to lead team sessions for a period; managers were given the opportunity to run the unit when his or her superior, was absent for a specified period, for whatever reason.

6.3.4.8 The lean programme going forward from current state at W01

The focus group session concluded with the team considering the lean thinking roll out process. It was agreed that the next step would be the development of workers in terms of the 20 keys process (Kobayashi, 1995). The team acknowledged the major finding that the evolution of structure had developed an effective flow or cellular structure (Haug, 2012).

6.3.5 Interpretation and analysis of data for case W01

Using the analysis for case F01 as the prototype for the study, the analysis of case W01 follows the same tactics as the analysis in case F01.

6.3.5.1 Pattern matching

As in the previous case study, patterns emerged from the questionnaires and the establishment of a chain of evidence that was gathered during the research period.

6.3.5.1.1 Pattern matching and explanation building in terms of the research propositions for W01

Using the identified propositions and the links identified in the responses to the questionnaires (Appendix K), the analysis was conducted and is presented in Table 6.6, which indicates the explanation building of the identified patterns emerging from the questionnaires, the observations and the interview details.

Table 6.6 Pattern matching (Yin 2014) for organisation W01 in terms of the research questions and propositions

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Research question - How	How is the organisational structure and behaviour significantly influenced by lean thinking when implemented?	
Main research proposition - MP1	MP1 The implementation of lean thinking will significantly influence the organisational structure and behaviour and will compel the organisation to undergo significant changes regarding structural and behavioural characteristics. These characteristics may be determined by analysing and testing the identified hypotheses of the research area per Section 4.5 and by pattern matching per this analysis.	
Pattern WMP1P1	Structure – Since the introduction of lean thinking in the form of the 20 keys from early 2000, the organisational structure that emerged is shown per Figure 6.5 and Figure 6.6 and indicates four separate organisations, three for distribution of products and one for manufacturing of products. For operations, a bottom to top structure of a first-line manager, reporting to an operations manager who reports to a business unit manager. First-line managers run mini business teams who operate manufacturing cells or continuous flow lines. The business unit managers’ report to the chief director of operations if in manufacturing or directly to the managing director, if not. Unit managers have service support functions such as maintenance or quality reporting directly to them. However, these functions are allocated directly to serve manufacturing cells. Service employees such as, for example, maintenance artisans, are allocated to manufacturing cells as specialists who assist the first-line managers to maintain continuous flow. From the scrap and binning business unit, materials flow, virtually, in a continuous stream to re-melt to extrusion and then to either anodising or powder	Figure 6.5 and Figure 6.6; MP1Q3.1.1 to MP1Q3.1.8; MP1Q3.1.14; MP1Q3.1.16 and MP1Q3.1.17

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	<p>coating. Visual area type Kanbans, control flow between business units utilising racks or skips. First-line managers run manufacturing cells, with work teams able to run cells in a self-directed manner for a considerable period without management intervention. From 2002, a team of specialists under the direction of the unit manager business development, has championed the twenty keys implementation for the total organisation. The national sales manager and a unit manager for planning and distribution of manufactured products report to the chief operations director.</p>	
Pattern WMP1P2	Structure – Major restructuring in 1997 to 1998 involved reducing the number of hierarchical levels from eight to four.	MP1Q3.1.36
Pattern WMP1P3	Structure – After major restructuring in 1997, every top manager had customer involvement; customers were allowed open communication with top management and any other manager in operations or staff whatever the situation; planning and sales were put in the same office to ensure a direct link of customers with operations; personal relations with customers were established.	MP1Q3.1.36
Pattern WMP1P4	Structure – Each manufacturing cell has a first-line manager and mini business team reporting to him or her. First-line managers have been well developed as a powerful leadership resource and run manufacturing cells or flow support teams virtually independently, based on mini business principles.	MP2Q1.3.18 and responses from top management team per questionnaire, Appendix G, question MP2TQ1
Pattern WMP1P5	Behaviour – With the major changes in 1997, employees were apprehensive and feared job losses, however, they were aware that the organisation was in the red and had expected that changes would have to be made. Employees responded positively	MP1Q3.2; MP1Q3.1.14; MP1Q3.1.15; MPQ3.1.17; MPQ3.1.20

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	to the changes, despite retrenchments, since the managing director at the time, consulted with all employees.	
Pattern WMP1P6	Attitude – After the introduction of lean in the form of the 20 keys, attitudes changed from negative to positive owing to: employees working in mini business teams; cleaning up the workplace; the introduction of production, profit and attendance incentive bonuses; more direct and open communications; employees receiving effective feedback through mini business meetings and the joint leadership meeting; management listening and responding well to employees concerns; employees acquiring a sense of ownership of the business; business growth and performance; awareness of business performance owing to the incentive bonus scheme; mini business teams competing against each other in terms of targets and goals; employees being treated more respectfully; empowering employees to make decisions without management interventions; employees participating in lean impact projects to turn the organisation around; and the introduction of new technology.	MPQ3.3.1; MP1Q3.3.4; MP1Q3.3.7; MP1Q3.3.8; MP1Q3.3.9; MPQ3.3.14; MP1Q3.3.17; MPQ3.3.21; MPQ3.3.33; MPQ3.3.36; MP1Q3.3.31; MP1Q3.3.32
Pattern WMP1P7	Commitment – Top, middle and operational management is affectively committed to helping the organisation achieve outstanding business results. Employees are becoming more affectively committed: participating more in mini business team meetings and providing more creative ideas; feeling responsible for the organisation; seeing the organisation as their own; seeing the benefits of giving of oneself; being motivated by the bonus for service delivery; seeing the organisation’s future as their family’s future; being willing to walk the extra mile; employees being invited to the monthly joint leadership meeting and being allowed to give feedback at this meeting;	MP1Q3.4.1; MP1Q3.4.4; MP1Q3.4.7; MP1Q3.4.8; MP1Q3.4.11; MP1Q3.4.15; MP1Q3.4.19; MP1Q3.4.21;; MP1Q3.4.23; MP1Q3.4.24; MP1Q3.4.28; MP1Q3.4.29; MP1Q3.4.36; MP1Q3.4.37

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	helping to maintain facilities; management having an open door approach to employees; being aware of the successes of the organisation; employees aware of the threat of China; commitment to mini business teamwork and working to achieve targets; intensive training and multi-skilling; First-line managers cultivating affective commitment through encouragement and recognition of ideas; organisation's concern for family and employing family members; information flowing quickly up and down the organisation; keenness to learn, especially among young employees; enjoying the thinking process of working smarter not harder; their role of cleaning and organising the workplace; awareness of achieving a common goal; and management nurturing creative thought in mini business team meetings.	MP1Q3.4.38; MP1Q3.4.39; MP1Q3.4.40
Research question - Why	Why is the organisational structure and behaviour significantly influenced by lean thinking when implemented?	
Main research proposition - MP2	MP2 The implementation of lean thinking will significantly influence the organisational structure and behaviour as a result of the requirements of the lean disciplines and techniques that lead to: total employee involvement; employees having to work in cross-functional and work teams, leading to self-directed work teams to implement these techniques; the empowerment of employees to implement specific lean techniques that will influence the organisational leadership, structure and behaviour.	
Pattern WMP2P1	Employee involvement – All employees of the organisation have been, and continue to be involved in the lean programme in the form of the 20 keys. Following the major changes in 1997, the managing director at the time introduced the programme assisted by the current managing director and the unit manager business development.	MP2Q1.1.10; MP2Q1.1.14; MP2Q1.1.17; MP2Q1.1.18; MP2Q1.1.21; MP2Q1.1.24

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	Consultants were used to train employees. However, all current training is arranged by the organisational development department.	
Pattern WMP2P2	Employee involvement – The techniques, cleaning and organising, setting objectives and teamwork were basic to the total organisation. Employees participated in impact projects, which combined teamwork, quick changeovers, cleaning and organising and waste reduction. Business units utilised and continue to utilise the applicable keys regarding the current focus of the organisation. The additional keys that were covered were: standard operational procedures; time control; empowerment; commitment; Kaizen; quality; maintenance; multi-skilling; methods; cycle time reduction; Kanbans; time control and discipline; value stream mapping; coupled manufacturing; value stream mapping; inventory reduction; production scheduling; and visibility. The current focus of the organisational development unit is the continuous improvement of maintenance and quality.	MP2Q1.2.1 to MPQ1.2.28
Pattern WMP2P3	Teamwork – Following the major changes in 1997, a calendar for team meetings was established which covers the following teamwork activities: Top management team meets once a week, middle and top management team meets twice a week, mini business small group activities meet once a day by unit and area and the joint leadership meetings are held once a month. The organisational development department is a team of experts that focuses on driving the keys throughout the organisation.	MP2Q1.2.4 specifically covers total organisation.

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
WMP2P4	Empowerment – Decision-making by employees had previously required management interventions. An employee in a team may lead a team or small group activity. Employees more empowered with up-skilling and multi-skilling through intensive training. There is a skills matrix that measures development of employees. Guidelines exist for team processes. Employees in teams are encouraged to take the initiative and work without supervision. Emphasis is on promotion from within.	MP2Q1.3.2 specifically covers the total organisation.
Research Question - How	How will the organisational structure change with the implementation of lean thinking?	
Sub research proposition SP1	SP1 The organisational structure will change fully to accommodate flow and pull, which will lead to organisational structures that will accommodate customer requirements in the form of manufacturing cells. This means that: lean techniques leading to flow and pull (refer to Figure 5.2) will be implemented using, at the outset, cross-functional teams to establish effective and efficient manufacturing cells; once established, self-directed work teams will follow Kaizen routines in order to optimise manufacturing cell effectiveness and efficiency; organisational functions required to accommodate the environment and to fulfil organisational operational requirements will be covered by self-directed work teams within the established manufacturing cells; the number of hierarchical levels will drop significantly in order to accommodate a low locus of decision-making, Hoshin Kanri and to service self-directed work teams; and within the manufacturing cells, self-directed work teams will implement the lean techniques that will assist with manufacturing cell optimisation.	

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Pattern WSP1P1	Structure – Structure has a manufacturing focus and distribution focus. Manufacturing falls under chief operations director, sales, planning and distribution of manufacture integrated with operations. Total organisation is a continuous flow line from scrap and binning to final product. Distribution organisation consists of three separate distribution organisations.	Refer to pattern WMP1P1
Pattern WSP1P2	Structure – Manufacturing cells were developed, based on process flow analysis and following world class best practices with top management taking an early initiative with major organisational transformation in 1997. Sequencing of value adding operation, set-up time reduction and taking out waste, contributed to continuously improving all the manufacturing cells of the organisation.	SP1Q1.12; SP1Q1.19 SP1Q1.2,1.3,1.4,1.5,
Pattern WSP1P3	Structure - Manufacturing cells developed fully as follows: Scrap and binning consists of a continuous flow line of sorting on a conveyor belt, feeding a bailer and then being palletised to be delivered internally to re-melt business unit; re-melt consists of a continuous flow line of bails melted in four furnaces cast in a pit producing billets sent to a Kanban distribution area; extrusion business unit collects billets from re-melt Kanban area and extrudes continuously through five press lines, delivered to skip area in manufacturing distribution; manufacturing distribution delivers directly to in-house anodising unit and / or powder coating manufacturing unit that operates as independent manufacturing cells.	SP1Q1.2 to SPQ1.19
Pattern WSP1P4	Structure – Each manufacturing cell has a first-line manager running a manufacturing cell with a mini business team. First-line managers report to operations managers who oversee five cells in extrusions, five cells in powder coating and one cell in anodising.	Refer to pattern WMPP1 as well as: MP1Q3.1.20, 3.1.26, 3.1.34; SP1Q5.1,

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	Scrap and binning is one manufacturing cell as is re-melt. Each operations manager reports to a unit manager who is part of the top management team.	
Pattern WSP1P5	Structure – First-line managers run manufacturing cells virtually self-directed, receiving support from maintenance and tooling and quality specialists. Maintenance and tooling artisans (die correctors) are specialists permanently allocated to a manufacturing cell. Quality engineers report directly to the unit manager to lend support to first-line managers. The die manufacturing shop is organised as a U cell that delivers dies directly to the extrusion cells. Dies are manufactured in accordance with best practice designs. Drawing office, sales and die manufacturing coordinate directly with customers regarding die specifications, and capabilities are matched to process.	SP1Q3.4; SP1Q3.1.8; SP1Q5.1 For self-directed teams refer to: SP5Q1.1.3 to 1.1.7. SP1Q9.10. For support from maintenance refer to: MP1Q3.4.4; SP2Q2.1.13; SP2Q2.2.16; SP2Q 2.4.5; MP2Q1.3.1.6 For support from quality engineer refer to: MP1Q3.1.12; For support from tooling specialists refer to: SP1Q8.1.17; SP1Q4.1.2
Pattern WSP1P6	Structure – Work teams, named mini business teams, who run manufacturing cells are becoming more skilled and more able to do: line inspection, tooling related tasks; maintenance tasks and admin tasks.	SP1Q9.1 to SP1Q9.4; SP1Q9.8; SP1Q9.12;
Pattern WSP1P7	Structure – The credit manager dealing with debtors meets cross-functionally once a month, with unit managers, operations managers and first-line managers regarding	MP2Q1.2.6; MP2Q1.1.5

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	quality performance. Credit notes are used as a measure of customer complaints regarding quality performance.	
Pattern WSP1P8	Structure – Sales are integrated into manufacturing with national sales manager reporting directly to the chief operations director.	Figure 6.6
Pattern WSP1P10	Structure – Product design, drawing office changed to report to sales but work cross-functionally with manufacturing in excellent teamwork.	MP1Q3.1.25
Pattern WSP1P11	Performance – Organisation has achieved: one-day delivery between business units and three-day deliveries to customers; stock turns exceeding 10 turns per annum due to make-to-order policy for manufacturing and 40 day stockists policy; a PBIT that exceeds 19, 6 % before gain-sharing, and there is a consistent process of 25% gain-sharing.	Appendix G focus group questionnaire, Section - SP2TQ2
Research Question - Why	Why will specific organisational changes be required in lean thinking implementation?	
Sub proposition SP2	SP2 Specific organisational changes identified per proposition SP1 will be implemented primarily to improve the competitive performance of the organisation in terms of the performance constructs identified in Section 5.2.1.3 and continuously to improve on the lean transformation process in order to: facilitate cross-functional team and eventually self-directed work teams; empower employees to implement the lean techniques; reduce functional and leadership impediments that block lean transformation; and cultivate new organisational behaviours that will lead to improved lean performance and to a creative and constructive lean culture.	

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Pattern WSP2P1	Structure – Lean process well established with first-line managers running manufacturing cells, reporting to operations managers responsible for a number of manufacturing cells per unit. This structure promotes continuous flow and pull. Unit managers provide support to manufacturing cells in maintenance, tooling, supply and distribution. Excellent delivery performance of three-day delivery to customers. Manufacturing cells have achieved effective flow utilising quick changeovers of less than three minutes for the extrusion lines, less than 20 minutes for powder coating and seconds for anodising.	Refer structure Figure 6.6. SP1Q7.23; SP1Q7.1.1 SP1Q7.1.2 to SP1Q7.1.19
Pattern WSP2P2	Structure – Lean process well established with organisational development team working cross-functionally in teams to maintain the upkeep of established lean disciplines with focus on continuous improvement projects. This team also ensures once a month continuous quality improvement and twice a week cross-functional resolutions of issues amongst business units. Reject rate has been reduced to less than 0.5%	MP1Q3.1.14; SP1Q3.1.14
Pattern WSP2P3	Structure and behaviour – Employees support the changed organisational structure due to: Improved, open communications; improved feedback; effective team structure; effective mini-business teamwork; cascaded team goals; good knowledge sharing amongst team members; training; morale; improved technology; working more easily; a better understanding of the way forward; being more streamlined; more empowerment; more sensitive leadership who listen; no hidden agendas; quick decision-making; consultation leading to joint decision-making; the joint leadership forum; more trust; layers of management taken out; improved information flow;	SP1Q8.2; SP1Q8.3; SP1Q8.6; SP1Q8.9; SP1Q8.9; SP1Q8.12; SP1Q8.13; SP1Q8.14; SP1Q8.15; SP1Q8.17; SP1Q8.18; SP1Q8.20; SP1Q8.21; SP1Q8.22; SP1Q8.24; SP1Q8.25;

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	improved materials flow; achieving targets; satisfying customers; everything required being provided; different department working together as if they are integrated; improved systems; having resolved ethnicity issues; more ownership; no silos; organisation working like a chain first-in first-out; effective cross-functional interactions; good cooperation amongst people; good visual management; focusing on internal customers and suppliers; effective working together of support people with first-line managers, for example, die corrector with first-line manager correcting press alignment; direct interactions with higher levels being possible; having achieved a well-integrated structure, close to the customer.	SP1Q8.26; SP1Q8.27; SP1Q8.30; SP1Q8.31
Pattern WSP2P4	Structure – After 1997 restructuring and reorganisation occurred under the new managing director. Positional and structural changes occurred, and lean thinking was introduced with the 20 keys process. A culture of trust was established with the new managing director, involving all the employees of the organisation in the decisions regarding the future of the organisation.	MP1Q3.1.20
Pattern WSP2P5	Structure – Team structure was introduced with emphasis on mini business teams running manufacturing cells or flow-lines. Visual management was extensively utilised to explain what was happening.	MP1Q3.3.14; SP2Q1.1.15
Pattern WSP2P6	Structure and teamwork – Decision taken to go for team structure. Top team meets once per week, top and middle management team meet twice a week, and mini business meetings take place daily and unit managers meet once a day as well. Warehouse and distribution mini business teams meet three times a week with the unit manager.	SP2Q1.1.8

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Pattern WSP2P7	Structure and empowerment – Flatter structure allows for decision-making and empowerment at lower levels; for example, in re-melt, the mini business team changed the way furnaces were loaded. Open channel of communications and joint leadership meetings empower employees to feel free to express themselves. Empowerment focused on idea generation from workers to improve the flow. Fifteen years ago the managing director asked the people how to change the output from 15 ton per day to 300 ton per day.	SP2Q1.2.14; SP2Q1.2.11; SP2Q1.2.17
Pattern WSP2P8	Structure and empowerment – Empowered through training by the organisational development team at the organisation and mini business, small group activities with employees providing ideas. People are up-skilled as well as multi-skilled. Employees are often given the opportunity to lead team meetings for one week. The first-line manager acts as facilitator. Skills matrix drives the development	SP2Q1.2.6
Pattern WSP2P9	Structure and leadership changes – Previous managing director changed the organisation: current managing director appointed in 2007; current managing director, actually had the role of assistant managing director; all aspects covered by the current managing director before his appointment; operations director appointed two to three years ago; structure remain four levels until the appointment of the chief operations director; organisational development department with unit manager part of structure since 2002.	SP2Q1.3.11; SP2Q1.3.25
Pattern WSP2P10	Structure and communications – Improved since major changes in 1997: culture is open and consultative; mini business meeting; twice a week meeting top with operations managers; workers may talk to the managing director and line managers	SP2Q2.1.1 to SP2Q2.1.31

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	do not take exception; joint leadership meeting; joint consultative committee with NUMSA and Solidarity.	
Pattern WSP2P11	Respect – The changed organisational structure led to: changed attitudes through improved organisational performance: incentive bonuses led to an awareness of the organisational performance; team structures that cultivated respect; the development of first-line managers who cultivated respect.	SP2Q2.2.30
Pattern WSP2P12	Leadership behaviour – Leadership behaviour is characterised by leaders who: are by nature consultative; stay humble; have a love of people; are results focused; believe that good business results change attitudes; believe that fairness is all important.	SP2Q2.3.35
Pattern WSP2P13	Attitudes – Attitudes have improved owing to: organisational growth; improved daily communications; the mini business and joint consultative meetings cultivating employee involvement; employees knowing where the organisation is going; workers being given the opportunity to learn; employees being able to provide feedback and to implement initiatives for which they are rewarded and recognised; concerns being effectively dealt with; more respectful, trustworthy and better leadership; the incentive bonuses and employees' awareness of the results of the organisation and employees having greater responsibilities in terms of the lean programme, with workers taking greater ownership of the process; awareness and alignment to the vision; and the transparency of management.	SP2Q2.4.1 to SP2Q2.4.9; SP2Q2.4.11, SP2Q2.4.12, SP2Q2.4.14 to SP2Q2.4.18, and SP2Q2.4.20, to SP2Q2.4.22
Research Question - How	How will the organisational behaviour change with implementation of lean thinking?	

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
Sub research proposition WSP3.1	SP3.1 The organisational behaviour will, at the outset of the transformation process, be characterised by a high degree of uncertainty, speculative communications, and a lack of commitment, negative attitudes, and leaders who are reluctant to relinquish power.	
Pattern WSP3.1P1	Structure and behaviour – The structural changes brought about in 1997 were due to the previous management not performing and their reluctance to engage the employees. The CEO was replaced. New structural changes brought about by new management, were viewed by most employees feeling: sceptical; fear; vulnerable; uncertain; just another thing; negative; forced into a new situation; and apprehensive.	MP1Q3.1.23; MP1Q 3.1.3; SP3Q1.9; SP3.1Q1.1 to SP3.1Q1.3, SP3Q1.5, SP3.1Q1.6, SP3.1Q1.11 to SP3.1Q1.1.13,
Pattern WSP3.1P2	Behaviour – In 1997, the new CEO consulted with the staff and brought with him skilled managers (key managers came from management consulting organisations) who were able to work well with people and deal with human issues and concerns. This was welcomed by the employees who responded positively by providing support and proposals for an effective transformation.	SP3.1Q1.1.17
Pattern WSP3.1P3	Behaviour – Some employees, realising that the organisation was in the red, welcomed the major transformation that occurred after 1997 and that resulted in the lean process in the form of the 20 keys with a feeling that things could not get worse and that the change presented an opportunity to keep their job.	SP3.1Q1.8, SP3.1Q1.10; SP3.1Q1.1.10; SP3.1Q1.1.16
Pattern WSP3.1P4	Behaviour – After the transformation in 1997, employees adapted well to the lean process over a period of nearly 15 years. Employees see the lean process as partially implemented, 50% to 90%, with still much to be done.	SP3.1Q1.1 to SP3.1Q1.9

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
<p>Sub research proposition SP3.2</p>	<p>SP3.2 After the lean process and the lean strategy have been thoroughly discussed by the leaders of the organisation and after thorough development and training has been implemented with total employee involvement, the organisational behaviours will change as follows: commitment will improve, becoming more affective, with a major portion of the employee complement committing to organisational vision, mission, goals and objectives; perception of leadership will change from disillusionment to understanding why the lean process is required; participation and involvement will improve, with employees providing creative and effective solutions to achieve flow and pull in the organisation and to improve on routines and standardised work; roles and responsibilities will change, with employees displaying a willingness to take on more than their respective original functions and job descriptions; knowledge of lean process will grow to a total understanding and appreciation of how full implementation of all the lean techniques can lead to ever-increasing organisational performance; attitudes will change from passive to active participation and involvement in finding solutions rather than creating problems; respect will improve with employees being recognised and rewarded for both their individual and their team contributions.</p>	
<p>Pattern WSP3.2P1</p>	<p>Behaviour and commitment – Since the major changes in 1997 and the introduction of the 20 keys: workers provide more ideas, than initially; more creative employees than before; workers feel responsible for the organisation; see the organisation as their own; see the benefits of going the extra mile; see the organisation’s future as their family’s future; commitment has improved with monthly joint leadership and management meetings (JLM); employees are more aware of organisational results</p>	<p>MP1Q3.4.1; MP1Q3.4.4; MP1Q3.4.7; MP1Q3.4.8; MP1Q3.4.22; MP1Q3.4.23; MP1Q3.4.26; MP1Q3.4.29; MP1Q3.4.30</p>

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	<p>and growth; are affectively committed since they are concerned for the organisation (nowhere to go); the incentive bonuses drive affective commitment; the organisation has developed a family culture and this contributes to the affective commitment of employees; managers cultivate affective commitment through encouragement and recognition of ideas; workers are more affectively committed as can be assessed in their willingness to work overtime and their active participation in the mini business teams; workers are more affectively committed owing to the effectiveness of the first-line managers; and workers are keen to learn, especially the younger employees.</p>	
<p>Pattern WSP3.2P2</p>	<p>Behaviour and organisational vision, mission and goals – Since the major changes, the vision was clearly defined as achieving one day delivery: employees are totally aligned to the vision of one day delivery, due to team structure, the leadership and the success of the organisation; employees understand the vision owing to its simplicity; from managing director to first-line manager, team goals are cascaded down through the whole organisation.</p>	<p>MP1Q3.5.4; MP1Q3.5.12; MP2Q 1.1.17</p>
<p>Pattern WSP3.2P3</p>	<p>Behaviour and leadership – Since the major changes in 1997 and the introduction of lean in the form of the 20 keys: employees see the leaders as strong, positive and confident; employees trust their judgement; see their performance, for example, buying other organisations successfully; employees have a high degree of respect for the leaders of the organisation; workers are positive owing to the manner in which change was communicated and driven and the positive results experienced from the growth of the organisation.</p>	<p>SP3.2Q1.1.3; SP3.2Q1.1.6</p>

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
<p>Pattern WSP3.2P4</p>	<p>Behaviour and participation in lean process – Since the major changes in 1997 and the introduction to lean in the form of the 20 keys: employees participate more because of: the mini business meetings; seeing the benefits of incentive bonuses; working to targets; receiving feedback; curiosity; receiving recognition; being keen to learn; filling in maintenance check sheets; management encouraging employees; interest generated through project work; involving the team members in the detail; respect employees have for each other.</p>	<p>SP3.2Q1.2.1 to SP3.2Q1.2.8</p>
<p>Pattern WSP3.2P5</p>	<p>Behaviour and employees providing ideas and solutions per Kaizen – Since the major changes in 1997 and the implementation of the team structure and lean thinking, employees have offered a number of ideas to improve the flow and pull of the organisation. Extrusions have: reduced cycle-times with new technology; reduced set-up times with quicker die change-overs; improved on die designs; and improved process control systems. Powder coating has: introduced new gun technology; introduced skips in the flow line; worked on improving change-overs from one colour to the next. Anodising has: achieved continuous flow with unique jig designs and the use of effectively designed skips. Re- melt has reduced cycle times by changing the method of loading of furnaces based on reduced volumes, but with a higher frequency.</p>	<p>SP1Q6.1 to SP1Q6.32, SP1Q3.5; SP1Q1.14</p>
<p>Pattern WSP3.2P6</p>	<p>Behaviour and standard work – Employees are participating in continuous improvement and the update of standard operating procedures once the idea has been trialled. This motivates and encourages the employees.</p>	<p>MP2Q1.3.5</p>
<p>Pattern WSP3.2P7</p>	<p>Behaviour and roles and responsibilities – Since the major changes in 1997, the roles and responsibilities of employees have drastically changed with employees:</p>	<p>SP3.2Q1.3.1; SP3.2Q1.3.2</p>

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	going beyond the previous line drawn for them and accepting additional responsibilities as a result of the keys; feeling driven to achieve the team targets; feeling that it is the right thing to do; participating in team tasks such as organising and cleaning; becoming more multi-skilled; making decisions regarding work content and schedules; taking responsibility for planning to achieve the targets set.	
Pattern WSP3.2P8	Behaviour and knowledge of lean process – Employees understand the lean techniques or keys in the following way: the continuous application of mini business teamwork running manufacturing cells or servicing cells or customers, team goals, cleaning and organising, participating in Kaizen, keeping time, maintaining discipline and commitment, scheduling the work sequentially, pulling the work from skips and delivering into skips (Kanban); achieving die change-overs in the given time limits; focusing on reduced waste and rejects, visual management with team members updating charts in mini business areas, becoming multi-skilled, and assisting maintenance with the filling in of maintenance schedules. Value stream mapping is done by trainees working within business development and or within manufacturing units and is utilised to review and improve or the current and future flow of manufacturing cells.	SP3.2Q1.4.1 to SP3.2Q1.4.22
Pattern WSP3.2P9	Behaviour leading to appreciation of how full implementation of all the lean techniques leads to ever-increasing organisational performance – Unit managers meet daily with first-line managers who meet daily with mini business teams who discuss organisational results and achievements and targets. Achievements are linked to profit gain-sharing, and enlighten employees as to how the organisation is doing. The	Teamwork: MP1Q3.1.20, MP2Q 1.2.4, Incentive bonuses: MP1Q 3.1.17, MP1Q3.1.18, MP1Q3.1.22,

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	organisational development team has champions that prioritise keys of lean techniques focus, and this is communicated weekly in mini team meetings, against set targets. Mini business teams controlled by first-line managers are kept constantly aware of their contributions regarding the achievement of targets through performance results and gain-sharing amounts. Mini business teams compete against each other to improve on the set targets.	MP1Q3.1.26 Organisational development team: MP1Q 3.1.14, MP2Q 1.1.5, MP2Q1.2.4, SP1Q7.18, SP2Q1.1.15, SP6Q2.1.3 Teams competing:MP1Q3.3.21
Pattern WSP3.2 P10	Behaviours and attitudes towards lean – Attitudes have improved towards the lean process owing to: the excellent consultation process followed by the leaders of the organisation; the participation of employees in the daily mini business team sessions leading to involvement and learning; positive organisational results and the employee awareness of same, through team participation, feedback sessions and the incentive bonus system; workers being encouraged to work smarter not harder; improved technology through Kaizen; employees being able to provide ideas for improvement and being recognised for this; employees working to achieve a target; employees accepting the keys since they are stressed and referred to continuously in team meetings, led by First-line managers; the improved disciples of the lean process; the improved trust cultivated by teamwork and leadership; the effectiveness of the First-line managers supporting the lean process; the recognition by the top of mini business team achievements and contributions.	SP3.2Q1.5.2, MP1Q3.2.5 SP2Q2.2.32, SP3.2Q MP1Q1.5.20, MP1Q3.3.21, SP3.2Q1.5.6; SP3.2Q1.5.10; SP3.2Q1.5.28; SP3.2Q1.5.29; SP3.2Q1.5.16; MP1Q3.4.4, MP2Q1.1.8; MP2Q1.1.14
Pattern WSP3.2 P11	Behaviours regarding respect and lean process – Respect is at a high level owing to: the approachability of leaders; leaders always listening carefully; leaders being	SP3.2Q1.6.3; SP3.2Q1.6.5;

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	respectful of knowledge and skills: the good and effective way leaders communicate; leaders providing instant feedback; support of the lean process; the good manners of leaders and their positive attitude to management attending mini business team meetings and interacting directly with employees; interdependence realised by management and employees alike; managers understanding the job content and contributions of workers better; the teams being respected by management for their contribution and participation; leaders not making unilateral decisions and involving employees in the decision-making process; self-respect being cultivated through participation in the keys in the mini business team sessions; the participation of teams in key 10 discipline and commitment.	SP3.2Q1.6.9; SP3.2Q1.6.10; SP3.2Q1.6.12; SP3.2Q1.6.20
Research Question - Why	Why will the organisational behaviour change with implementation of lean thinking?	
Sub research proposition SP4	SP4 As employees and leadership become more familiar with the lean transformation process organisational behaviour will change with the inevitable change in organisational culture and the necessary organisational structural changes. New learning will take place in terms of the work teams implementing the lean techniques identified in process Figure 5.2.	
Pattern WSP4P1	Structure and behavioural change – The flattened organisational structure consisting of manufacturing cells led by first-line managers, and manned by mini business teams, making up business units, coupled with the team structure of top middle and first-line managers and the supporting lean champions from the	MP1Q3.1.23; MP1Q3.1.36 SP1Q7.12; SP1Q7.13; SP1Q7.23; SP5.2Q1.2.6; SP5Q1.2.12; MP1Q3.2.19

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	organisational development team, has presented an effective framework for behavioural change that has proved favourable for lean transformation.	
Pattern WSP4P2	Organisational culture and behavioural change – The following cultural changes have occurred: a culture of trust owing to leadership consulting with the total organisation, leaders being open, Kaizen continuous improvement, goal alignment and employee participation in teamwork; an entrepreneurial culture because of less red tape and less bureaucracy in getting things done; a reduced blame culture contributed to positive attitudes; a family culture has developed that has contributed to the affective commitment of employees, owing to high levels of respect; the culture is an open consultative culture as a result of the mini business structure and the openness of the leadership; a culture of transparency has developed because there are no hidden agendas in the organisation; a supportive culture with employees standing together and being willing to help one another; and a culture of ownership in the way employees feel about the organisation.	MP1Q3.2.19; MP1Q3.3.20; MP1Q3.3.23; MMP1Q3.4.22; SP4Q1.4; SP2Q2.1.31 SP2Q2.2.13 SP2Q2.2.7; SP4Q1.28
Research Question - How	How can the organisational structure be best redesigned to optimise the use of all lean thinking techniques and disciplines?	
Sub research propositions SP5.1 and SP5.2	SP5.1 the best organisational structure will lead to the optimisation of self-directed teamwork and the elimination of functional and leadership impediments to lean implementation. Self-directed work teams will be maximally empowered to fulfil a major portion of the required roles and responsibilities for the day-to-day running of the organisation.	

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	<p>SP5.2 The best organisational structure will fully accommodate a cellular format, with fully empowered self-directed work teams, well able to implement all the identified lean disciplines and techniques.</p>	
<p>Pattern WSP5.1P1</p>	<p>Structure – The developed structure consists of profit centre business units that have continuous flow achieved with manufacturing cells with support functions, manned by work teams led by first-line managers who are virtually self-directing. The organisational structure is flat, open and entrepreneurial, allowing for empowerment and initiatives to develop. The structure maintains its lean approach through an organisational development business unit and effective cross-functional, management and employee teams that timeously drive lean initiatives.</p>	<p>SP1Q4.1.7 MP1Q3.1.23; SP1Q8.1.5; SP2Q2.2.32; MP2Q1.3.10; SP1Q2.12; SP1Q4.1.7; SP5.2Q1.2.12; MP1Q3.2.19; MP1Q3.3.14; MP2Q 1.2.4</p>
<p>Pattern WSP5.1P2</p>	<p>Structure – First-line managers are individuals with strong leadership characteristics and who are qualified by the organisation’s development unit in lean thinking and in how to run a mini business, i.e. how to run a manufacturing cell as a small business. The employees on the team are workers who participate actively to achieve the goals of the mini business. First-line managers train, develop and empower their teams to run independently and to be self-directed. (the cranes are running).The first-line managers are supported by tool specialists (called die correctors), maintenance specialists (millwrights), lean and admin specialists who from time to time help and support first-line managers in maintaining and continuously improving the flow of materials from supplier to customer and in developing the team members’ skills.</p>	<p>MP1Q3.1.26; MP2Q1.3.18; MP2Q1.3.1.7; MP2Q1.3.10; SP1Q8.1.17; SP1Q9.14; MP1Q3.1.14; MP1Q3.1.20</p>
<p>Pattern WSP5.1P3</p>	<p>Structure – The organisational development department acts cross-functionally with all the departments and units of the organisation. This unit is well respected by the</p>	<p>MP1Q3.1.14; MP1Q3.1.20; MP2Q1.1.5 (goal setting</p>

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	employees, and management of the organisation and interactions are effected by means of impact projects or arranged target training. The organisational development unit set the respective goals for the mini business team in conjunction with top management.	and focus); MP2Q1.1.9; MP2Q1.1.10 (target training)
Research question - Why	Why should the organisational structure be redesigned to accommodate the use of all lean thinking techniques and disciplines?	
Sub research proposition SP6	SP6 The organisation will have to undergo the redesign as indicated per SP5.1 and SP5.2 in order to accommodate effective lean implementation in terms of Hoshin Kanri and policy deployment and value stream mapping developed between leader and employees, enabling quick and effective communications that will lead to a competitive global organisation, implementing and continuously improving the lean techniques by way of empowered self-directed teamwork engaged in: problem-solving; Kaizen; distinguishing value; reducing the seven wastes; five S; TPM; visual management; standard work; and the same self-directed work teams operating manufacturing cells engaged in: Taguchi; cycle time reduction; one-piece flow; Kanban; SMED; Poka-yoke and Jidoka; and Heijunka.	
Pattern WSP6P1	Structure – W01 has become a mature lean manufacturing organisation with a team structure and well cascaded team goals per key two and three, akin to the Hoshin Kanri: First-line managers run to set targets, manufacturing cells with mini business teams, or support functions that provide processed work and or tools to manufacturing cells in the same business unit or to manufacturing cells located downstream; First-line managers provide effective feedback, reporting to operations managers, reporting	Figure 6.5 and Figure 6.6; Appendix G question number SP2TQ2

Categories	Built explanations of emerging patterns relative to research how and why questions and the propositions	References
	to business unit managers, reporting to the chief operations director reporting to managing director; business development manager with lean champions acts cross-functionally to assist business units and first-line managers to maintain and/or continuously improve on lean process; human resources and financial units cross-functionally support business units and distribution organisations.	
Pattern WSP6P2	Structure facilitating behaviours conducive to lean – The structure facilitates the continuous cultivation of behaviours conducive to lean process: First-line managers in charge of mini business teams meet daily with mini business team utilising effective visual management in designated team meeting areas, emphasising keys applications and team performance against set targets; First-line managers train team members in keys applications; First-line managers facilitate team members’ participation in continuous improvement and idea generation; the business development manager has specialists championing lean process and participating with top management in setting aligned team goals; business development units facilitate and provide all the organisational training and development requirements; top management facilitates an open-door policy; top management encourages mini business teams in lean process; top management regularly conducts visits to team areas; flat structure with only one management layer between first-line managers and top management.	Figure 6.5 and Figure 6.6; Pattern WSP2P3; MP2Q1.2.4 (team structure and calendar)
Pattern WSP6P3	Organisational performance – World class performance levels being achieved: lean well implemented per audit, Figure 6.4.	Figure 6.4; Appendix G question number SP2TQ2

Table 6.6 shows that W01 had made remarkable progress with lean implementation. The exercise indicates advanced alignment between patterns and the propositions and assisted significantly in confirming the research propositions. Definite structural and behavioural patterns emerged, indicating the relationships between structure and organisational behaviour, indicating how the cultivation of behaviours conducive to lean thinking was achieved. As in F01, patterns emerging in the W01 case study were linked to the literature review that led to the development of the propositions. The next section discusses how the literature relates to the patterns that developed.

6.3.5.1.2 Literature linked to patterns – W01

With the development pattern of patterns leading to a new approach to lean thinking, as was indicated in the rationale for this study, and as in the case of the prototype case study F01, the literature linked to the patterns in the W01 study distinguished between patterns indicating structural evolution with behaviour and patterns of structure that lead to the cultivation of behaviours conducive to lean thinking. The following section analyses the theory linked to structural evolution, followed by the theory linked to organisational behaviour change.

6.3.5.1.2.1 Literature linked to the organisational structure patterns – W01

The analysis of how the literature related to the organisational structure patterns was achieved by selecting a pattern or patterns sequentially from Table 6.6 and then relating these to the literature review. Where patterns were linked in terms of the literature references to others patterns down the list, these were linked to the originally identified pattern. The following discussion identifies the literature links by selected pattern:

- Patterns WMP1P1, WSP2P3; WSP4P1; WSP3.1P1; WSP5.1P1 indicate that W01 had in the late 1990s and early 2000s, restructured the organisation along the value stream in a very similar way to what Haug (2012) had found in two electronic organisations in his empirical research. The W01 managing director had clear insight into how continuous flow would occur in accordance with a structural design that would support the flow. The flattened structure made lean implementation easier (Nahm *et al.* 2003). Patterns WMP1P2, WSP2P4 and WSP2P9 refer to leadership changes and radical organisational changes occurring in line with Francis *et al.* (2003), who found that new leadership competencies are required with major transformations. The radical changes included a flattening of the structure, as was found by Nahm *et al.* (2003) and O'Carroll (2004). Pattern

WMP1P3 refers to what may be a new principle of lean thinking that was instituted for W01, that every manager should have access to every customer and vice versa. It was, therefore, expected that every manager, no matter which function allocated, related to the customers of the organisation. Pattern WMP1P4; WSP5.1P1; WSP5.1P2 deals with the development of first-line managers as mini business leaders, destined to run a manufacturing cell or a support team that will promote flow and pull in the organisation (Haug, 2012). Pattern WSP1P1 distinguishes two distinct organisational structures for W01, i.e. one structure for distribution and one for manufacturing. For W01, flat structures were designed for both organisations, similar to Nahm *et al.* (2003) and Haug (2012), resulting in effective structures that make vertical and horizontal integration simple and direct. According to pattern WSP1P2; WSP1P3, W01 had developed a continuous flow line consisting of five distinct manufacturing units, each with its own set of manufacturing cells, linked with effective visual Kanbans across the total facility. Pattern WSP1P4 WSP5.1P2 reflects that manufacturing cells are run by mini business team managers who are highly skilled and competent enough to run cells as small businesses. Patterns WSP1P5; WSP2P5; WSP5.1P2 confirm that the manufacturing cells of W01 were run by virtually self-directed work teams, as was found to be the case by Haug (2012) in the two electronic organisations' case studies. Further analysis into the reason for the success of the W01 work teams found this to be the support for the work teams that existed in the form of upstream support of visual supply Kanbans, tool and die support with a permanent die corrector allocated to each team, a maintenance specialist allocated to each team, a draughtswoman reporting to sales but also in regular touch with the die manufacturing cell (refer to pattern WSP1P10) and the mini business teams dealing with customer order details and product design specifications (refer pattern WSP1P10) and a financial accounting staff member who provided support from the finance department to assist with the performance records of the cell (refer to pattern WSP1P7). The visual workplace (Braden *et al.*, 2012) is also prevalent for the W01 work teams who meet daily in specially allocated team areas to focus on team goals, objectives, visible tables, graphs of team performance, standard operating procedures and specific keys. Pattern WSP1P6 refers to the continuous improvement of each mini business team in the organisation in order to empower more (Poppendieck, 2002; Pinheiro, 2010) and achieve more self-direction (O' Carrol, 2004; Jumara, 2005; Kent, 2006). Patterns WSP2P2; WSP5.1P1; WSP5.1P3 refer to the organisational development

unit (Brown *et al.*, 2006; Gonzalo, 2007) that had been established for W01 in 2003 in order to develop the total organisation in the in application of the 20 keys (Kobayashi, 1995). This organisational development unit has as objective the total involvement of the organisation in the lean process in the form of the 20 keys (Kobayashi, 1995). The total W01 organisation consists of a structure of teams, as indicated in pattern WSP2P6, and teams meet at set times to set agendas that review performance against team goals, objectives and future short and long-term plans. This process secures effective forward and feedback communications for the organisation (refer to pattern WSP2P10). The consistency of the communication in the teams through the set meetings and agendas are as prescribed by the Hoshin Kanri techniques (Dennis, 2006) or by key two and three (Kobayashi, 1995). At team meetings problem-solving is done, sometimes with the support of a lean champion from the organisational development unit, according to prescribed methods such as those identified by Ōhno (1988), Liker (2004), Womack and Jones (2010) Marksberry *et al.* (2011) and Nicholas (2011) (refer to pattern WSP3.2P5). Patterns WSP6P1; WSP6P2 describes the maturity of the organisation regarding lean implementation. In terms of a lean strategy, the Hoshin Kanri (Dennis, 2006) vision and mission and organisational goals have been well cascaded throughout the organisation. The team structure of W01 has provided each team with a set of team goals that are fully aligned to the organisational strategic goals, as is reflected in its growth and financial performance.

Applications of the lean techniques (Womack & Jones, 2003; Quarterman, 2007) are summarised according to the patterns coinciding with the research proposition SP6, which indicates the significant progress made by the W01 organisation in terms of pattern WSP6P3:

- Hoshin Kanri and policy deployment for W01 (Dennis, 2006) are reflected in key two (managing objectives) and key three (improving team activities). Without exception, each of the interviewees knew verbatim the vision and mission of the organisation.
- Visibility in the workplace (Womack and Jones, 2003) is evident in W01 in application, in pattern WSP6P2 with W01 using team meeting places to meet with teams in the presence of visible information and visible controls, and that, as in F01, is akin to the visible workplace referred to by Braden *et al.* (2012).

- W01 used five S or key one (cleaning and organising) as a stepping stone to introduce lean thinking to the organisation, rather like F01 and similar to what was found by Suárez-Barraza and Ramis-Pujol (2012). This technique has become a habit after twelve years of continuous cleaning of their workplaces by mini business teams.
- Knowledge of the seven wastes (Ōhno, 1988; Womack and Jones, 2003) was confirmed by most of the interviewees in their knowledge of key 13 (Kobayashi, 1995), relating this to the reject rate which was below 0, 5% for W01.
- The awareness of standard work practices (Womack and Jones, 2003; Nicholas 2011) was evident, and it was noted by the managing director that the first-line managers were responsible for updating standard operating procedures with their respective team members.
- Interviews revealed a high level of awareness of Kaizen and problem-solving, as advocated by Ōhno (1988), Liker (2004), Manos (2007), Doolen (2008), Womack and Jones (2010), Marksberry *et al.* (2011) and Nicolas (2011), as indicated in Table 6.5. Kaizen is an entrenched behaviour which is cultivated by the organisational development unit's involvement in the on-going prioritising of specific keys.
- Cellular manufacturing utilising value stream mapping (Rother and Harris, 2001), SMED (Shingō, 1989), single piece flow (Womack and Jones, 2003) and cycle time reduction (Rother and Harris 2001; Womack and Jones; 2003; Nicolas 2011) were techniques that had been used in all the manufacturing cells that had been developed at W01. At the outset, the managing director had visited foreign organisations to review best practice flow lines for aluminium extrusions.
- SMED (Shingō, 1989) was applied in all set-up operations, resulting in die changes of less than three minutes per change-over, less than 15 minutes for spray gun change-over and seconds for anodising change-over.
- Single-piece flow (Womack and Jones, 2010) was not an issue but was possible with the change-over times achieved.
- Heijunka or level scheduling (Jones, 2006) was applied as a pure sequential loading process by the members of mini business teams and had become an entrenched habit as a result of the ample capacity of the productive system. Customer orders were perfectly scheduled by date and only interrupted if a customer required immediate delivery.

- Poka-yoke and Jidoka (Ōhno, 1988; Shingō, 1989) was not used as focused techniques.
- Value-stream-mapping (Rother and Harris, 2001) was used when W01 worked closely with students from the University of Pretoria and this was an on-going practice. Students were employed at W01 during their vacations or when they required practical experience for their honours and masters dissertations in industrial engineering.
- Teamwork (Womack and Jones, 2003; Jumara, 2005; Kent, 2006) was a well-entrenched technique used in mini business teams and cross-functional teamwork throughout the organisation, as was discussed in the majority of patterns in Table 6.6,
- Taguchi (Todd, 1995) was a specialised technique that was found to be used by the systems business unit when specific designs were created to accommodate the customer in alignment with facility capabilities. Team members were not aware of this technique, and it is an area where future work will be done by the top management team, as was agreed after the focus group interview held by the researcher.
- Visual Kanbans (Quarterman, 2008) had been well developed by the W01 management team for all the processes, from re-melt to final processing, both anodising and powder coating.
- Total productive maintenance (Nicholas, 2011) is ongoing, with mini business team members filling in checklists for maintenance specialists who are present in all manufacturing cell work areas.
- Value from the point of view of the customer (Womack and Jones 2003) is well established with most customer orders entering the manufacturing cells directly via the planning office. It was found that first-line managers were acutely aware of customer requirements.
- Performance had improved in W01 with the progress in lean thinking, as reflected in pattern WSP1P11, with significant profit, productivity and service delivery improvements, as advocated by Womack and Jones (2010) and as found by Lander (2007) in his research.

Similar to the process followed in the previous section and as for F01, the next section will review how the literature is linked to the patterns of organisational behaviour outlined in Table 6.6.

6.3.5.1.2.2 Literature linked to the organisational behaviour patterns – W01

The following analysis links literature to the organisational patterns at W01 in terms of the behavioural constructs that were identified for this study:

- As in F01, behavioural resistance to the lean implementation process was found at the outset in W01, reflected in pattern WMP1P5; this was expected from Ōhno (1988) and the negative responses identified by Hasle *et al.* (2012).
- Attitudes in patterns WMP1P6; WSP2P13; WSP2P3; WSP3.1P2; WSP3.1P3; WSP3.1P4 WSP3.2 P10 were found to be negative at the beginning of the lean process in the early 2000s. By the time of the study, attitudes had changed to support the lean process as result of the following changes: the consultative, open door style of the managing director; the mini business team initiative; teams with their own designated meeting places; greater involvement of employees in the process, such as in daily mini business team meetings; involvement of employees in Kaizen events; growing awareness among employees of the organisational growth and performance through gain-sharing; the open door approach taken by managers; visits to team meeting areas by top team managers; initiation of monthly tank talk by managing director; the experience gained by employees from training in the 20 keys facilitated by the first-line managers and the organisational development unit. The experience at W01 is similar to those observed by Doolen *et al.* (2008), who found varied responses, and similar to the findings of Tress and Espinoza (2012) who found attitudes which were conducive to lean thinking similar to those experienced at W01.
- A large segment of employees appeared to be affectively committed (Angelis *et al.* 2011) (see Table 6.5), based on an analysis of interviewee knowledge of the main Kaizen events that had occurred in the organisation. It appeared that employees held the organisation in high esteem, with almost all those interviewed knowing the vision and mission thoroughly, as reflected in patterns WMP1P7; WSP3.2P1; WSP3.2P2; and WSP3.2P5. This indicated behaviours of high participation; being nurtured to provide ideas by skilled first-line managers; being encouraged and recognised; participating as a team, especially in cleaning and organising; realising the organisation's care for family; being aware of contributions to achieving targets; being rewarded in terms of gain-sharing; learning; becoming multi-skilled; and realising that the organisation was competing with China. The high level of affective

commitment can be attributed to the effective mini business team processes, similar to findings by Jumara (2005) and Kent (2006).

- With key two and key three focusing on teamwork and achieving team targets respectively, similar to Hoshin Kanri, being applied in patterns WMP2P3; WSP6P2; WSP3.2P9, W01 had experienced more affective commitment with the open sharing of the organisational strategy by the managing director at the monthly tank talks and joint consultative forum, and in the weekly meetings of unit managers and first-line managers and their teams when agendas were set. Gagnon (2004) also found that workers reacted positively when they were made aware of the organisational strategy. Again, effective team processes similar to those found by Jumara (2005) and Kent (2006) can be attributed to the highly skilled first-line managers who ran effective team meetings and the organisational development unit's champions who prioritised specific techniques for the continuous improvement of the organisation.
- Perceptions of leadership in pattern WSP2P12; WSP3.2P3 indicated complete trust and confidence in the leadership of the organisation. The characteristics mentioned referred to an open consultative, supportive, and constructive style similar to the findings of Johnson (2009) and Testani and Ramakrishnan (2011).
- Roles and responsibilities in pattern WSP3.2P7 had changed according to the responses of those employees who could remember the previous dispensation. With Haug (2012) stating that roles and tasks for management will have to change, but not indicating how these should change, the findings at W01 suggested that management required roles that made more teamwork and greater empowerment of employees a reality. This was found to be the case at W01. It was also found that employees changed their roles willingly once the habits of team participation had taken root. Cleaning and organising or five S appeared to be the chief reason for the willingness of employees to accept new roles and responsibilities in terms of the lean thinking process.
- Empowerment as advocated by Nahm *et al.* (2003), Pinheiro (2010) and Poppendieck (2002) was observed at W01 in patterns WSP3.2P6 WMP2P4; WSP4P1, owing to the flat structure that had resulted in a low locus of decision-making (Nahm *et al.* 2003) and which indicated more empowerment of work teams, which was expected to occur with new leadership in 1997. The new leaders realised the need for employee empowerment, for employees to become more involved in decision-making such as leading teams, changing schedules and

participating in decisions regarding plant condition. Another pertinent observation was that team members under the leadership of the first-line manager were empowered to change standard work practice for the better.

- Respect in patterns WSP3.2 P11; WSP2P11 at W01, as was experienced by Czabke *et al.* (2008), was found to be at a high level as a result of the effective open leadership and the feeling employees had that their contributions to the growth of the organisation were respected.
- Employee involvement reflected in patterns WMP2P1; WMP2P2; WSP3.2P4 indicated active and high involvement as a result of active participation by team members owing to outside consults training, the effective behaviour of the first-line managers in training team members on a regular basis and encouraging their participation. Employees were encouraged to express their views, ideas and grievances and these were quickly resolved because of the strict disciplinary code at W01. Involvement also improved when employees participated in work teams and cross-functional Kaizens involving lean champions. Such behaviours were emphasised by Ōhno (1988), Shingō (1989), Liker (2004) and Womack and Jones (2010) and were further refined by Afsar (2010), who proposed HR support for the process. This appeared to be the case at W01 with the HR director taking a substantial interest in the well being and performance of first-line managers.
- Knowledge of the lean thinking process reflected in pattern SP3.2P8 was found mainly in terms of the habits that had been ingrained in the work teams who knew: five S; teamwork; meeting targets; Kaizen and problem-solving; running flow lines or manufacturing cells; keeping to time disciplines; and performing work to standard operating procedures. Awareness of quick changeovers was also found to be an established habit, with team members understanding the effect of on time delivery and reducing customer lead times. Nahm *et al.* (2003) and Lander (2007) have emphasised the point of organisations learning to learn with the lean process and at W01 this aspect had been well handled, with first line managers' ongoing training of team members and the support of lean champions of specific focus areas such as quality and maintenance. The flat structure facilitated effective learning in W01 as was pointed out by Curado (2006).
- Communications reflected in pattern WSP2P10 were found to be highly effective at W01 owing to the teams and meeting structures that assured almost continuous horizontal and vertical integration. Information was updated twice weekly and if required, teams met immediately, as was experienced by the researcher. The top

team coordination with first-line managers was consistent, and daily unit managers and first-line managers' meetings took place before the first-line managers interacted with their teams. Such effectiveness is in line with the findings of Worley and Doolen (2006), who found a dynamic relationship between good communication and lean implementation attributable to good management.

- Organisational culture (pattern WSP4P2) was found to have changed remarkably over the 14 years of lean implementation at the organisation. Employees who could remember the previous dispensation described the then culture as closed and secretive. W01 was found to have an open culture of people who cared for each other. Some saw it as an entrepreneurial culture brought about by empowerment and the effective mini business team processes. Most employees, however, regarded the culture as being like a family. Cooper (2011) also acknowledged the role of organisational culture and the need for a collaborative effort by lean experts and lean champions if a culture to establish a conducive to lean implementation was to be created, as had occurred in W01.

6.3.5.2 Addressing rival explanations

The findings reflected in the pattern matching exercise (see Table 6.6) rival the model proposed by Womack and Jones (2003), and together with the previous case study support the propositions that organisational structures will change to support the flow by way of cellular manufacturing. The components of an effective lean structure are revealed as a flat open structure with first-line managers running effective work teams that, in the main, can operate in a self-directed manner. Even the support functions have cellular type structures, as was the case in the die manufacturing plant that operated U-cells and interacted effectively with first-line managers to provide tooling in the form of extrusion dies, which promoted quick change-overs. Another pattern that provides an additional component for an effective lean structure is that of a lean champions unit that provide cross-functional support to the total organisation, as was evident in both the cases.

6.3.5.3 Considerations regarding the use of logic models

Throughout the research study, the models developed in Figure 5.2 and Figure 5.4 were used consistently. This was confirmed in the W01 case study in the generation and testing of the hypotheses, as well as in the generation and testing of the propositions with matched explained patterns.

6.4 QUANTITATIVE ANALYSES

In this study, the data gathered for both the qualitative and quantitative phases occurred in parallel with the qualitative analyses, and the constructs for the research were applied to both the research methodologies. Multiple regression analysis was applied to data gathered from both cases as a logical step to determine the trends emerging from the regression equations compared to the stated hypotheses. The qualitative research findings were used to analyse the trends from the regression results and are discussed in the following sections.

6.4.1 Quantitative data

The instruments used to collect the quantitative data can be found in Appendices A, B and C. Appendix A indicated the extent of lean implementation as assessed by employees, and Appendices B and C measured the structural and behavioural constructs as assessed by the employees. Table 6.7 identifies the findings and the outcomes of the multiple regression analyses in terms of the generated hypotheses.

Table 6.7 Multiple regression analyses, results and hypotheses testing-for hypotheses, S indicates structure and B, indicates behaviour

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
HYP1 and HYP1.1	R-squared	0.5118	51.18 % of the change in LHINT can be explained by the change in the 20 independent variables for equation: $LHINT = -0.05 \cdot HOSK + 0.01 \cdot POLDEP + -0.03 \cdot DISTVAL + 0.03 \cdot W + -0.07 \cdot PROB + 0.11 \cdot KAIZ + 0.05 \cdot 5S + -0.06 \cdot TAG + -0.03 \cdot CTR + 0.03 \cdot SMED + -0.07 \cdot VSM + 0.04 \cdot CM + -0.05 \cdot SPF + 0.10 \cdot POKJID + -0.03 \cdot KAN + 0.28 \cdot HEIJ + -0.13 \cdot VIS + 0.01 \cdot TPM + -0.06 \cdot STAND + 0.46 \cdot TW + 2.24 (+/- 0.73)$
			HYP1 – Confirmed: as lean process progresses the cross-functional interactions improves accordingly.
			Hyp1.1 – Confirmed for: Heijunka, SMED and cellular manufacturing. Not confirmed for: one-piece flow; Kanban; Taguchi; cycle-time reduction and value-stream mapping. This was expected due to participants' knowledge of particular techniques being more in terms of SMED and cellular manufacturing as significant techniques.
	f - statistic	6.0285	Therefore, analysis is significant.
	Critical F-statistic	1.64884	Critical F-statistic at 95% confidence.
Durbin-Watson statistic	1.62305	Critical D-W values: lower (dl)=1.57; upper (du)=1.78 and therefore positive autocorrelation detected at 95% confidence	

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
	Standard error	0.7270	To +/- on result of regression equation
HYP2 and HYP2.1	R-squared	0,5723	57.23% of the change in NOHL can be explained by the change in the 20 independent variables for equation: $NOHL = -3.73 \cdot HOSK + 1.02 \cdot POLDEP + 4.23 \cdot DISTVAL + -2.80 \cdot W + 1.63 \cdot PROB + 4.61 \cdot KAIZ + -1.52 \cdot 5S + 1.01 \cdot TAG + 6.77 \cdot CTR + -6.82 \cdot SMED + 1.51 \cdot VSM + 0.84 \cdot CM + 0.95 \cdot SPF + -3.98 \cdot POKJID + -1.80 \cdot KAN + -5.77 \cdot HEIJ + 1.53 \cdot VIS + -0.61 \cdot TPM + 5.39 \cdot STAND + -11.11 \cdot TW + 31.79 (+/- 17.89)$
			Hyps 2 – Confirmed for: teamwork; SMED; Heijunka; single-piece flow. Not explained for cellular manufacturing and value-stream mapping, however, expected since only specialist departments worked with these techniques.
			Hyps 2.1 - Confirmed by the general results that demonstrate knowledge of lean process indicating that, as levels increase, the knowledge of lean process in general decreases with lean implementation and vice versa.
	f - statistic	7,65	Therefore, analysis is significant.
	critical F statistic	1.64884	Critical F-statistic at 95% confidence
	Durbin-Watson statistic	0,28868	Critical d-w values: lower (dl) =1.57; upper (du) =1.78 and therefore positive autocorrelation detected at 95% confidence.
	standard error	17,889	To +/- on result of regression equation

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
HYPS3	R-squared	0.5879	58,79 % of the change in LOCDM can be explained by the change in the 20 independent variables by the equation: $LOCDM = -0.16 \cdot HOSK + 0.05 \cdot POLDEP + 0.10 \cdot DISTVAL + -0.04 \cdot 7W + 0.09 \cdot PROB + 0.08 \cdot KAIZ + -0.06 \cdot 5S + -0.01 \cdot TAG + 0.18 \cdot CTR + -0.03 \cdot SMED + 0.07 \cdot VSM + 0.03 \cdot CM + 0.20 \cdot SPF + -0.11 \cdot POKJID + -0.14 \cdot KAN + -0.29 \cdot HEIJ + 0.11 \cdot VIS + -0.03 \cdot TPM + 0.17 \cdot STAND + -0.73 \cdot TW + 3.46 (+/- 0.72)$
			HYPS3 – confirmed for SMED and teamwork. Not confirmed for cellular manufacturing, indicating that the higher the locus of decision making, the more cellular manufacturing is utilised. This result, however, was expected due to the low level of empowerment that existed for the case study participants from especially F01 and the complex labour relationships that were observed during the research period.
	F- statistic	8.2043	Therefore, analysis is significant.
	Critical F statistic	1.64884	Critical F-statistic at 95% confidence
	Durbin-Watson statistic	0.64259	Critical D-W values: lower (dl) = 1.57; upper (du) = 1.78 and therefore positive autocorrelation detected at 95% confidence.
	Standard error	0.7218	To +/- on result of regression equation
HYPS 4	R-squared	0.5070	50,70 % of the change in NOF can be explained by the change in the 20 independent variables for equation: $NOF = -0.22 \cdot HOSK + 0.26 \cdot POLDEP + 0.07 \cdot DISTVAL + -0.08 \cdot 7W + -0.08 \cdot PROB + 0.04 \cdot KAIZ + 0.10 \cdot 5S + -0.02 \cdot TAG + -0.04 \cdot CTR + 0.00 \cdot SMED + -0.08 \cdot VSM + 0.12 \cdot CM +$

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
			$0.06*SPF + -0.30*POKJID + -0.03*KAN + -0.19*HEIJ + 0.17*VIS + 0.22*TPM + -0.03*STAND + -0.40*TW + 3.38 (+/- 0.73).$ HYPS 4 – was confirmed by the equation, indicating that the higher the degree of formalisation, the lower the application of standard work as a technique as well as the utilisation of teamwork as a technique and vice versa.
	F - statistic	5.9123	Therefore, analysis is significant.
	Critical F statistic	1.64884	Critical F-Statistic at 95% confidence.
	Durbin-Watson Statistic	1.49331	Critical D-W values: Lower (DL) =1.57; Upper (DU) =1.78 and therefore positive autocorrelation detected at 95% confidence.
	Standard error	0.7298	To +/- on result of regression equation
	HYPS5	R-squared	0.4041

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
	F - statistic	3.8997	Therefore, analysis is significant.
	Critical F statistic	1.64884	Critical F-statistic at 95% confidence.
	Durbin-Watson Statistic	2.07027	Critical D-W Values: Lower (DL) =1.57; Upper (DU) =1.78 and therefore no autocorrelation detected at 95% confidence.
	Standard error	0.7274	To +/- on result of regression equation
HYPS 6	R-squared	0.5975	59.75 % of the change in CELFM can be explained by the change in the 20 independent variables for the equation: $CELFM = 0.25 \cdot HOSK + -0.15 \cdot POLDEP + -0.13 \cdot DISTVAL + 0.17 \cdot 7W + -0.10 \cdot PROB + -0.34 \cdot KAIZ + -0.01 \cdot 5S + 0.00 \cdot TAG + -0.22 \cdot CTR + 0.13 \cdot SMED + 0.03 \cdot VSM + -0.10 \cdot CM + -0.06 \cdot SPF + 0.40 \cdot POKJID + 0.08 \cdot KAN + 0.29 \cdot HEIJ + -0.06 \cdot VIS + 0.02 \cdot TPM + -0.30 \cdot STAND + 0.58 \cdot TW + 2.13 (+/- 0.89)$
			HYPS 6 – was confirmed for most of the lean techniques, however, not for policy deployment, problem-solving and Kaizen, visibility, standard work and distinguishing value from a customer viewpoint. Cellular format to cellular manufacturing showed a flat relationship, as was to be expected.
	F - statistic	8.5364	Therefore, analysis is significant.
	Critical F statistic	1.64884	Critical F-statistic at 95% confidence.

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
	Durbin-Watson Statistic	0.62475	Critical D-W Values: Lower (DL) =1.57; Upper (DU) =1.78 and therefore no autocorrelation detected at 95% confidence.
	Standard error	0.8908	To +/- on result of regression equation
Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
HYPB1	R-squared	0.4512	45.12 % of the change in ALMVG can be explained by the change in the 20 independent variables for the equation: $ALMVG = -0.02 \cdot HOSK + 0.07 \cdot POLDEP + 0.01 \cdot DISTVAL + 0.07 \cdot 7W + 0.03 \cdot PROB + 0.20 \cdot KAIZ + 0.03 \cdot 5S + 0.07 \cdot TAG + -0.08 \cdot CTR + -0.18 \cdot SMED + -0.05 \cdot VSM + 0.08 \cdot CM + 0.18 \cdot SPF + 0.04 \cdot POKJID + 0.03 \cdot KAN + 0.02 \cdot HEIJ + -0.08 \cdot VIS + -0.14 \cdot TPM + -0.04 \cdot STAND + 0.40 \cdot TW + 2.34 (+/- 0.76)$
			HYPB1 – was confirmed for problem-solving, Kaizen, 5 s, and policy deployment except for Hoshin kanri due to participants understanding policy deployment, however, not fully the meaning of Hoshin Kanri.
	F- statistic	4.7279	Therefore, analysis is significant.
	Critical F- statistic	1.64884	Critical F-statistic at 95% confidence. (Significance holds to 99.9% confidence)

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
	Durbin-Watson statistic	1.42074	Critical D-W Values: Lower (DL) =1.57; Upper (DU) =1.78 and therefore positive autocorrelation detected at 95% confidence.
	Standard error	0.7603	To +/- on result of regression equation
HYPB2	R-squared	0.5239	52.39% of the change in PARTINV can be explained by the change in the 20 independent variables as explained by the equation: $PARTINV = 0.29 \cdot HOSK + 0.00 \cdot POLDEP + -0.02 \cdot DISTVAL + 0.13 \cdot 7W + -0.05 \cdot PROB + 0.00 \cdot KAIZ + 0.05 \cdot 5S + -0.03 \cdot TAG + 0.19 \cdot CTR + -0.22 \cdot SMED + -0.01 \cdot VSM + 0.12 \cdot CM + -0.09 \cdot SPF + 0.01 \cdot POKJID + -0.07 \cdot KAN + 0.21 \cdot HEIJ + 0.02 \cdot VIS + -0.07 \cdot TPM + -0.14 \cdot STAND + 0.39 \cdot TW + 1.97 (+/- 0.79)$.
			HYPB2 – was confirmed for cycle time reduction, and most of the lean techniques. Not confirmed for: SMED, value stream mapping, one-piece flow, Kanban and TPM. This is owing to current focus by the participants when participating in green areas or mini business team meetings. Specialists are involved in more complex lean techniques.
	F- statistic	6.3269	Therefore, analysis is significant
	Critical F- statistic	1.64884	Critical f-statistic at 95% confidence (Significance holds to 99.9% confidence)

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
	Durbin-Watson statistic	1.32061	Critical D-W values: lower (DL) = 1.57; upper (DU) =1.78 and therefore positive autocorrelation detected at 95% confidence.
	Standard error	0.7854	To +/- on result of regression equation
HYPB3	R-squared	0.5029	50.29% of the change in COM can be explained by the change in the 20 independent variables as explained by the equation: $COM = 0.06 \cdot HOSK + -0.01 \cdot POLDEP + -0.06 \cdot DISTVAL + 0.04 \cdot 7W + -0.01 \cdot PROB + 0.09 \cdot KAIZ + 0.04 \cdot 5S + 0.07 \cdot TAG + -0.01 \cdot CTR + -0.17 \cdot SMED + 0.03 \cdot VSM + 0.03 \cdot CM + -0.01 \cdot SPF + 0.09 \cdot POKJID + 0.03 \cdot KAN + 0.07 \cdot HEIJ + -0.07 \cdot VIS + -0.12 \cdot TPM + -0.12 \cdot STAND + 0.56 \cdot TW + 2.41$ (+/- 0.62)
			HYPB 3 – was confirmed with increased communications correlating well with an increased overall understanding of lean process. Negative b coefficients can be explained by the current knowledge base of the participants.
	F- statistic	0.6183	Therefore, analysis is significant
	Critical F- statistic	1.64884	Critical F-statistic at 95% confidence. (Significance holds to 99.9% confidence)
	Durbin-Watson statistic	1.30502	Critical D-W Values: lower (DL) =1.57; upper (DU) =1.78 and therefore positive autocorrelation detected at 95% confidence.

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
	Standard error	0.6183	To +/- on result of regression equation.
HYPB4	R-squared	0.4226	42.26% of the change in PERCL can be explained by the change in the 20 independent variables. PERCL = 0.18*HOSK + 0.04*POLDEP + -0.18*DISTVAL + 0.07*7 W + 0.02*PROB + 0.14*KAIZ + 0.04*5S + 0.13*TAG + 0.02*CTR + -0.06*SMED + -0.05*VSM + -0.02*CM + -0.03*SPF + -0.02*POKJID + 0.17*KAN + 0.13*HEIJ + -0.10*VIS + -0.11*TPM + -0.10*STAND + 0.24*TW + 2.79 (+/- 0.71)
			HYPB4 – was confirmed for most lean techniques with the exception of most of the flow techniques and due to low level of knowledge of these techniques and same being utilised mainly by specialists in the respective organisations. The hypothesis indicates increased respect for leaders with increased awareness of lean process.
	F- statistic	4.2082	Therefore, analysis is significant.
	Critical F- statistic	1.64884	Critical F-Statistic at 95% Confidence (Significance holds to 99.9% Confidence)
	Durbin-Watson statistic	1.67261	Critical D-W Values: Lower (DI) =1.57; Upper (Du) =1.78. Therefore Positive Autocorrelation maybe present at 95% Confidence.
	Standard error	0.7139	to +/- on result of Regression Equation

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
HYPB5	R-squared	0.3984	39.84% of the change in RLSRESP can be explained by the change in the 20 independent variables as explained by the equation: $RLSESP = 0.02 \cdot HOSK + -0.04 \cdot POLDEP + 0.13 \cdot DISTVAL + 0.02 \cdot 7W + 0.05 \cdot PROB + 0.15 \cdot KAIZ + 0.20 \cdot 5S + -0.05 \cdot TAG + -0.03 \cdot CTR + -0.18 \cdot SMED + -0.04 \cdot VSM + 0.13 \cdot CM + -0.06 \cdot SPF + -0.14 \cdot POKJID + 0.05 \cdot KAN + 0.02 \cdot HEIJ + 0.10 \cdot VIS + 0.02 \cdot TPM + 0.12 \cdot STAND + 0.10 \cdot TW + 2.38 (+/- 0.64)$
			HYPB5 – was confirmed for most of the lean techniques, indicating that workers accept more responsibilities and more role changes as lean Implementation progresses.
	F- statistic	3.8082	Therefore, analysis is significant.
	Critical F- statistic	1.64884	Critical F-statistic at 95% confidence. (Significance holds to 99.9% confidence)
	Durbin-Watson statistic	1.32601	Critical D-W Values: lower (DL) =1.57; upper (DU) =1.78 and therefore positive autocorrelation detected at 95% confidence.
Standard error	0.6406	To +/- on result of regression equation	

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
HYPB6	R-squared	0.2144	Only 21, 44 % of the change in RESP can be explained by the change in the 20 independent variables as explained by the equation: $RESP = -0.04 \cdot HOSK + -0.01 \cdot POLDEP + 0.04 \cdot DISTVAL + 0.04 \cdot 7W + 0.02 \cdot PROB + 0.09 \cdot KAIZ + -0.01 \cdot 5S + 0.12 \cdot TAG + -0.13 \cdot CTR + -0.03 \cdot SMED + 0.15 \cdot VSM + -0.12 \cdot CM + -0.01 \cdot SPF + 0.03 \cdot POKJID + 0.08 \cdot KAN + -0.10 \cdot HEIJ + -0.15 \cdot VIS + -0.10 \cdot TPM + -0.06 \cdot STAND + 0.41 \cdot TW + 3.54 (+/- 0.73)$.
	F- statistic	1.5693	Therefore the result is not significant. Expected, as most of the participants felt that they were well respected in the organisation despite the lean process.
	Critical F- statistic	1.64884	Critical F-statistic at 95% confidence. (Significance holds to 99.9% confidence)
	Durbin-Watson statistic	1.41090	Critical D-W Values: Lower (DL) =1.57; Upper (DU) =1.78 and therefore positive autocorrelation detected at 95% confidence.
	Standard error	0.7295	To +/- on result of regression equation.
HYPB7	R-squared	0.2589	Only 25. 89 % of the change in KNOWLP can be explained by the change in the 20 independent variables as explained by the equation: $KNOWLP = -0.04 \cdot HOSK + 0.12 \cdot POLDEP + 0.07 \cdot DISTVAL + 0.03 \cdot 7W + -0.04 \cdot PROB + 0.15 \cdot KAIZ + 0.06 \cdot 5S + 0.11 \cdot TAG + -0.09 \cdot CTR + -0.13 \cdot SMED + 0.08 \cdot VSM + 0.02 \cdot CM + -0.07 \cdot SPF + 0.02 \cdot POKJID + 0.12 \cdot KAN + -0.06 \cdot HEIJ + -0.08 \cdot VIS + -0.02 \cdot TPM + 0.01 \cdot STAND + 0.08 \cdot TW + 3.44 (+/- 0.60)$

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
			HYPB 7 – was partially confirmed, indicating that, as more lean techniques are utilised, more learning by employees will be experienced.
	F- statistic	2.0087	Therefore result is significant.
	Critical F- statistic	1.64884	Critical F-Statistic at 95% confidence. (Significance holds to 98.9% Confidence)
	Durbin-Watson statistic	1.88203	Critical D-W Values: lower (DL) = 1.57; upper (DU) =1.78 and therefore no autocorrelation detected at 95% confidence.
	Standard error	0.6039	To +/- on result of regression equation.
HYPB8	R-squared	0.3313	33.13 % of the change in ATT can be explained by the change in the 20 independent variables as explained by the equation: $ATT = -0.10 \cdot HOSK + 0.06 \cdot POLDEP + 0.11 \cdot DISTVAL + 0.02 \cdot 7W + 0.05 \cdot PROB + 0.22 \cdot KAIZ + 0.03 \cdot 5S + -0.02 \cdot TAG + -0.08 \cdot CTR + -0.12 \cdot SMED + 0.03 \cdot VSM + 0.06 \cdot CM + 0.06 \cdot SPF + -0.08 \cdot POKJID + 0.08 \cdot KAN + -0.14 \cdot HEIJ + 0.08 \cdot VIS + -0.02 \cdot TPM + 0.08 \cdot STAND + 0.07 \cdot TW + 3.16 (+/- 0.59)$

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
			HYPB 8 – was confirmed by positive relationships from: policy deployment; distinguishing value; waste reduction; Kaizen; problem-solving; five S; value-stream mapping and, to a lesser extent, from cellular manufacturing and single-piece flow, confirming that employees are developing a positive attitude by participating in the techniques highlighted. Negative b values are indicators of a low level of knowledge in these particular lean applications.
	F- statistic	2.8492	Therefore result is significant.
	Critical F- statistic	1.64884	Critical F-statistic at 95% Confidence (Significance holds to 99.9% confidence)
	Durbin-Watson	1.12673	Critical D-W Values: Lower (DL) =1.57; Upper (DU) =1.78 and therefore positive autocorrelation detected at 95% confidence.
	Standard error	0.5880	To +/- on result of regression equation.
HYPB9	R-squared	0.3961	39.61 % of the change in COMM can be explained by the change in the 20 independent variables as explained by the equation: $COMM = 0.14 \cdot HOSK + 0.10 \cdot POLDEP + -0.07 \cdot DISTVAL + -0.01 \cdot 7W + 0.06 \cdot PROB + 0.12 \cdot KAIZ + 0.10 \cdot 5S + -0.05 \cdot TAG + 0.11 \cdot CTR + -0.11 \cdot SMED + 0.03 \cdot VSM + 0.02 \cdot CM + 0.04 \cdot SPF + -0.07 \cdot POKJID + 0.04 \cdot KAN + 0.11 \cdot HEIJ + 0.00 \cdot VIS + -0.10 \cdot TPM + 0.07 \cdot STAND + -0.03 \cdot TW + 2.84 (+/- 0.67)$

Hypothesis number	Equation parameters	Value	Comments and observations regarding reliability of the outcome and findings
			HYPB 9 – requires qualitative analyses to assess commitment to lean at the outset. However, the outcome was significant in terms of increased commitment being found in the utilisation of techniques such as : Hoshin Kanri; policy deployment; problem-solving; value-stream mapping; cellular manufacturing; single-piece flow; Kanban; Heijunka; visibility; standard work; and teamwork.
	F- statistic	3.7721	Therefore result is significant.
	Critical F- statistic	1.64884	Critical F-statistic at 95% Confidence (Significance holds to 99.9% confidence)
	Durbin-Watson	1.77450	Critical D-W Values: lower (DL)=1.57; upper (DU)=1.78 and therefore Positive Autocorrelation maybe present at 95% Confidence
	Standard error	0.6680	To +/- on result of regression equation

Table 6.7 indicates that with the exception of respect, all the hypotheses were determined significant with explained variances from the stated hypotheses. These results, however, are in terms of the two case studies analysed and therefore not generalisable. The qualitative research clearly indicated that knowledge of more complex lean techniques such as Poke-yoke, Jidoka, Taguchi, value stream mapping and Heijunka is still reserved for a few specialists in the organisation; however, once flow and scheduling systems have been implemented, workers appear to understand the procedures well enough to allow the lean process to be effective. The question of respect is also explained in terms of the qualitative research, indicating that the F01 interviewees had commented in the main that respect had never been at issue, even under the previous management, and with W01 interviewees indicating that since the major change late in 1990s and early in the 2000s respect had not been in question either. This is a compliment to both management teams, since leaders displayed a natural affinity for people, and respect for people appeared to have been part of their behavioural upbringing and culture.

6.5 CROSS-CASE ANALYSES

The cross-case analyses considered patterns that were repeated when case studies were compared. The following analyses in Table 6.8 covered this process for the two case studies F01 and W01. The analyses were done using the detailed reference patterns from Table 6.3 for the F01 organisation and from Table 6.6 for the W01 organisation.

Table 6.8 Cross-case analyses for the two case studies F01 and W01 – Identified replication in terms of the propositions.

Proposition number	Matched replicated patterns by proposition	
MP1	<p>RFMP1PS1 – Appointment of managing director, plant manager and engineering manager in 2012.</p> <p>RFMP1PS2 – Top team wishes to restructure as lean progresses and indicated their concerns with current matrix creating silos. Three-year plan being developed. Cross-functional team activity considered key.</p> <p>RFMP1PS3 – Supervisors working at cell implementation with industrial engineering manager and plant manager.</p> <p>RFMP1PS3 – Plant manager and supervisors appreciating self-directed initiatives from workers.</p> <p>RFMP1PS4 – Green areas established and work teams are being developed.</p> <p>RFMP1PS5 – Corporate support SA operation with Kaizen team working cross-functionally with F01 employees.</p> <p>RFMP1PS6 - Managing director contemplating appointment of lean champion to speed up lean implementation.</p>	<p>RWMP1PS1 – New managing director in 1998 brought significant changes: hierarchical levels reduced from eight to four; lean in the form of 20 keys introduced 2002; production bonuses, profit bonuses and attendance bonuses introduced and 25% of organisational gains shared with employees.</p> <p>RWMP1PS2 – Restructuring involved: total organisation supporting the manufacturing cells; unit and operations managers meet twice weekly to deal with cross-functional issues; mini business teams have meeting places; each mini business team runs a manufacturing cell and each team is led by a first-line manager.</p> <p>RWMP1PS3 – Appointment of a business development manager (2003), championing the 20 keys process; lean champions empowered to set organisational goals by unit.</p>
MP2	<p>RFMP2PPS1 - Plant manager: has implemented green areas, involving all the manufacturing, distribution and warehouse employees.</p>	<p>RWMP2S1 – Managing director (1998) initiated the mini business team concept with teams meeting daily in mini business areas from 2002 onwards</p>

Proposition number	Matched replicated patterns by proposition	
	<p>RFMP2SP2 – Green areas teamwork is occurring with discussions involving production output and quality.</p> <p>RFMP2PS3 – Quarterly tank talk by managing director involving all the employees with feedback.</p> <p>RFMP2PS4 – Lean awareness owing to five-S.</p> <p>RFMP2PS5 – Plant manager working to create self-directed teams. Export team virtually fully self-directed.</p> <p>RFMP2PS6 – Employees and managers working in cross-functional team to create cellular manufacturing.</p> <p>RFMP2PB1 – workers see the benefits of finding things quicker in a clean workplace and are working to achieve self-direction.</p>	<p>RWMP2S2 – Organisational development unit worked at developing first-line managers to fully understand lean 20 keys.</p> <p>RWMP2S3 – First-line managers are facilitating mini-business team meetings and conducting training in 20 keys.</p> <p>RWMP2S4 – Workers are empowered through multi-skilling and running cells in self-directed manner.</p> <p>RWMP2S5 – Managing director (1998) initiated joint leadership meeting: employees invited; organisational performance discussed; feedback from workers responded to.</p> <p>RWMP2B1 – Workers are providing ideas for Kaizen activity, example of a remarkable die design idea by a die corrector.</p> <p>RWMP2B2 – Cross-functional team of unit and operations managers: ensures complete downwards communication to first-line managers and upwards communications from first-line managers twice weekly.</p>
SP1	<p>RFSP1PS1 – Cross-functional teams developing in the organisation: planning, sales, and manufacturing supervisors meet daily to schedule orders; cross-functional</p>	<p>RWSP1PS1 – Manufacturing cell first-line managers' report to operations manager reporting to unit managers; sales totally integrated with manufacturing and is part of</p>

Proposition number	Matched replicated patterns by proposition	
	<p>interaction between engineering, sales and planning to configure assembly orders; cross-functional teams have successfully implemented cells for distribution and a NPD cell.</p> <p>RFSP1PS2 – F01 has developed: a rotor cell, rubber cell and assembly cell; focused on developing more cells in other areas.</p>	<p>operations; die correctors and maintenance artisans are allocated to cells and work closely with first-line manager; customers link directly with cells; all customer orders are made to order within three days of placement and planning links directly with First-line managers regarding customer orders. With major change (1998) layers were reduced from eight to four.</p> <p>RWSP1PS2 – Highly successful with single minute exchange of die (SMED) implementations achieving less than three minutes for extrusions, under 18 minutes for powder coating and seconds for anodising changeovers.</p>
SP2	<p>RFSP2PS1 – Since lean, productivity has improved from 40% to 76% and on-time delivery from 40% to 62%.</p> <p>RFSP2PS2 – Cross-functional teams have implemented cells for the rotor, rubber, assembly and NPD cell. Green areas are promoting teamwork at shop level. People in cells are starting to act as teams, most notably the assembly cell.</p> <p>RFSP2PS3 – Teams operating cells are becoming more self-directing with four out of 17 employees in assembly cell working without supervision.</p>	<p>RWSP2PS1 – W01 is a world-class organisation; has won the national productivity award twice in a row; has achieved world class levels of performance achieving 19, 5% PBIT to sales and three-day deliveries all made to order; achieving 40 die changes per day compared to a similar Italian organisation achieving, only three to four a day.</p> <p>RWSP2PS2 – Mini business teams run manufacturing cells with virtually, full self-directed teams.</p>

Proposition number	Matched replicated patterns by proposition	
		<p>RWSP2PS3 – First-line managers work virtually independently from operations manager, taking all the relevant decisions to run a small business.</p>
<p>SP3.1 and SP3.2</p>	<p>RFSP3.1B1 – When lean was introduced after September 2012, employees felt threatened, not consulted, concerned about job losses, speculated, felt that it would result in doing more without rewards. Disciplinary dismissals occurred.</p> <p>RFSP3.2B1 – Affective commitment: improving; workers are participating more and giving ideas in green areas or at point Kaizens; workers want to contribute more, example of a forklift driver reporting on the making of excess stock and shop stewards providing researcher with ideas on how to improve F01; found most employees to be unaware of the vision and mission but well aware of the goals of F01.</p> <p>RFSP3.2B2 – 23 of 66 participants interviewed felt confident about the new leadership, active since 2012 and recognised the improvements from lean process.</p> <p>RFSP3.2B3 – More participation than before in lean process from workers as indicated by 29 of 66 participants and attributed to green areas and awareness of benefits and results; workers are more involved in the development of SOPS and Kaizen activities.</p>	<p>RWSP3.1B1 – When lean was introduced in 2002, employees felt threatened, not consulted, concerned about job losses, speculated, felt that it would result in doing more without rewards.</p> <p>RWSP3.2B1 – Currently, high level of affective commitment, evident from worker participation in mini business team meetings, Kaizen events and ideas presented by the participants during interviews. High level of awareness of the vision, mission and goals of W01.</p> <p>RWSP3.2B2 – High level of trust and confidence in the current leadership from 60 of 70 participants.</p> <p>RWSP3.2B3 – High level of participation in lean process as was confirmed by 62 of the 70 participants.</p> <p>RWSP3.2B4 – Managing director confirmed that SOPS are established, updated and changed by the mini business teams facilitated by First-line managers.</p> <p>RWSP3.2B5 – Worker knowledge of lean is: five-S; workers participating more in maintenance check sheets; cycle time reduction; teamwork in mini business areas;</p>

Proposition number	Matched replicated patterns by proposition	
	<p>RFSP3.2B4 – Production manager confirmed that workers are participating more in the derivation of SOPS facilitated by supervisor.</p> <p>RFSP3.2B5 – knowledge of lean process mainly up to supervisor level. Workers involved in five-S, ideas and Kaizen.</p> <p>RFSP3.2B6 – Attitudes are improving as more awareness is gained of lean process as observed from researcher’s group session with shop stewards and positive responses from 21 participants.</p> <p>RFSP3.2B6 – More respectful management due to: leaders having an open door policy; recognition by leaders; recognition through reward ceremony; more teaching and coaching; having a more open participative and non-autocratic leadership style; employees being able to share ideas in team forums; respectful leadership; employees being able to participate in green area meetings; workers realising the benefits gained from lean process.</p>	<p>visibility; Kaizen; problem-solving; SMED; goal alignment; waste reduction; and value stream mapping for expansion.</p> <p>RWSP3.2B6 – Improved attitudes due to: participating in mini business team activities; participating in cleaning and organising, five-S activities; employees feeling the togetherness in mini business teamwork; workers feeling that they are contributing towards the lean 20 keys process; a tidy workplace making employees feel good; incentive bonuses helping to maintain a positive attitude; employees gauging W01 success in terms of bonus pay-outs; workers supporting overtime; management’s open door approach; business growth and performance with employees benefiting; prompt grievance handling; effective mini-business teamwork; consultative management; automating processes; better disciplines; clear SOPS ; workers achieving targets; employing family; empowered first-line managers; humble leadership; affirmative action; recognition in team session; leaders visiting mini business team areas; effective team-competitions; multi-skilling and up-skilling of employees; workers’ cleaning achieving earned-respect; improved</p>

Proposition number	Matched replicated patterns by proposition	
		discipline through procedure; respectful leadership; transparent leadership; leaders making an effort to greet employees; employees able to provide input at the joint leadership meeting; management listening with care; effective grievance handling; non-harassment of employees; non-emotional behaviour from leaders.
SP4	<p>RFSP4PB1 – Behaviour has changed due to: more lean awareness; five-S awareness; the remarkable turnaround since lean implementation; more visibility; more cross-functional teamwork; more shop-floor teamwork; green areas; more open door communications; changes in leadership style to less autocratic; more recognition; more idea sharing; more focus on self-directed teamwork and more awareness of results due to lean.</p> <p>RFSP4B2 – Positive culture: more awareness; participative; impact and urgency; standards and discipline; structured; accommodating; strong in adaptation and growth; output focused; solution focused; teamwork; cooperation; lean; and service first.</p>	<p>RWSP4PB1 – Behaviour has changed owing to: lean awareness; a cleaner workplace; teamwork; togetherness; discipline; caring attentive managers; decisive leadership; results; bonuses; mini business areas; visibility; grievance handling; well-mannered leaders; greeting of employees; empowerment; self-directing teams; multi-skilling; up-skilling; idea sharing; respect-culture; transparency; consultations; working easier; clear-cut sops; and follow through.</p> <p>RWSP4B2 – Organisational culture: trustful; entrepreneurial; “we are family”; open; happy; stand together; like a chain; clean and green; tight and effective; teamwork; make a plan; do it right; customer focused; lean; goal aligned and vision focused.</p>
SP5.1 and SP5.2	RFSP5.1 and RFS5.2.PS1 – Senior team focused on restructuring within the matrix; contemplating appointment of	RWSP5.1 and RW5.2.PS1 – effective organisational structure: manufacturing cells report to leaders who report

Proposition number	Matched replicated patterns by proposition	
	<p>a lean champion to accelerate lean process; focused on developing work teams; supervisors and plant manager focused on teamwork and developing self-directed teams.</p>	<p>to operations managers who report to unit managers; lean champions cross-functionally focused, setting priorities and goals; manufacturing cells are cross-functionally linked, one factory to the next; sales and manufacturing cross-linked; finance cross-functionally focused; permanent support in manufacturing cells from maintenance and die correctors; continuous flow virtually achieved.</p>
SP6	<p>RFSP6P1 – Working to lean being achieved in most areas with good progress being made.</p>	<p>RWSP6P1 – Working to lean, well achieved in all areas: Cellular or flow structures are well evolved. World class performance levels being achieved.</p>

Table 6.8 identifies the patterns that indicated duplication in the two case studies. This process identified the structural components for a discrete organisational structure that supports the lean process and cultivates behaviours conducive to lean processes.

6.5.1 Significance of the duplication – organisational structure

A closer analysis of the patterns emerging from the duplication exercise proves the significance of this research in terms of how and why lean organisational structures evolve after successful implementation of the flow and pull processes and most of the 20 techniques (Womack and Jones, 2003; Quarterman, 2007) that were used as the independent variables in the case study methodology.

In the two cases, duplication (Yin, 2014) indicated the following structural components for a lean discrete organisation: flow and pull (Womack and Jones, 2010) is fully established in manufacturing cells (Rother & Harris, 2001; Hyer & Wemmerlov, 2004) by business unit; manufacturing cell teams are managed by manufacturing cell managers (W01 refers to these managers as first-line managers and F01 as supervisors) who run their respective teams in their respective manufacturing cells. Manufacturing cell managers are highly skilled in lean thinking and are able to train and develop their team members; manufacturing cell managers are supported by operations or unit managers who respect the abilities and commitment of manufacturing cell managers; manufacturing cell managers receive support from all departments such as sales, finance, engineering and human resources, all of whom are thoroughly aware of lean processes and respect the abilities and achievement of the manufacturing cell managers; a lean champions unit provides specialist services to business units and to manufacturing cell managers (F01 has an international Kaizen team and W01 has a business development team); the lean champions team coordinates cross-functional teamwork for lean projects; cross-functional issues are resolved in a regular team meeting involving all unit and operations managers; unit and operations managers meet daily with all unit manufacturing cell managers; maintenance and tooling teams provide a specialist per manufacturing cell who works closely with manufacturing cell managers (W01); where tools are manufactured on site, these are supplied through a tool manufacturing U cell (Hyer & Wemmerlov, 2004) and provided directly to the particular manufacturing cell requiring such tools (W01); Kanbans that are situated in close to start of flow facilities provide materials for make to order production; Kanbans (Quarterman, 2008; Nicholas, 2011) are fed by upstream manufacturing cells (W01); First-line managers run supply flow lines to the Kanbans of downstream units (W01); work teams who run cells are almost self-directing, as confirmed

by manufacturing cell managers (W01 in most cases and F01 in the assembly team); managers support and promote empowerment of teams (confirmed by F01 assembly supervisor and most First-line managers of W01).

6.5.2 Significance of replication – organisational behaviour

As a result of the structural changes, replication (Yin, 2014) indicated the following behavioural changes with lean implementation: in W01, commitment is more affective owing to structural changes involving mini business work teams who meet daily in neat team areas equipped with full visual management controls (Braden *et al.*, 2012) and in F01 where cellular teams exist, affective commitment (Angelis *et al.*, 2011) is very evident (assembly, rubber and chrome manufacturing cells); workers at W01 are empowered to update performance graphs during daily team sessions and workers are given the opportunity to lead teams. Where cellular manufacturing (Rother & Harris, 2001) exists similar patterns are emerging; flatter structures (Nahm *et al.*, 2003) at W01 allow more open and direct contact with senior management; management encourages worker participation and worker feedback with daily sessions, and unit managers regularly attend team meetings held in neat, clean team areas. At F01 management teams realise the constraints of the matrix and are working closely to counter the silo effect (Hettler, 2008); in both F01 and W01, green areas and meeting areas (Braden *et al.*, 2012) encourage workers and assist with ownership and commitment; F01 has a quarterly tank talk and W01 a monthly joint leadership meeting to which workers are invited. They are encouraged to provide feedback at these meetings; both managing directors encourage open door communication and this empowers workers to participate and contribute to team sessions and to provide ideas for improvement; patterns that help with attitudes and general behavioural changes show almost perfect duplication in F01 and W01, embedded in constructive, supportive and consultative leadership (Johnson, 2009), team meeting areas, team sessions, Kaizen activities (Doolen *et al.*, 2008; Womack & Jones, 2010), open door communications, easier working through improved technology; effective grievance handling, effective discipline, clear cut work standards (Nicholas, 2011), five S (Womack & Jones, 2010), clean areas, leaders visiting team sessions, idea sharing, multi-skilling and gain-sharing (F01 considering).

A final comment regarding the replication analysis is the example set by W01 in achieving an organisational structure that fully supports the propositions and that fully explains the how and why of lean organisational structures.

6.6 CONSIDERING HYPOTHESES WITH PROPOSITIONS

Having completed the cross-case analyses, it was apparent to this researcher that the hypotheses identified the expected trends of the variables and their interrelationships, whereas the propositions were used to establish how these interrelationships appeared to function in the purposive sample cases. Providing short descriptions of the hypotheses and propositions, the following analysis in Table 6.7 considered this aspect carefully in terms of the patterns that had emerged in the interrelationships of the variables according to the hypotheses and the patterns identified during the matching with propositions phase of the analysis.

Table 6.9 Identified patterns when hypotheses and propositions are considered.

Hypotheses	Proposition	Identified pattern
Main hypothesis is that lean will influence the organisational structure and behaviour significantly	MP1 – Same as the main hypothesis emphasising that hypothesis outcomes should be utilised to vet the proposition.	Reviewing F01 and W01 as a whole, F01 is an organisation in transition with lean implementation and W01 is an organisation that has virtually fully implemented lean and has undergone significant organisational changes since implementation.
<p>HYP S1 – Horizontal integration will increase with progressive lean implementation.</p> <p>HYP S1.1 – More horizontal integration with more complex lean techniques being utilised.</p> <p>HYP S1.2 – More horizontal integration coincides with more teamwork.</p>	MP2 – Organisational structure influenced by employee involvement in cross-functional teams and empowerment of employees. Leadership will be impacted.	F01 has developed manufacturing cells with USA Kaizen team and W01 implemented lean in the form of 20 keys utilising cross-functional teams. F01 in the process of making leadership changes to improve flow. W01 had a complete management change, and change-surviving managers were instructed to get more involved with the shop floor and with customers. Specialists are implementing the more complex flow techniques; however, employees have adapted well in terms of standard work. F01 established cross-functional sales and planning team and other teams within the organisation. W01 has an established team structure of cross-functional teams and work teams that are led by first-line managers.
HYP S2 decreased hierarchical levels with more cross-functional teamwork.	SP1 – Organisational structure influenced by cross-functional teams implementing lean techniques leading to flatter structures especially when flow and pull is introduced with success.	F01 has a deep structure and contemplating how to restructure more effectively within the matrix. W01 used cross-functional teams to implement lean, has a flat structure of only four levels. F01 focusing on manufacturing cells and improved supplier development. W01 has achieved full continuous flow and pull with well-developed manufacturing cells. Highly skilled first-line managers run cells

Hypotheses	Proposition	Identified pattern
<p>Hyps2.1 decreased hierarchical levels with more lean skills.</p>	<p>Self-directed teams run manufacturing cells. Self-directed teams deal with environmental issues and requirements.</p>	<p>virtually self-directed effectively and efficiently. W01 has organisational development unit dealing with green requirements and legislation, as well as implementing lean and developing skills for lean. W01 has departmental teams that work virtually self-directed.</p>
<p>HYPS3 – Lower locus of decision taking with cross-functional teams developing more cellular manufacturing towards improved flow.</p>	<p>MP2 -- More empowerment of employees to implement lean techniques. SP1 – Flatter structures with more self-directed teams. Self-directed work teams will follow Kaizen routines. SP3 – employees provide creative and effective solutions to achieve flow and pull in the organisation and continuously to improve on routines and standardised work themselves. SP5.1 – Self-directed teams running flow lines and manufacturing cells will take care of the day to day running of the organisation.</p>	<p>F01 still developing manufacturing cells however, are taking steps with three successful cells and buying reporting to industrial engineering managers to improve supply. W01 has achieved continuous flow with integrated cellular structures one unit to the next. Used top management cross-functional team to acquire best practice flow methods overseas. First-line managers so skilled and empowered that they run the day to day requirements of the organisation successfully without interventions. First-line managers make most of the day to day decisions and even contribute to strategic decisions per example of flow line for re-melt operations. W01 work teams virtually working self-directed. Work teams for both F01 and W01 utilise Kaizen for day to day improvements.</p>
<p>HYPS4 – Nature of formalisation will reduce with SOPs being done by</p>	<p>SP3 – Participation and involvement will improve, with employees providing creative and</p>	<p>F01 require formal help from engineering with SOPs, but workers getting more involved with engineer responsible for SOPs often consulting with shop level supervisors and employees. W01 has fully</p>

Hypotheses	Proposition	Identified pattern
self-directed teams becoming more skilled in lean techniques.	effective solutions to achieve flow and pull in the organisation and continuously to improve on routines and standardised work	achieved first-line managers updating SOPs with their respective work-teams.
HYP5 – the levels of communication will improve with improved lean processes	SP2 – Specific organisational changes will be made to reduce functional and leadership impediments that block lean transformation. SP6 – Hoshin Kanri and policy deployment and value stream mapping developed between leader and subordinates will enable quick and effective communications.	F01 is working towards full lean implementation with commitment from the senior management team. Top team appreciated that functional impediments were adversely affecting communications with matrix structure. F01 managing director introduced open door approach to improve communications as well as quarterly tank talk to all employees. W01 has fewer organisational levels and direct cross-line communications are encouraged. Formal team structure of cross-functional and work teams empowered to be more self-directing. Team goals (Hoshin Kanri) have been cascaded throughout the organisation and are reviewed daily through teams communicating with each other. Managing director has open door policy. Monthly feedback sessions involve employees, and active feedback is invited. Value stream mapping has been done for the total organisation. Workers understand flow processes well through practical examples.
HYP6 – Organisation will transform completely to cellular format with full lean implementation	SP1 – all the lean techniques leading to flow and pull will be implemented utilising, at the outset, cross-functional teams, to establish effective and efficient	F01 implementing cellular manufacturing with structural changes being made to improve flow. W01 has achieved full cellular structure with first-line managers, unit managers and organisational development units and functional units supporting the first-line managers and their teams. Organisational development unit consists

Hypotheses	Proposition	Identified pattern
	<p>manufacturing cells SP5.2 – The best organisational structure will fully accommodate a cellular format, with fully empowered self-directed-work teams</p>	<p>of lean champions working cross-functionally with total organisation. Impact project teams and regular cross-functional teams exist. Unique features of tooling teams feeding manufacturing cells. Set-up teams support cellular teams, Maintenance specialists support cellular teams. Finance experts support cellular teams. Flow is continuous one unit to the next.</p>
<p>HYPB1 – the awareness of vision, values, mission, goals and objectives will increase with more awareness of Kaizen, problem-solving and Hoshin Kanri.</p>	<p>SP3 – Knowledge of lean process will improve to a total understanding and appreciation of how full implementation of all the lean techniques leads to ever-increasing organisational performance.SP6 – The organisation will have to undergo redesign to utilise Hoshin Kanri and policy deployment.</p>	<p>F01 has cascaded goals and objectives by department and manufacturing area. People still learning the meaning of the vision and aspects of organisational performance. W01 has a simple vision of “One-day delivery” and all employees understand and relate same to organisational performance in daily team area meetings. All have received training in lean and first-line managers impart and maintain knowledge. Gain-sharing relates to organisational performance and all employees understand this well.</p>
<p>HYPB2 – employee participation will increase, the more flow techniques are utilised.</p>	<p>MP2 – employees will be empowered to implement specific lean techniques and participate in self-directed teams doing so.</p>	<p>F01 utilising specialists doing value stream mapping and TAKT time to establish cells but not Kanban, single piece flow and Heijunka and employee participation still in progress, employees are not scheduling through cells themselves being dependent on planning. W01 has established full flow with top management having determined best practice flow from overseas visits. University students and specialists worked on value stream maps for W01. Work- and cross-functional</p>

Hypotheses	Proposition	Identified pattern
		<p>teams have been focusing on cycle time reduction in all areas and have worked closely to improve the flow to make to order status. Cellular manufacturing teams are scheduling work themselves on make-to-order basis (Heijunka and single piece flow sorted) and are actively participating in daily team meetings to satisfy customers in terms of delivery. Die manufacturing and die correction specialists have assisted the teams in reducing set-ups time (SMED), achieving less than three minute set-ups for extrusions, less than 20 minutes for powder coating and seconds for anodising.</p>
<p>HYPB3 – communications will improve with clarity of lean process.</p>	<p>SP6 – More effective communications with lean techniques of Hoshin Kanri and policy deployment by way of teamwork.</p>	<p>F01 employees exposed to lean with USA Kaizen team using cross-functional teams to improve flow. Employees participate actively in five S. Most employees wish to help and participate and lean programme seeing improvements. Green areas are helping to clarify lean process. Three manufacturing cells are indicating the way forward for improved flow. Cross-functional planning and sales teams meet daily with shop floor to improve customer service. W01 has a well-established communication system with fixed teams meeting in team areas to set agendas. Feedback and direction are communicated daily in established forums. All employees involved in work teams named mini business teams. Monthly feedback sessions involving invited employees are held. Joint consultative committee with union shop stewards meets monthly.</p>

Hypotheses	Proposition	Identified pattern
<p>HYPB4 – leadership will be challenged with progressive lean process.</p>	<p>SP3.1 and SP3.2 – The organisational behaviour will, at the outset, resist lean; challenging leaders, will however, improve with lean process and improvements</p>	<p>F01 and W01 experienced some significant resistance to changes with lean at the outset; however, improved with understanding and knowledge of lean. At F01 leaders were changed with lean introduction as was the case with W01; however, as more lean process was experienced the perception of leadership in both organisations improved to a large extent, employees expressing their support and appreciation for their leaders.</p>
<p>HYPB5 – roles and responsibilities will be clarified with progressive lean process.</p>	<p>SP3.2 – Roles and responsibilities will change, with employees displaying a willingness to take on more than their respective original functions and job descriptions.</p>	<p>F01 has involved the total organisation in five S, and there is increased appreciation and participation without expectation for increased pay. Workers are assuming more roles in lean process such as helping with set-up and working in area teams in green areas. W01 has, with a few exceptions, fully implemented lean with team members actively participating and willing to assume new roles such as leading teams when managers are absent, performing extra duties such as clean-up, inspection and maintenance work.</p>
<p>HYPB6 – employees will feel more respected with progressive lean implementation. (Was found not to be significant statistically.)</p>	<p>SP3 – With lean implementation, respect will improve with employees being recognised and rewarded for both their individual and team contributions.</p>	<p>F01-previous and current management respected employees greatly, so no changes noted with progressive lean implementation. W01 respect the current and previous CEO at a significant level. New employees comment on the fact that they have always been respected.</p>
<p>HYPB7 – knowledge of lean will improve with</p>	<p>SP3.2 – After the lean process and the lean strategy have been</p>	<p>F01 has trained all manufacturing employees in lean and has arranged additional exposure with the help of the USA Kaizen team. Most</p>

Hypotheses	Proposition	Identified pattern
experience, training and development of employees.	thoroughly discussed by the leader/s of the organisation and after thorough development and training have been implemented with total employee involvement, the organisational behaviours will change to affective commitment and more supporting attitudes.	supervisors have a good knowledge of lean due to daily focus and green areas. W01 established an organisational development team and has fully developed first-line managers in lean process. Lean champions prioritise lean techniques and champion implementation cross-functionally and frequently.
HYPB8 – attitudes will be challenged with lean implementation; however, will improve with lean successes.	SP3.1 and SP3.2 – at the outset lean will be resisted; however, with use and experience this will change to a more positive situation with benefits gained from organisational growth.	F01 after three years with lean, F01 still experiencing pockets of negative feeling towards lean process; however, most employees are now supporting the process having seen improvements in housekeeping and flow. Since 2003, W01 , has virtually full implementation and is in the process of continuous improvement Kaizen, and new focus, such as on quality and plant maintenance. Attitudes are very positive with anticipation of new growth.
HYPB9 – commitment will be challenged; however, will improve with lean success.	As above for the propositions SP3.1 and SP3.2 .	F01 , still implementing lean basics, is experiencing pockets of affective commitment with its ideas programme, green areas and growing teamwork. W01 has a high level of affective commitment, constantly demonstrated by team members providing and testing new ideas for improvement.

Table 6.9 supports the replication analyses (Yin, 2014) and construct validity (Yin, 2014) of the research, indicating how the propositions support the hypotheses in patterns that were replicated in the two organisations (see Table 6.8). Again, the findings of the study point to a lean organisational structure, incorporating advanced flow and pull (Womack & Jones, 2010), manufacturing cells (Rother & Harris, 2001; Hyer & Wemmerlov, 2004), led by highly skilled first-line, or manufacturing cell managers who report to unit managers who occupy top management positions. The fact that operations managers in the W01 case are still prevalent as a layer may be debated in terms of further refinements and developments as the lean process progresses. How and why a lean champions unit should be part of the structure was demonstrated in both the F01 and W01 cases.

6.7 CASE STUDY VALIDITY

The methodology (Yin 2014) in this study comprised pattern analyses and replication in both cases F01 and W01. The quantitative work confirmed to a large degree the construct validity and suggested significance relationships among the identified variables; however, the case study content needed to be analysed in some detail to test for the remainder of the validity in terms of considering internal validity, external validity and reliability in one setting. This analysis is provided in Table 6.10.

Table 6.10 Case study validity testing

Tests	Case study tactic	Phase of research in which the tactic occurs
Construct validity	<ul style="list-style-type: none"> • Use multiple sources of evidence. • establish chain of evidence • have key informants review draft case study reports 	<p>The constructs that were used in both the quantitative and qualitative research proved relevant in terms of hypothesis significance, proposition pattern matching and other sources of evidence such as value stream mapping and lean story boards; a chain of evidence was established in terms of structural and behavioural patterns indicating consistency between the two cases; key informants from both organisations reviewed draft reports from group questionnaires, before committing to final comment.</p>
Internal validity	<ul style="list-style-type: none"> • Do pattern matching • Do explanation building • Address rival explanations • Use logic models 	<p>Table 6.8 shows the detailed replicated pattern matching and identifies similar results for both cases, supporting the propositions of the research; Explanation building was used for the hypotheses, propositions and the patterns; rival explanations were considered, from the theory by Womack and Jones (2003) in terms of matrix type structures versus the propositions from this research and findings from the F01 case study countering their proposal; the logic models utilised throughout this research were the concept, Figure 1.1, and the constructs model per Figure 5.2 and these proved decisive for this study.</p>
External validity	Use replication logic for multiple-case- studies	<p>Replication was established for both cases in terms of considerations regarding organisational structure based on thought processes and trends from case study F01 and confirmation of fact in case study W01. Virtually perfect replication was found for both case studies regarding commitment, attitudinal and communication behaviour.</p>

Tests	Case study tactic	Phase of research in which the tactic occurs
Reliability	Use case study protocol	The case study protocol was consistent in terms of the ethical process; the researcher dealing with each participant in a consistent manner asking the same structured questions; consistently evaluating the units of the research; consistently considering value stream mapping and lean story boards and the analyses of data that indicated clear generalisations in matched patterns.

Table 6.10 indicates that for this research, validity in each test category was achieved. The validity is supported fully in terms of the research protocol that was followed. The consideration of hypotheses and propositions relative to the identified patterns provided effective vetting of the research propositions.

6.8 Review of research objectives

The following table summarises the achievement of the literature and empirical objectives of the research in line with the findings discussed in this chapter.

Table 6. 11 Achievement of the literature and empirical objectives in alignment with the major findings of the research

Type of objective – literature/ empirical	Description of objective	Level of achievement
Literature Objectives	<p>Determine from the available literature the lean thinking applications and their influence on organisational structure and behaviour.</p> <p>And: Determine whether studies have been conducted that explain the relationships between lean thinking and organisational structure and behaviour.</p>	<p>Fully achieved based on the literature review of the thesis, which indicated that, with lean implementation, discrete manufacturing organisations should restructure along the value streams of the organisation (Jones, Medlen, Merlo, Robertson & Shepherdson, 1999; Nahm, Vonderembse & Koufteros, 2003; Haug, 2012, O'Carroll, 2004; Brown, et al, 2006; Worley & Doolen, 2006; Hettler, 2008); however, the review highlighted the gap in the literature because the content did not include what type of restructuring should be done or how this should be carried out. More directly related work by Haug (2012) and a study by Nahm <i>et al.</i> (2003) indicated that organisations that have achieved lean success, restructure with emphasis on cellular manufacturing, however their research did not reveal how and why particular structures evolve or how these work in relation to other non-manufacturing organisational units such as: human resource; marketing, sales, engineering and other units. Nahm <i>et al.</i> (2003) effectively identified structural variables that was utilised together with a construct of cellular manufacturing based on Haug's (2012) observations, in the analyses of the hypotheses generated for this research (Refer to the lean assessment questionnaires Appendices A to C). The points made by Hettler (2008) regarding functional silos with lean</p>

Type of objective – literature/ empirical	Description of objective	Level of achievement
		<p>implementation, were especially relevant to the field research, as is evident in the F01 case discussed in Chapter 6. Regarding organisational behaviour, in the context of the implementation of lean thinking, the following literature were reviewed: Gagnon (2004) studied employee behaviour and organisational strategy; Harris (2007), Angelis, Conti, Cooper and Gill (2011) and Losonci et al. (2011) investigated organisational commitment; Cameron-Strother (2009) considered employee behaviour under conditions of performance evaluation; Poppendieck (2002) investigated empowerment and the lean elements in her research and Pinheiro (2010) also focused on employee empowerment; Hasle, Bojesen, Jensen and Bramming (2012) researched employee health; and Tress and Espinoza (2012) identified the attitudes associated with successful lean thinking implementation. These particular behavioural structural and behavioural indications were taken into account in the research methodology and more specifically in the questions asked of participants. (Refer to questions per Appendices E and G per questions : MP1and 2 and per SP1 to SP6)</p>
	<p>Determine the gap in the literature regarding lean thinking and how it</p>	<p>Fully achieved per the analyses above relating to the particular gaps identified from the literature review. The gap in the literature illustrated that although there are some guidelines regarding the shape of organisational structure (Haug, 2012;</p>

Type of objective – literature/ empirical	Description of objective	Level of achievement
	affects organisational structure and behaviour.	Nahm et al. 2003), there is no concrete evidence that provides adequate information regarding the detail of how and why organisational structure and behaviour will change. More specifically work concerning the lean techniques: by Ōhno (1988) and Shingō (1989), Womack and Jones (2003) and Liker (2004); highlighted the lack of detail regarding lean techniques, and how these techniques affected the behaviour and structure of organisations adopting a lean transformational strategy.
Empirical objectives	Establish to what extent organisations have implemented lean thinking in terms of techniques and organisational performance.	Fully achieved in terms of the established and detailed research that was done utilising case study methodology in conjunction with quantitative study utilising linear regression methodology. Case study methodology provided the constructs for a wider scope of analyses and revealed the approaches organisations follow with lean thinking implementations. In both the case studies it was evident that organisational approaches to lean implementation followed a route closely associated with the model depicted per figure 5.2 as was revealed in the F01 cases study where the management had worked their way through the lean basics commencing with five S, progressing to the more complex implementation of cellular manufacturing. Their approach was replicated in the W01 case study where management had followed a similar process. For both case studies

Type of objective – literature/ empirical	Description of objective	Level of achievement
		replication was determined for cross functional team work and self-directed team work as more manufacturing cells were being implemented.
	Determine which organisational structures and behaviours best suit the organisation in the implementation of lean thinking implementation.	Fully achieved as is discussed per the analyses, table 7.1 of the research outcome, according to which 10 new disciplines had emerged from the research. The ten disciplines had emerged following a pattern matching process per Yin (2013) and a cross case analyses for the two case studies, in particular as highlighted per table 6.9.
	Provide new guidelines and a framework that will add to the body of knowledge regarding lean thinking and its influence on organisational structure and behaviour.	Fully achieved as is discussed in the outcome of this research, following a pattern matching and hypotheses exercise per Yin (2013) and summarised effectively in table 6.9. Also, per the replication analysis, the example set by W01 in achieving an organisational structure that fully supports the propositions and that fully explains the how and why of lean organisational structures, closely resembles the optimised structure as per figure 7.1 and the ten new disciplines that had emerged from the research per table 7.1.

The above table indicates the effective achievement of the research objectives and validates the mixed method research process undertaken.

6.9 SUMMARY

The chapter commenced with lean audits for the cases F01 and W01. The quantitative data was gathered in the interview sessions with all participants in which the qualitative data was captured. The questionnaires were completed correctly by each participant, each case was dealt with in a consistent manner, following the research protocol and ethical standards to the letter. Each participant's answers were code categorised per the extensive details covered in the response write-ups per Appendices H I, J and K and this meant that the responses per question could effectively be cross-referenced by the respective question and name codes of the participants. The quantitative data was collected using Appendices A, B and C and data was captured according to Appendices L, M and N for the multiple regression analyses.

The analysis of data in both the qualitative study and quantitative study proved significant with some exceptions, such as in degree of respect for subordinates exhibited by previous and current management.

The hypotheses were effectively compared to the propositions, having concluded the quantitative results before analysing the multiple regression equations and statistics for significance and reliability.

The outcome of the research matched the propositions of the research to some degree, indicating the way forward for lean discrete organisational structures in terms of components identified. These included manufacturing cell managers running manufacturing cells (Rother & Harris, 2001) according to sound business principles, reporting to unit managers that function at top management level. A highly skilled lean champions unit (Brown *et al.*, 2006) is part of the structure acting cross-functionally and interdependently with manufacturing cell managers and unit managers in designated cross-functional teams. Support functions within units, such as plant maintenance or tooling specialists are permanently allocated to manufacturing cells. From CEO through to manufacturing cell managers, leadership is characterised by individuals who display an open, constructive, supportive style (Johnson, 2009), encouraging and empowering subordinates to as high a level as possible. Manufacturing cell managers meet daily with their respective teams in clean and neat meeting areas designated for that team. Visual management (Nicholas, 2011) is used by team members to gauge performance, and team members are upskilled to update visual controls themselves. Manufacturing cell teams are self-directing (O' Carroll, 2004), able to operate without the manufacturing cell manager when and if the need arises. Gain-sharing based on team goals is applied to the total

organisation and is used by employees to gauge the success of the organisation. Team meetings, where the identified lean techniques are used, lead to affective commitment and positive, supportive attitudes. The described organisational structure together with the set team structures cultivate behaviours conducive to lean operation and lead to supportive organisational cultures characterised as family, close-knit and customer oriented cultures.

A review of the objectives indicates effective achievement for all the identified categories.

CHAPTER SEVEN: CONCLUSION, OUTCOMES, SIGNIFICANCE AND FUTURE RESEARCH

7.1 INTRODUCTION

This concluding chapter considers the outcomes of the study, which indicate new principles for lean thinking regarding lean organisational structures for discrete manufacturing. The quantitative research supported the qualitative research to a significant extent, firstly providing effective construct validity and secondly providing substantial significance and reliability from the case study research. The cross-case analysis indicated clear replication (Yin, 2014) of patterns, providing simple yet clear direction for the how and why of lean organisational structures that cultivate supportive behaviours for lean thinking.

In this chapter the solution to the problem is discussed in Section 7.2 in terms of the outcomes of the combined quantitative and qualitative case study research. The solution takes into account the format of a typical optimised lean structure in terms of the components of such a structure that were revealed in the detailed analysis described in the previous chapter

Section 7.3 provides a detailed analysis of the new principles and disciplines that have emerged from the research, illustrating the addition to the body of knowledge of lean thinking in the context of discrete manufacturing organisations that have adopted a lean transformational strategy.

The significance of the findings is discussed in Section 7.4 and the thesis concludes in Section 7.5 with recommendations for future research into discrete manufacturing, South African organisations and how to optimise learning of lean thinking throughout the organisation, and most importantly, how to involve all the subordinate levels in the organisation.

7.2 OUTCOMES – SOLUTION TO THE PROBLEM

The solution lies in discrete manufacturing organisations achieving continuous flow with effective pull (Womack & Jones, 2010), using to the full all the available lean techniques identified (Womack & Jones, 2003; Quarterman, 2007). For the organisation adopting a lean transformational strategy, the structural and behavioural aspects may be clarified in terms of optimisation and cultivation of behaviours, discussed next.

7.2.1 Optimisation of structure

Optimised lean structures for discrete manufacturing organisations will consist of a structure that has self-directed teams (O' Carrol, 2004; Haug, 2012) manning manufacturing cells and reporting to a unit manager, who reports in turn to the chief executive. Sales, finance, maintenance, high quality human resources and any other required service functions will be permanently linked to a particular manufacturing cell or cells (Rother & Harris, 2001; Hyer & Wemmerlov, 2004) to ensure a continuous flow of information and material to and from the cell. A lean champion, leading lean specialists (Brown *et al.*, 2006), will cross-functionally support cell development through the setting of goals and priorities and the facilitation of action plans (Dennis, 2006). Manufacturing cells (Rother & Harris, 2001; Hyer & Wemmerlov, 2004) will be enabled to receive customer orders that have been directly processed through effective Kanbans (Quarterman, 2008; Nicholas, 2011) and scheduling processes (Jones, 2006). Cells feeding cells will be cross-functionally linked through effective cross-functional teamwork.

7.2.1.1 Typical discrete cellular manufacturing organisational structure

The outcomes of the research have provided useful guidelines for a typical lean structure that indicates that discrete manufacturing organisational structures are built on the basis of achieving effective flow and pull (Womack & Jones, 2010) through cellular manufacturing (Rother & Harris, 2001; Hyer & Wemmerlov, 2004). Utilising the practical example of the W01, manufacturing cells (Rother & Harris, 2001; Hyer * Wemmerlov, 2004), manned by self-directed teams under the leadership of highly skilled and competent manufacturing cell managers will be the focus level of such a structure. This typical lean structure is depicted in Figure.7.1

Figure 7.1 Cellular manufacturing three layer organisational structure

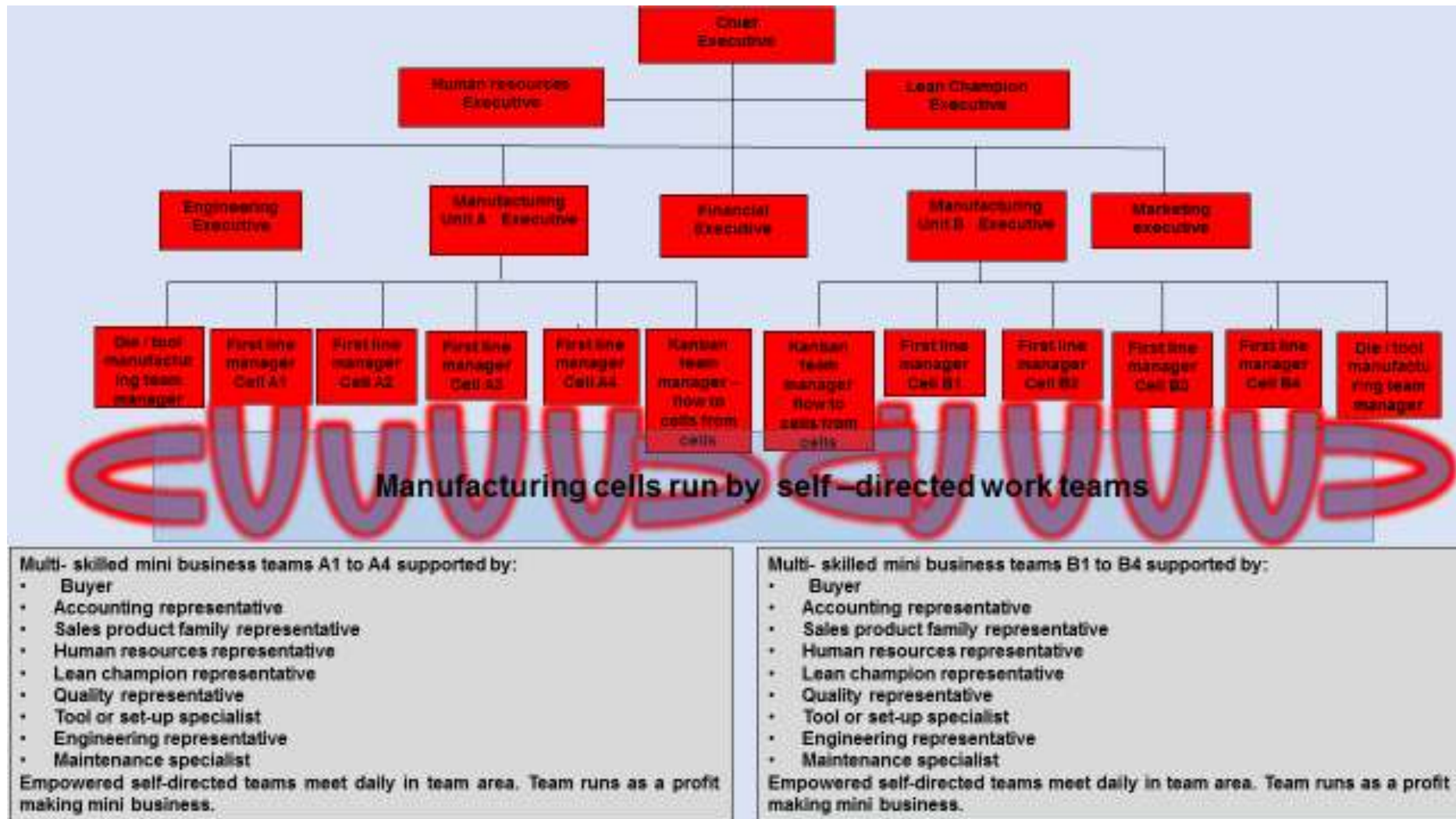


Figure 7.1 illustrates the effective whole of a discrete manufacturing organisational structure incorporating new principles and disciplines for lean thinking in order to achieve a cellular manufacturing format. The number of hierarchical levels is indicated as three, from the manufacturing cell manager level upwards to unit manager, to chief executive. Manufacturing cells (Rother & Harris, 2001; Hyer & Wemmerlov, 2004) are run by self-directed work teams (O'Carroll, 2007). A lean champions unit oversees organisational development involving the total organisation in the lean process.

7.2.2 Cultivation of behaviours conducive to the implementation of lean thinking

The cultivation of lean behaviours will occur through a lean champion or unit of lean champions, providing education, training, coaching and learning of lean practices to the lowest levels of the organisation, using the system of first-line manufacturing cell managers (or cell-team leaders) who are thoroughly lean skilled. Behavioural changes will be achieved through cross-functional teamwork, leading to the design of effective manufacturing cells (Rother & Harris, 2001; Hyer & Wemmerlov, 2004) by employees facilitated by team leaders. Behavioural change will continue with employees becoming more empowered and self-directing (O' Carroll, 2004; Haug, 2012), continuously being encouraged by open, supportive and constructive leadership (Johnson, 2009). This includes the frequent visiting of teams on the shop floor or in meeting areas. Affective commitment will be cultivated through effective daily, green area type team processes, inviting active participation and idea sharing. Gain-sharing will be implemented with growth and is vital for employees if they are to own the organisation. It will also allow the gauging of organisational performance by employees. Positive attitudes will be cultivated by:

- the organisational growth
- improved daily communications
- mini business and joint consultative meetings
- cultivating employee involvement
- employees knowing where the organisation is going
- workers being given the opportunity to learn
- employees being able to provide feedback and initiatives for which they are rewarded and recognised
- concerns being effectively dealt with
- more respectful, trustworthy and better leadership

- incentive bonuses created through measured gain sharing and employees' awareness of results of the organisation
- employees having more responsibilities in the lean programme
- workers taking more ownership of the process
- awareness of and alignment to the vision
- transparency of management.

7.3 NEW PRINCIPLES FOR LEAN THINKING

Based on the research findings, and revisiting the propositions and analysis in detail, the components that contribute to the solution of the problem, the new principles and disciplines are formulated in terms of the specific links that were found between the hypotheses, propositions and patterns. The new principles are presented with new disciplines that will be required for effective lean structure development. These will assist in the cultivation of behaviours that support lean processes. These principles are formulated in Table 7.1.

Table 7.1 New principles and disciplines for lean discrete manufacturing organisational structures

New lean principle	New lean discipline	Lean techniques
Flattened widened structure	<ul style="list-style-type: none"> • Top man tank talk consultative style • Top team meets with groups • Leadership style – supportive, open, constructive, never autocratic • Consult on strategy • Involve total organisations–Tank talk and consulting with groups. • Respect / listen / accept/ ideas/ explore options • Address all concerns and objections. / explore alternatives • Joint consultative forums • Consult on company performance • Every manager linked to a customer/s 	<ul style="list-style-type: none"> • Hoshin Kanri • Policy deployment • Five S • Seven wastes • Waste from customer viewpoint • Problem-solving • Kaizen • Teamwork • Visibility • Total productive maintenance (concept) • Standard work (SOPs)
Lean champion and team as an organisational unit	<ul style="list-style-type: none"> • Organisational development through lean and mini business training and development • Cross section of total organisation involved • Cross-functional teams focused on results • Idea generation • Everyone gets involved • Everyone encouraged 	As above and below, however, prioritised in terms of applications and impact project/s identified

New lean principle	New lean discipline	Lean techniques
Team structure-Cross-functional and self-directed teams	<ul style="list-style-type: none"> • Routine defined cross-functional teams • Defined work teams in terms of product flow • Fixed meeting agenda by team • Employees involved in process and method • Neat clean team areas / display boards • Urgent team formations 	<ul style="list-style-type: none"> • Teamwork • SOPs • Visibility • Problem-solving • Kaizen • Five S
Tool supply cells or tooling specialists	<ul style="list-style-type: none"> • U-cells developed to supply manufacturing cells with tooling / die requirements • Permanent specialist (tool and die correctors) allocated to manufacturing cells 	<ul style="list-style-type: none"> • SMED • Cycle time reduction • Cellular manufacturing • Problem-solving • Kaizen
Maintenance team of specialists	<ul style="list-style-type: none"> • Permanent allocation of maintenance specialist to manufacturing cell • Specialist trains and develops team members 	<ul style="list-style-type: none"> • TPM is basic • Visibility • Problem-solving • Kaizen • Five S
Manufacturing cell managers	<ul style="list-style-type: none"> • Training and development by lean champion/s is practical with lean applications • How teamwork • Leadership style – supportive, open, constructive, never autocratic • Support from maintenance and tooling specialists 	All the lean techniques, however, prioritised in terms of impact and urgency.

New lean principle	New lean discipline	Lean techniques
	<ul style="list-style-type: none"> • Support from financial specialists (mine business performance of manufacturing cell debtors / creditors control) – cross-functional team sessions held regularly 	
Manufacturing cells by unit-workers and hardware	<ul style="list-style-type: none"> • Tested with teams • Specialists focus • Modular cells • Best practice • Empowerment • Self-directed team development • Team members involved in visibility updates • Make to order • Kanban to and from cells • Downstream service-cross-functional team • Cross-functional teams with work teams work on improving flow • Cross-functional teams with work teams focused on flow improvements • Work teams assist with creation of manufacturing cells 	<ul style="list-style-type: none"> • Value stream mapping • Cycle time reduction • SMED • Kanban • Cellular manufacturing • One-piece flow • Heijunka • Poke Yoke • Jidoka • Taguchi • Visibility • Five S is basic • Hoshin Kanri basic with teamwork.
Unit managers, (Top management) team up with manufacturing cell managers	<ul style="list-style-type: none"> • Cross-functional issues resolved (weekly or when issue develops) 	<ul style="list-style-type: none"> • Teamwork • Hoshin Kanri • Problem-solving • Kaizen • Visibility

New lean principle	New lean discipline	Lean techniques
Self-directed work teams	<ul style="list-style-type: none"> • Manufacturing cell managers train and develop team members • Empowered team members act as team leaders and participate to update visual aids in team meeting areas. • Schedule orders that come into the cell directly from customers, or downstream manufacturing units. • Update SOPs (May even create new SOPs, which are coordinated in the cross-functional review meetings) • Kanban teams supply and deliver into Kanban areas with Kanban controls • Run themselves as mini-businesses 	<p>All the lean techniques, however, special focus on which techniques provide the best results.</p> <ul style="list-style-type: none"> • Hoshin Kanri focused on goal achievement.
Gain-sharing aligned to organisational performance	<ul style="list-style-type: none"> • Awareness of organisational performance • Sense of purpose • Search for improvements by team members • Attitudes change with purpose and sense of ownership • Affective commitment in search of improvements • Sense of togetherness 	<ul style="list-style-type: none"> • Cycle time reduction • SMED • Problem-solving • Kaizen

Table 7.1 reflects the new disciplines for lean thinking that are required for the development of effective discrete manufacturing organisational structures. The new disciplines, together with the organisational structure (see Figure 7.1), provide a framework and guideline for the development of this type of structure that will help to establish behaviours that lead to positive attitudes and more affective commitment on the part of employees in the organisation.

7.4 SIGNIFICANCE

The significance of the findings is that new principles for lean organisational structures have emerged. These new principles eliminate some of the uncertainties associated with the adoption of a lean transformational strategy by a discrete manufacturing organisation and has added significantly to the body of knowledge on lean thinking.

The 20 techniques model indicated Figure 5.1 is appropriate to these implementation guidelines and indicates the fact that by utilising five S (Osada, 1991), teamwork and goal setting and alignment (Hoshin Kanri in Dennis, 2006) as an initial step is the right thing to do, since it creates a new way forward for the organisation and provides the ideal opportunity to involve the total organisation. Following on from this approach, the techniques of Kaizen (Quarterman, 2007; Nicholas, 2011), problem-solving (Nicholas, 2011), waste elimination (Ōhno 1988; Shingō 1989), viewing waste from the customer's perspective (Womack & Jones, 2010), assisting in maintenance (TPM in Nicholas, 2011), using visual management (Nicholas, 2011; Braden *et. al.*, 2012) in team locations with team meetings, and creating own standard operating procedures, secures a good foundation for creating and implementing flow and pull (Womack & Jones, 2010).

The significance and role of cross-functional teamwork has been clarified, in particular how and why to use this. The findings from W01 indicate that the way that these teams operate with consistent and frequent team sessions with unit, operations and first-line managers who meet to resolve cross-functional or general organisational issues is effective. Another significant finding is that these teams are formed when necessary to deal with critical issues that develop during operations.

Findings from W01 and F01 have highlighted the pattern of self-directed work teams (O' Carroll, 2004) operating within the organisational structure, with W01 setting the example of teams effectively and efficiently operating the manufacturing cells (Rother & Harris, 2001; Hyer & Wemmerlov, 2004) or flow lines of the organisation. A significant finding is that the first-line managers who run the work teams at W01 form the basis for the achievement of effective flow and pull (Womack & Jones, 2010) within business units and from one business unit to the next downstream. Even in distribution, first-line managers oversee work teams operating warehouses as flow lines, receiving products from manufacturing and dispatching these to customers to achieve virtually full one-day on-time deliveries.

Of profound significance was how manufacturing cells (Rother & Harris, 2001; Hyer & Wemmerlov, 2004) have been developed by both F01 and W01. F01 was in the process

of achieving full manufacturing cell operations, using the techniques associated with cycle time reduction (Nicholas, 2011), SMED (Ōhno, 1988; Shingō, 1989) based on customer TAKT times (Rother and Harris, 2001). W01 had achieved full implementation of cellular manufacturing (Rother & Harris, 2001; Hyer & Wemmerlov, 2004) for the total manufacturing operation, based on best practice flow for extrusions, powder coating and anodising with quick change over technology or SMED taken to a high level (Ōhno, 1988; Shingō, 1989). Realising the importance of simplicity, management at W01 has developed effective Kanbans for the operation (Quarterman, 2007; Nicholas, 2011), using identification skips to which finished products are allocated for further processing by downstream units. Heijunka type scheduling (Jones, 2006) has been simplified, based on the decision taken by all manufacturing units to make to order, and this has been successfully achieved by orders flowing directly to first-line managers who allow the team to schedule the work through the cell.

The study has highlighted the need for lean specialists and champions for lean structures (Brown *et al.*, 2006). At F01, the head office in the USA sent lean specialists to assist local cross-functional teams to develop manufacturing cells (Rother & Harris, 2001) while at W01 the lean specialists are 20 keys specialists (Kobayashi, 1995) from the organisational development unit, who assist first-line managers directly with Kaizen continuous improvement. At W01, this specialist team (Brown *et al.*, 2006) focuses on the development of first-line managers to implement improvements directly with their respective work teams.

The need for service units to fully support flow (Haug, 2012) is highlighted particularly within the W01 organisation, where the financial department, human resources department, quality and engineering or systems units, support manufacturing units and first-line managers comply fully with the requirements of resources and information.

A significant finding was how first-line managers ran their teams and manufacturing cells in the form of mini businesses, complete with goals and daily feedback that gauged performance.

The question of gain-sharing is of major significance since it provides a sense of ownership of the business and triggers support and cooperation from the self-directed teams. It creates awareness of how the business is faring, and it energises work teams to improve continuously in their current operations.

Regarding the more complex lean techniques the research indicated that for both the F01 and W0 organisations, Taguchi (Tod, 1995) Poka-yoke, Jidoka (Ōhno, 1988 & Shingō,

1989) and Heijunka (Jones, 2006) offer opportunities for further improvements and highlights the need for lean specialists to develop further into these refinements. The ideal state would be that first-line managers or manufacturing cell managers achieve specialist status with these particular techniques.

7.5 FUTURE RESEARCH

Cultivating knowledge of lean thinking among workers is the future challenge for South African lean organisations since a key lesson learnt from this research was how organisations convey the lean message to workers and employees not in management. This can be achieved through the development of first-line supervision or first-line management to train and develop subordinates in the lean process. However, it would appear that this aspect requires further follow-through, and this presents an opportunity for future research. With literacy and language issues still prevalent, “a picture paints a thousand words” may be a best method in this regard. Keeping it simple remains the main lesson gained from this research study.

Further research is required on discrete manufacturing organisations that have advanced into lean structures, as indicated in this study. Specifically, these are the techniques of Poka-yoke, Jidoka (Ōhno, 1988; Shingō, 1989) and Taguchi (Tod, 1995). This researcher believes that involving self-directed work teams in developing skills to a more advanced level will make it possible for such organisations to achieve even higher levels of product quality, leading to parts per million rejects and waste performances. A die corrector at W01 proved as much with die design changes of amassing proportions that had provided the organisation with a competitive edge that led to significant productivity and quality improvements. Although the research goes a long way towards identifying a new way forward for lean thinking, it is considered that the outcome may not be totally generalisable and further detailed research across more discrete manufacturing organisations should be considered as a future research option.

REFERENCES

- Abdulmalek, F.A., Rajgopal, J. and Needy, K.L. 2006, "A Classification Scheme for the Process Industry to Guide the Implementation of Lean", *Engineering Management Journal*, 18(2), pp. 15–25
- Afsar, B. 2010, "The Relation of High-Performance Work Systems with Employee Involvement", *Management & Marketing-Craiova*, 2, pp. 295–307.
- Akao, Y. 2004, *Hoshin Kanri: Policy Deployment for Successful TQM*, [Paperback]. Cambridge Massachusetts, USA: Productivity Press.
- Allen, N.J. and Meyer, J.P. 1990, "The measurement and antecedents of affective, continuance and normative commitment to the organization", *Journal of Occupational Psychology*, 63(1), pp. 1–18.
- Alukal, G. 2007, "Lean Kaizen in the 21st Century", *Quality Progress*, 40(8), pp. 69–70.
- Angelis, J., Conti, R., Cooper, C. & Gill, C. 2011, "Building a high-commitment lean culture", *Journal of Manufacturing Technology Management*, 22(5), pp. 569–586.
- Aguinis, H. 1995, Statistical power with moderated multiple regression in management research, *Journal of Management*, 21, (6), pp. 1141–1158.
- Bamford, D. 2011, "*The Paradox of Lean Leadership?*" [online] Manchester: Manchester Business School.
- Available at: <http://www.oeuk.com/wp-content/uploads/D_Bamford_The_Paradox_of_Lean_Leadership_Sept_2011_2.pdf> [Accessed 2 September 2013]
- Behrouzi, F. and Wong, K.Y. 2011, "Lean performance evaluation of manufacturing systems: A dynamic and innovative approach", *Procedia Computer Science*, 3, pp. 388–395.
- Bertoncelj, A. and Kavcic, K. 2012, "TAKT-Time model optimisation on basis of shop-floor approach", *Studia Universitatis Babeş-Bolyai*, 57(1), pp. 72–83.
- Bhasin, S. 2011, "Performance of organisations treating lean as an ideology", *Business Process Management Journal*, 17(6), pp. 986–1011.
- Blanchard, D. 2007, "Lean on me", *Industry Week*, 256(12), pp. 53–54.
- Bloom, B. S. 1956, *Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain*. New York: David McKay Co Inc.

- Bo, M. and Mingyao, D. 2012, "Research on the Lean Process Reengineering Based on Value Stream Mapping for Chinese Enterprises", *Management Science and Engineering*, 6(2), pp. 103–106.
- Boyle, T.A., Scherrer-Rathje, M. and Stuart, I. 2011, "Learning to be lean: the influence of external information sources in lean improvements", *Journal of Manufacturing Technology Management*, 22(5), pp. 587–603.
- Braden K., Corbin, T.P., Moore, L.E. & Walsh, L. 2012, "Visual workplace practices positively impact business processes", *Benchmarking*, 19(3), pp. 412–430.
- Brown, C.B., Collins, T.R. and McCombs, E.L. 2006, "Transformation from Batch to Lean Manufacturing: The Performance Issues", *Engineering Management Journal*, 18(2), pp. 3–13.
- Burnes, B., Cooper, C. and West, P. 2003, "Organisational learning: The new management paradigm?" *Management Decision*, 41(5), pp. 452–464.
- Cameron-Strother, A.H. 2009, The causal relationship inherent in the alliance of lean infrastructures, employee engagement, leadership impact, and team dynamics in modern manufacturing environments. Doctor of Philosophy thesis. Capella University. Minneapolis.
- Carbery, R. and Garavan, T.N. 2005, "Organisational restructuring and downsizing: issues related to learning, training and employability of survivors", *Journal of European Industrial Training*, 29(6), pp. 488–508,522.
- Coleman, B.J. and Vaghefi, M.R. 1994, "Heijunka (?): A key to the Toyota production system", *Production and Inventory Management Journal*, 35(4), pp. 31.
- Cooper, J.J. Jr. 2011, The integral role of organisational characteristics and their impact on lean implementation success. Doctor of Philosophy thesis. Southern Illinois University at Carbondale, Illinois.
- Collie, S. and Rine P.J. 2009, Survey design. Available at:
 <http://www.virginia.edu/processsimplification/resources/survey_design.pdf> [Accessed 3 January 2014].
- Corbin, J. & Straus, A. 2008, *Basics of qualitative research: Techniques and procedures for developing grounded theory*. (4th edition). Thousand Oaks, CA: Sage Inc.

- Curado, C. 2006, "Organisational learning and organisational design", *The Learning Organization*, 13(1), pp. 25–48.
- Czabke, J., Hansen, E.N. & Doolen, T.L. 2008, "A multisite field study of lean thinking in U.S. and German secondary wood products manufacturers", *Forest Products Journal*, 58(9), pp. 77–85.
- Dennis, P. 2006, *Getting the right things done: A leader's guide to planning and execution*, Boston, MA: Lean Enterprise Institute.
- De Vaus, D. 2002a, *Analyzing Social Science Data: 50 Key Problems in Data Analysis*. Sage Inc. Thousand Oaks, California, 91320.
- De Vaus, D. 2002b, *Surveys in Social Research*, Abingdon, Oxon, OX14 4RN: Taylor and Francis
- Dolcemascolo, D. 2008, "Achieving one piece flow". [online] Available at: <http://www.reliableplant.com/Read/14703/one-piece-flow> [Accessed 7 October 2013]
- Doolen, T.L., Van Aken, E.M., Farris, J.A., Worley, J.M. & Huwe, J. 2008, "< IT> Kaizen</IT> events and organizational performance: a field study", *International Journal of Productivity and Performance Management*, 57(8), pp. 637–658.
- Francis, D., Bessant, J. and Hobday, M. 2003, "Managing radical organisational transformation", *Management Decisions*, 41(1) pp. 18–31.
- Gagnon, M.A. 2004, Investigating employee strategic alignment during a transformation to lean manufacturing. Doctor of Philosophy thesis. The Pennsylvania State University. Pennsylvania.
- Gander, M.J., PhD 2009, "Managing People in A Lean Environment: The Power of Informal Controls and Effective Management of Company Culture", *Journal of Business Case Studies*, 5(6), pp. 105–110.
- Gonzalo, P.V.J. 2007, "Do the integration of holistic concept in lean manufacturing: what is the future conduct of lean manufacturing?" *Cultura Científica y Tecnológica Universidad Autónoma de Ciudad Juárez*, 71, p. 135.
- Good, C.V. & Scates, D.E. 1954, *Methods of research: Educational, psychological, and sociological*. New York: Appleton-Century- Crofts. Inc.

Grütter, A.W., Field, J.M. and Faull, N.H.B. 2002, "Work team performance over time: three case studies of South African manufacturers", *Journal of Operations Management*, 20(5), pp. 641–657.

Guldemond, E., Ten Have, K. and Knoppe, R. 2010, "Organizational Structures In Collaborative Work Environments: The Return Of The Matrix?" SPE Intelligent Energy Conference and Exhibition.

Harris, C.M. 2007, An extension of a three component model of organisational commitment to the area of commitment to organisational change in facilities implementing Lean Production. Doctor of Business Administration thesis. Anderson University. Anderson, Indiana.

Hasle, P., Bojesen, A., Jensen, P.L. and Bramming, P. 2012, "Lean and the working environment: a review of the literature", *International Journal of Operations & Production Management*, 32(7), pp. 829–849.

Haug, P. 2012. Value stream management: empirical evidence on lean organizational structures. Available at:

<<http://decisionsciences.org/Proceedings/DSI2008/docs/47-6897.pdf> > [Accessed on: 8 May 2013]

Herscovitch, L., and Meyer J. P. (2002). Commitment to organisational change: Extension of a three component model. *Journal of Applied Psychology*, 87 (3), 474–487

Hettler, N. 2008, "Lean Means Business", *Manufacturing Engineering*, 140(1), pp. 103–104,106,109.

Hines, P., Holweg, M. and Rich, N. 2004, "Learning to evolve: a review of contemporary lean thinking", *International Journal of Operations & Production Management*, 24 (10), pp. 994–1011.

Hosie, P.J. and Smith, R.C. 2009, "A future for organisational behaviour?" *European Business Review*, 21(3), pp. 215–232.

Hyer, N. and Wemmerlov, U. 2002, "Reorganizing the factory: Competing through Cellular Manufacturing." Portland, Oregon: Productivity Press.

Hyer, N. and Wemmerlov, U. 2004, "Cell Manufacturing", *Mechanical Engineering*, 126(3), pp. E14–E16.

Ichniowski, C. and Shaw, K. 1999, "The effects of human resource management systems on economic performance: an international comparison of US and Japanese plants". *Management Science*, 45(5), 704–721.

Ichniowski, C., Shaw, K. and Prensush, G. 1997, "The effects of human resource management practices on productivity: a study of steel finishing lines". *American Economic Review*, 87(3), 291–313.

Johnson, D.J. 2003, "A Framework for Reducing Manufacturing Throughput Time", *Journal of Manufacturing Systems*, 22(4), pp. 283–298.

Johnson, J.M. 2009, Leadership and organisational performance in a global, "Fortune" 500 Six Sigma operating company: A correlational research study. Doctor of Philosophy thesis. Capella University, Minneapolis, Minnesota, USA.

Jones, C., Medlen, N., Merlo, C., Robertson, M. and Shepherdson, J. 1999, "The Lean Enterprise", *BT Technology Journal*, 17(4), pp. 15–22.

Jones, D.T. 2006, "Heijunka: levelling production", *Manufacturing Engineering*, 137(2) pp. 29–30, 32, 34, 36.

Jørgensen, M. and Phillips, L. 2002, *Discourse Analysis as Theory and Method*, London: Sage Publications Ltd.

Jumara, J.J. 2005, A case study of the influence of organization theory on organizational change. Doctor of Philosophy thesis, University of Missouri – Kansas City.

Jusko, J. 2007, "Strategic deployment: how to think like Toyota", *Industry Week*, 256(11), pp. 34–35, 37.

Kent, T.W. 2006, "A process for identifying the skills needed for operating in a self-directed work team in a manufacturing setting", *Team Performance Management*, 12(7/8), pp. 258–271.

Keogh, M.K. 2006, Reducing value stream lead time: A two-phase analysis of the factors that contribute to the success of manufacturing streamlining initiatives. Minneapolis, Minn.: Capella University. Available at:

<http://books.google.co.za/books?hl=en&lr=&id=dxNNT2WHk1AC&oi=fnd&pg=PR5&dq=Reducing+value+stream+lead+time+by+Keogh,+M.K.+&ots=QaIQ5W8-dE&=>> Accessed on: [19 September 2013].

King, G., Keohane, R.O. and Verba, S. 1994, *Designing Social Inquiry: Scientific Inference in Qualitative Research*. Princeton University Press, New Jersey.

Kobayashi, I. 1995, *20 keys to workplace improvement*, United States of America: Productivity Press.

Kucner, R.J. 2008, A socio-technical study of lean manufacturing deployment in the remanufacturing context. Doctor of Philosophy thesis. University of Michigan, Ann Arbor, Michigan, United States.

Lander, E. 2007, Implementing Toyota-style systems in high variability environments. Doctor of Engineering (Manufacturing) thesis, University of Michigan College of Engineering Graduate Professional Programmes. Ann Arbor Michigan.

Lægaard, J. and Bindslev, M. 2006, "Organizational Theory", [online] Ventus Publishing ApS (BookBoon. com). Available at:

<http://www.academy-british.co.uk/Library-eng/organizational-theory> [Accessed 19 September 2013].

Lean global network, 2013, "Meet our affiliates", [online]. Available at:

<http://leanglobal.org/network/> [Accessed on 14 August 2013]

Liker, J. 2004, *The Toyota Way-14 Management Principles from the World's Greatest Manufacturer*. New York: McGraw-Hill.

Lok, P. and Crawford, J. 2004, "The effect of organisational culture and leadership style on job satisfaction and organisational commitment: A cross-national comparison", *The Journal of Management Development*, 23(4), pp. 321–338.

Lorsch, J. W. and Lawrence, P. R.1970, *Studies in organization design*, Homewood, Illinois: Irwin Inc.

Losonci, D., Demeter, K. and Jenei, I. 2011, "Factors influencing employee perceptions in lean transformations", *International Journal of Production Economics*, 131(1), pp. 30–43.

Lynch, L.L. 2005, The relationship of lean manufacturing 5S principles to quality, productivity, and cycle time. Doctor of Philosophy thesis. Walden University, Minneapolis, Minnesota, USA.

Manos, A. 2007, "The Benefits of Kaizen and Kaizen Events", *Quality Progress*, 40(2), pp. 47–48.

- Marksberry, P., Bustle, J. and Clevinger, J. 2011, "Problem-solving for managers: a mathematical investigation of Toyota's 8-step process", *Journal of Manufacturing Technology Management*, 22(7), pp. 837–852.
- Meade, D.J., Kumar, S. and Houshyar, A. 2006, "Financial analysis of a theoretical lean manufacturing implementation using hybrid simulation modelling", *Journal of Manufacturing Systems*, 25(2), pp. 137–152.
- Meredith, J., 1998. "Building operations management theory through case and field research". *Journal of Operations Management* 16(4), pp. 441–454.
- Nahm, A.Y., Vonderembse, M.A. and Koufteros, X.A. 2003, "The impact of organisational structure on time-based manufacturing and plant performance", *Journal of Operations Management*, 21(3), pp. 281–306.
- Nicholas, J. 2011, *Lean production for a competitive advantage*, New York: CRC Press.
- Nuutinen, M. and Lappalainen, I. 2012, "Towards service-oriented organisational culture in manufacturing companies", *International Journal of Quality and Service Sciences*, 4(2), pp. 137–155.
- O'Carroll, R. 2004, "Designing Organisations to Survive in the Global Economy: An Insider's Account", *Irish Journal of Management*, 25(2), pp. 76–91.
- Ōhno, T. 1988, *Toyota production system: beyond large-scale production*, Cambridge Massachusetts, USA: Productivity Press.
- Osada, T. 1991, *The 5S's: Five Keys to a Total Quality Environment*, Tokyo: Asian Productivity Organisation.
- Pallant, J. 2010, *SPSS survival manual: A step by step guide to data analysis using SPSS*, Maidenhead: Open University Press.
- Pennington, R. 2014, Business systems multiple regression forecasting model. (REGFOR). [online] Available at: <http://www.business-spreadsheets.com/help.asp?t=8> [Accessed 5 July 2014]
- Pinheiro, R.E. 2010, Organizational change and employee empowerment – a grounded theory study in lean manufacturing integration into a traditional factory environment. Doctor of Philosophy thesis. Capella University, Minneapolis, Minnesota, USA.
- Poppendieck, M. 2002. "Principles of lean thinking"[online]. Eden Prairie: Poppendieck.LLC. Available at:

< http://www.gregoryneilassociates.com/articles/lean_thinking.pdf> [Accessed 7 May 2013]

Quarterman, L. 2007, "Implementing lean manufacturing", *Management Services*, 51(3), pp. 14–19.

Quarterman, L. 2008, "KANBAN scheduling system", *Management Services*, 52(1), pp. 28–31.

Rashid, Md. Z. A., Sambasivan, M. and Johari, J. 2003, "The influence of corporate culture and organisational commitment on performance", *The Journal of Management Development*, 22(8), pp. 708–728.

Roberts, J. 2011, "Decline in manufacturing must be reversed". [online] Available at: <<http://www.bizcommunity.com/Article/196/365/67480.htm>> [Accessed 19 September 2013]

Rother, M. and Harris, R. 2001, *Creating continuous flow: an action guide for managers, engineers and production associates*, Cambridge, MA: Lean Enterprises Institute Incorporated.

Rother, M. and Shook, J. 2003, *Learning to See: Value-Stream Mapping to Create Value and Eliminate Muda*, Version 1.3 June 2003. Cambridge, MA: Lean Enterprise Institute.

Rowley, J. 2002, "Using case studies in research", *Management Research News*, 25(1), pp. 16–27.

Sawhney, R. and Chason, S. 2005, "Human Behaviour Based Exploratory Model for Successful Implementation of Lean Enterprise in Industry", *Performance Improvement Quarterly*, 18(2), pp. 76–96.

Scherrer-Rathje, M., Boyle, T.A. and Deflorin, P. 2009, "Lean, take two! Reflections from the second attempt at lean implementation", *Business Horizons*, 52(1), pp. 79–88.

Schonberger, R.J. 2010, *World class manufacturing: the next decade: building power, strength, and value*, New York: Simon and Schuster.

Shenton, A.K. 2004, "Strategies for ensuring trustworthiness in qualitative research projects", *Education for Information*, 22(2), pp. 63–75.

Shetty, S.K. 2011, A Proposed New Model to Understand Lean Implementation Using Employee Perception. Doctor of Philosophy thesis. The University of Alabama, Huntsville.

- Shingō, S. 1989, *Study of the Toyota production system: from an industrial engineering viewpoint*, Cambridge Massachusetts, USA: Productivity Press.
- Singh, B.J. and Khanduja, D. 2010, "SMED: for quick changeovers in foundry SMEs", *International Journal of Productivity and Performance Management*, 59(1), pp. 98–116.
- Spear, S. and Bowen, H.K. 1999, "Decoding the DNA of the Toyota production system", *Harvard Business Review*, 77(5), pp. 96–108.
- Stanlib. 2013, "SA manufacturing activity experienced a sharp decline in March 2013", [online] Available at: <http://www.stanlib.com/EconomicFocus/Pages/SAManufacturingMarch2013.aspx> [Accessed 19 September 2013]
- Stone, K.B. 2012a, "Four decades of lean: A systematic literature review", *International Journal of Lean Six Sigma*, 3(2), pp. 112–132.
- Stone, K.B. 2012b, "Lean Transformation: Organisational Performance Factors that Influence Firms' Leanness", *Journal of Enterprise Transformation*, 2(4), pp. 229–249.
- Suárez-Barraza, M.F. and Ramis-Pujol, J. 2012, "An exploratory study of 5S: a multiple case study of multinational organizations in Mexico", *Asian Journal on Quality*, 13(1), pp. 77–99.
- Taguchi, G. 1989, *Introduction to quality engineering*. New York, NY: UNIPUB.
- Testani, M.V. and Ramakrishnan, S. 2011, "Lean Transformation Leadership Model: Leadership's Role in Creating Lean Culture", *IIE Annual Conference. Proceedings*, pp. 1–8.
- Thomas, A.J. and Antony, J. 2005, "A comparative analysis of the Taguchi and Shainin DOE techniques in an aerospace environment", *International Journal of Productivity and Performance Management*, 54(8), pp. 658–678.
- Thompson, J. D. 1967 *Organizations in action*, New York: McGraw-Hill.
- Todd, J. 1995, *World-class manufacturing*, London: McGraw-Hill Book Company.
- Yang, T. and Su, C. 2007, "Application of hoshin kanri for productivity improvement in a semiconductor manufacturing company", *Journal of Manufacturing Technology Management*, 18(6), pp. 761–775.
- Todd, J. 1995, *World-class manufacturing*, New York: McGraw-Hill Book Company.

- Tracey, M.W. and Flinchbaugh, J. 2006, "HR's Role in the Lean Organisational Journey", *World at Work Journal*, 15(4), pp. 49–58.
- Tress, E.P. and Espinoza, A.B., 2012, "The human side of Lean Manufacturing: A successful model implementation", *IIE Annual Conference. Proceedings*, Hilton Bonnet Creek, Orlando, Florida, May 19-23, 2012, pp. 1–10.
- Van Aken, E.M., Farris, J.A., Glover, W.J. and Letens, G. 2010, "A framework for designing, managing, and improving Kaizen event programmes", *International Journal of Productivity and Performance Management*, 59(7), pp. 641–667.
- Vermaak, T. D. 2008, Critical success factors for the implementation of Lean Thinking in South African Manufacturing Organisations. Doctor of Commerce thesis, University of Johannesburg, Johannesburg.
- Von Rosenstiel, L. 2011, *Employee Behavior in Organizations. On the Current State of Research***, Mering, Germany: Rainer Hampp Verlag.
- Whetten, D.A. 1989, "What constitutes a theoretical contribution?" *Academy of Management Review*, 14(4), pp. 490–495.
- Womack, J.P. 2002, "Lean thinking: Where have we been and where are we going?" *Manufacturing Engineering*, 129(3), pp. L2.
- Womack, J. and Jones, D.T. 1990, *The machine that changed the world*, New York: Rawson Associates.
- Womack, J.P. and Jones, D.T. 1996, *Lean thinking: banish waste and create wealth in your corporation*, New York: Free Press.
- Womack, J.P. and Jones, D.T. 2003, *Lean thinking: banish waste and create wealth in your corporation*, New York: Free Press.
- Womack, J.P. and Jones, D.T. 2010, *Lean thinking: banish waste and create wealth in your corporation*, Free Press. New York
- Worley, J.M. and Doolen, T.L. 2006, "The role of communication and management support in a lean manufacturing implementation", *Management Decisions*, 44(2), pp. 228-245.
- Yin, R.K. 2014, *Case study research: Design and methods*, Fifth edition, Thousand Oaks, California: Sage.

APPENDICES

The appendices follow in Alpha notation below:

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY						
Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
1. Hoshin Kanri and strategic planning						
	Lean thinking is the basis of the strategic plan					
	The total organisation has been involved in the setting of the strategic plan.					
	Suppliers and customers are integrated into the strategic plan as part of the value stream					
	Results from the lean implementation are utilised to review the plan.					
	What customers perceive as value is a strategic driver					
	The vision, mission, values, goals and objectives have been formulated based on a lean transformation strategy					
2. Policy deployment						
	The vision, Mission values , goals and objectives have been totally adopted by the total organisation					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY						
Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	Organisational goals objectives and action plans has been cascaded throughout the organisation and to the lowest levels.					
	Feedback from implementations and Kaizen is utilised to review the strategic plan.					
3. Value defined from customer viewpoint						
	There is a formal process in place according to which customer values are being determined					
	What customers define as value has been established and documented.					
	How the organisation can best satisfy customer values has been documented as standard operating procedures.					
	Customer definitions of value have been incorporated in the organisational strategy.					
	The 7 wastes have been formally identified for the organisation by area process and function.					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY						
Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	Each identified waste has been registered and incorporated in the Kaizen register.					
4. Seven Wastes identified for the total organisation						
	Wastes that can immediately be eliminated have been dealt with and a review procedure is in place to address re occurrence.					
	Waste that can not immediately be eliminated has been identified for future corrective action.					
	The wastes targeted for elimination has been included in the Kaizen programme.					
5. Problem-solving						
	There is a clearly communicated policy and procedure for dealing with problem-solving in the organisation					
	The three C's and Five why's , Fishbone and A3 PDCA problem-solving methods have been in trained for the total organisation					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY						
Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	Statistical techniques have been in trained for the total organisation to be utilised in the problem-solving process.					
6. Kaizen or continuous improvement						
	There is a clearly communicated policy and procedure for continuous improvement in the organisation.					
	The necessary infrastructure is in place to support the improvement process.					
	Employees have been trained in continuous improvement methods					
	Employees are fully participating in continuous improvement projects.					
	Continuous improvement projects are being implemented to a time line.					
	Continuous Improvement projects are recorded and implemented.					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY						
Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	Successful continuous improvement projects are registered as standard work.					
	The improvements made throughout the organisation involve only minor or no capital investment.					
	Continuous improvements are dominated by small improvements					
	All standard operating procedures are subject to continuous improvement.					
	The organisation is clean and tidy.					
7. Five S or continuously neat organisation						
	Work in process materials are clearly categorized by number.					
	Work in process materials have a designated place or area.					
	Tools are positioned on shadow boards or racking that allow for easy access.					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY

Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	All employees accept responsibility that daily “clean-up & put away” activities are part of their job.					
	Everything in use has a designated place. Every container, tool and equipment rack is clearly labelled and easily accessible to the user. People using tools, parts, fixtures, quality gauges, etc. know where to find them					
	Lines on the floor clearly distinguish work areas, paths, and material handling isles. Signs clearly identify production, inventory staging, and material drop areas.					
	Every container, tool and equipment rack is clearly labelled and easily accessible to the user. People using tools, parts, fixtures, quality gauges, etc. know where to find them.					
8. Taguchi or design quality into the product						

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY

Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	All product designs are done with respect to Taguchi code					
	Product designs are done with respect to process.					
	Product design are to achieve zero defects through design.					
	All manufacturing processes have been cycle timed and a standard time per operation established.					
9. Cycle time reduction						
	All standard operations have been critically examined according to the 5 whys technique.					
	Non performing methods are recorded as continuous improvement projects.					
	Once a month audits are conducted to determine the effectiveness of methods to predetermined time standards.					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY						
Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	Methods that do not meet predetermined standard criteria are immediately corrected and standardised.					
	Standard operating procedures are continuously updated for improved methods.					
10. SMED or one digit exchange of die						
	Set-up and / or Changeover activities have been subject to detailed work measurement, such as motion study, time study and video recording of process to identify waste.					
	Jigs and fixtures and set-up tools and aids have been designed for each change over to achieve change over times that are less than 10 minutes.					
	All changeovers for all operations achieve standard times that are below 10 minutes.					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY						
Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	Changeovers are scheduled in advance and communicated so all workers on the team. They know the day's change over schedule					
	All of the fixtures, tools, fasteners, materials, parts, raw stock, lifting equipment. Etc. needed for the next production run are prepared in advance to reduce change-over times					
11. Value stream mapping						
	All product transformation activities have been identified.					
	Process flow charts have been established for each flow process.					
	Value-adding transformation processes have been identified by cycle time and by process and by item.					
	All set-up processes have been identified by cycle time and by process and by item.					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY

Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	Detailed plant layouts have been prepared tracking the product flow from transforming operation to transforming operation					
	Current state value stream maps have been prepared for each product or family of product flows.					
	Future state value stream maps have been prepared for each product or family of product flows.					
	Each future state value stream map has been registered as a continuous improvement project					
	All value stream maps have been implemented as manufacturing cells by product or family of products that use the same facilities for continuous flow.					
12. Cellular manufacturing						

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY

Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	All facilities that transform a product or family of products from raw material stage to finished goods stage, have been laid out in sequence on the shop floor forming U's from inflow point to outflow point.					
	U cells have been optimised by reducing component and material travel distances and by placing workstations closer together					
	All work teams have been multi-skilled to move from manufacturing cell to manufacturing cell in pace with customer demand or TAKT time.					
	All sequenced operations cycle slightly faster than TAKT time					
	All operations per work station in a cell have been line balanced					
13. One-piece flow						

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY

Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	All set-ups and cycle times have been identified by operation and by product. Set-up and change over times are less than 10 minutes					
	All workstation capacities have been determined and have been assessed in terms of total workflow based on the average customer demand measured as TAKT time.					
	Product and product family flows have been simulated by workstation to determine if one item flow from one demand to the next can be achieved. Simulation is based on customer pull one make one principles. Practice runs show that one-piece flow is being achieved.					
	One-piece flow has been achieved for each product being processed through the manufacturing cells.					
14. Poka-yoke and Jidoka or mistake proofing and automatic inspection						

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY

Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	Employees have been trained in the principles and methods of error proofing within the production process. The work teams in manufacturing cells work at projects to continuously reduce production defects and identify error proofing and automatic inspection opportunities.					
	All operations have been equipped with stops should processes go wrong or with inspection devices that split good from bad products.					
	Error proofing devices and methods have been applied to both manual operations and automated process within the plant. Where practical manual processes have been improved using check fixtures, locating devices, poke-yoke methods etc. Automated machines are equipped with self-inspection technology.					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY						
Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	All manual work tasks have been equipped with mechanical checks to aid human judgment.					
	Processes are equipped with call lights signals or sounds so that workers and machines call for assistance when a problem is encountered.					
15. Kanban or pull production control						
	All employees have been trained in the principles and implementation of production material pull systems. A customer order is regarded as a pull signal and works on the principle: sell one, make one. The signal moves upstream from work station to work station, pulling work through the manufacturing cells					
	All suppliers have been trained in the principle of pull production. When signalled, suppliers delivery into Kanban areas, bins or locations.					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY						
Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	Material flow or movement in the plant is dependent on individual pull signals, as parts or materials are used at assembly or dispatched to customer					
	Downstream processes are pulling material from upstream processes such as manufacturing cells or from stock. The upstream production schedules are, therefore, dependent on downstream usage.					
	Manufacturing cells do not produce more parts than the subsequent processes requires.					
16. Heijunka or level production scheduling						
	All production products have been matched with respective manufacturing cell. Cycle times per operation are slightly less than TAKT time. Changeovers are less than 10 minutes per operation					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY						
Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	All products are scheduled according to TAKT demand and evenly loaded to manufacturing cells during the production day. Mixed scheduling is purposely done to ensure a representative supply to TAKT.					
	Heijunka scheduling boards provide visible loading in pace with customer demand. Falling behind can be clearly seen with washing line displays,					
17. Visual Management						
	Updated display boards containing job training, safety, key performance indicators, operating data, production data, quality problems and countermeasure information are readily visible throughout the plant					
	Display boards are updated frequently for each cell, work area or process. Operators get regular					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY						
Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	feedback on the teams overall production performance					
	Lines on the floor clearly distinguish work areas, paths, and material handling isles. Signs clearly identify production, inventory staging, and material drop areas.					
	Check sheets that describe and track the top defects are posted and kept up to date at each workstation.					
	Every production process has the Standard Operating Procedure posted within view of the worker performing the process.					
18. Total productive maintenance						
	All employees have been trained in total productive maintenance					
	Teams manning manufacturing cell do their own routine maintenance					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY						
Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	All machines have been made fail safe. Guarding work on the basis that if the guard is disturbed , the machine stops					
	All manufacturing call and work stations have pre - planned maintenance schedules that are strictly adhered to.					
	According to a predetermined schedule, management and workers, work with specialists to do rebuilding of workstations to be better than new utilising latest state of the art hydraulics, pneumatics, electrics and electronics.					
	Daily measurements are done by the manufacturing cell teams to frequently asses overall equipment effectiveness					
19. Standard work						
	Each production process has a detailed standard operating procedure					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY

Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	Standard Operating Procedures (SOPs) are used to train operators for each production process.					
	Employees manning manufacturing cells provide input and are involved in the process of job design and standardization.					
	Every production process has the Standard Operating Procedure posted within view of the worker performing the process.					
	Frequently repeated, non-production operations in the plant are standardised such as changeover processes, quality checks, equipment and perishable tool checks, etc.					
	Standard Operating Procedures are registered and regularly reviewed. The register show what and when improvements have been made to the process					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY						
Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
20. Teamwork and total employee involvement						
	All employees have been trained in lean thinking and all have participated through Hoshin Kanri in the strategic plan and the setting of goals, objectives and targets					
	Leaders and managers communicate with employees and teams regarding employee satisfaction within the workplace and organisational objectives at least once per month.					
	Employees are able to accurately describe the company goals and objectives and how their job contributes to the achievement of those goals and objectives					
	There is a formal process for production workers to regularly receive feedback on problems detected in downstream processes.					

APPENDIX A - LEAN ORGANISATION ASSESSMENT SURVEY

Code	Measurement item	Not observed at all	Process has commenced	Action plan/ programme to establish	Action plan/ programme implemented	Processes and procedures are fully entrenched
		0	1	2	3	4
	There is a formal process in place that provides production workers with the opportunity to work in teams to address production performance, quality, or safety issues					
	When problems in the production process occur, they are detected and investigated within 1 hour of the first occurrence by the team manning the cell.					
	Teams work closely with management to resolve issues and to take prompt corrective and preventive action.					

APPENDIX B - MEASUREMENT OF ORGANISATIONAL STRUCTURE QUESTIONNAIRE						
Code	Measurement Item	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
		1	2	3	4	5
1. Locus of Decision making						
	Our workers have the authority to correct problems when they occur.					
	our work teams have control over their job					
	our supervisors or middle managers are supportive of the decisions made by our work teams					
	we encourage workers to be creative in dealing with problems at work					
2. Nature of formalisation						
	we have written rules and procedures that show how workers can make suggestions for changes					
	We have written rules and procedures that show how workers can experiment with their job.					
	we have written rules and procedures that guide quality improvement efforts					
	we have written rules and procedures that guide creative problem-solving					
3. Number of layers in hierarchy						
	More than 6 layers between operators and CEO					

	More than 4 but less than 6					
	More than 2 but less than 4					
	Less than 2					
4. Level of horizontal integration						
	Our workers are assigned to work in cross-functional teams					
	Our workers are required to work in cross-functional teams					
	Our managers are assigned to lead various cross-functional teams					
	Our most important tasks are carried out by cross-functional teams					
5. Level of communication						
	Lots of communications are carried out among managers					
	Communications are easily carried out among workers					
	Strategic decisions are quickly passed on to relevant work group					
	Communication between different levels in hierarchy is easy					
	Workers can easily meet and communicate with upper management					
6. Cellular format						
	Managers that oversee manufacturing cells report directly to the CEO					
	Sales orders come into cells					
	Manufacturing cells coordinate directly with customers					
	Suppliers relate directly with Manufacturing cells					

APPENDIX C - ORGANISATIONAL BEHAVIOUR QUESTIONNAIRE						
Code	Measurement item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
1. Communications						
	Managers listen when we discuss how to improve things					
	Instructions are clear and to the point					
	Managers and supervisors welcome our ideas for solving issues and problems					
	We discuss the lean project daily					
	We understand lean for our business					
2. Vision, values mission and organisational goals awareness						
	The mission values and goals have been explained to us					
	Our goals are aligned with the strategic goals of the business					
	We participated in the strategic plan of our business					
3. Leadership						
	Our managers support the lean process well					
	Our CEO supports the lean process well					
4. Participation and Involvement						
	We participate in the lean process					
	We contribute to the lean process					
5. Roles and responsibilities						
	We welcome changing from process to process					

APPENDIX C - ORGANISATIONAL BEHAVIOUR QUESTIONNAIRE

Code	Measurement item	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	We have clear-cut Key performance areas and key performance indicators					
	We have clear-cut targets					
6. Knowledge						
	We know our work well					
	I can perform more than one task					
	I have been trained to perform more than one task					
7. Commitment						
	We are committed to fully implement lean					
	Lean is helping the organization					
8. Attitude						
	We are positive about our future					
	The job is interesting					
	Lean is a challenge					
9. Respect						
	We are respected for our skills					
	We are respected for our contributions					
	We are respected for our abilities					

APPENDIX D - DERIVING AT THE QUESTIONNAIRE FOR INDIVIDUAL INTERVIEWS

OPENING REMARKS

Thank you so much for agreeing to participate in this research study. The questions that we will be discussing involve the research into your lean implementation programme and the study is focussing on organisational structure and behaviour aspects relative to lean disciplines, techniques and systems. Please feel free to answer the questions in terms of your particular viewpoint or how you feel about the current state of the programme.

Note that your name will not be mentioned during and after the interview is concluded. You need not fear that confidentiality will be breached in any way. So please answer without prejudice or concern.

Some of the questions consist of a set of questions to determine influences, links and relationships. In terms of team response, please answer each of these individual questions through consensus. Please feel free to make recommendations on how you as a team see particular issues and how you would go about resolving same.

The coding of the question or question set are as follows:

MP-Main research proposition; SP- Sub research proposition; Q-Question or question set linking data to a particular research proposition; 1/2-Question or question set number.

QUESTIONS LINKING DATA TO MAIN RESEARCH PROPOSITIONS

MP1 The implementation of lean thinking will significantly influence the organisational structure and behaviour and will compel the organisation to undergo significant changes regarding structural and behavioural characteristics. These characteristics may be determined by analysing and testing the identified hypotheses of the research area per Section 4.5 and by pattern matching.

MP1Q1. Could you please explain your position in the organisation?

MP1Q2 When, in your opinion, did your organisation commence with the lean implementation process?

MP1Q3.1 This research specifically looks at the influence of lean thinking on the organisational structure and behaviour. What are your particular views concerning organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?

MP1Q3.2 This research, as explained above, specifically looks at the influence of lean thinking on the organisational structure and behaviour. What are your particular views

concerning how people in the organisation have responded, behaviourally, to the organisational changes?

MPQQ3.3 Would you be able to be more specific about organisational behaviour changes in terms of attitudes of employees?

MPQ3.4 Would you be able to be more specific about organisational behaviour changes in terms of commitment of employees?

MPQ3.5 Would you be able to be more specific about organisational behaviour changes in terms of how employees feel about the lean vision, mission, goals and objectives?

MP2 The implementation of lean thinking will significantly influence the organisational structure and behaviour as a result of the requirements of the lean disciplines and techniques that lead to: total employee involvement and employees having to work in cross-functional and work teams, leading to self-directed work teams to implement these techniques; the empowerment of employees to implement specific lean techniques that will influence the organisational leadership, structure and behaviour.

MP2Q1.1 Would you be able to elaborate on how the employees of the organisation have been involved in the lean implementation process and could you be specific regarding the particular lean techniques and / or disciplines utilised?

MP2Q1.2 Could you tell me more about the teamwork in the organisation and how it works?

MP2Q1.3 Would you say that teams operating within the organisation have been empowered in any way regarding deciding on, for example, what and when to purchase things such as materials and tools or what to manufacture and how and when to manufacture? Could you also elaborate on team roles, responsibilities and authority levels?

QUESTIONS LINKING DATA TO SUB RESEARCH PROPOSITIONS

SP1 The organisational structure will change fully to accommodate flow and pull, which will lead to organisational structures that will accommodate customer requirements in the form of manufacturing cells. This means that: lean techniques leading to flow and pull (refer to Figure 5.2) will be implemented using, at the outset, cross-functional teams to establish effective and efficient manufacturing cells; once established, self-directed work teams will follow Kaizen routines in order to optimise manufacturing cell effectiveness and efficiency; organisational functions required to accommodate the environment and to fulfil organisational operational requirements will be covered by self-directed work teams within

the established manufacturing cells; the number of hierarchical levels will drop significantly in order to accommodate a low locus of decision-making, Hoshin Kanri and to service self-directed work teams; and within the manufacturing cells, self-directed work teams will implement the lean techniques that will assist with manufacturing cell optimisation.

SP1Q1 Could you elaborate on the process, how the organisation derived its manufacturing cells in terms of the utilisation of lean disciplines and techniques? Could you also explain why this particular process was followed?

SP1Q2 Could you explain how you achieved flow and pull in your organisation in terms of the specific lean techniques utilised to achieve this?

SP1Q3 Did you utilise teamwork to implement flow and pull in your organisation? Can you expand on this?

SP1Q4 Would you say your organisation has managed to implement manufacturing cells utilising the techniques associated with flow and pull? Could you expand on this?

SP1Q5 Are your manufacturing cells manned by work teams and can you explain how this works in terms of the control systems and how the employees in the manufacturing cell function regarding, for example, their roles and responsibilities or other attributes?

SP1Q6 Since the implementation of manufacturing cells, would you say that Kaizen as a lean technique is effectively utilised? Could you expand on how it is utilised and are you able to provide an example/s?

SP1Q7 Since the implementation of manufacturing cells, would you say that the organisation has changed its organisational structure in any way to service these manufacturing cells and help them function better? Would you say that these changes have helped to improve your customer service? Do you think there is an alternative and better way to achieve even higher levels of customer service?

SP1Q8 How would you describe your current organisational structure functionally, since lean implementation? Could you explain how this organisational structure has changed since lean implementation? Is this the best organisational structure for lean operations? What would you do differently from the organisational structure to improve on the current situation?

SP1Q9 Could you describe which organisational functions or tasks are being performed by work teams within the manufacturing cells?

SP1Q10 Has your organisation undergone significant change in terms of the number of hierarchical levels of the organisation? If so how and why has it changed?

SP1Q11 What do you understand under Hoshin Kanri and policy deployment as far as your organisation is concerned? Are you able to explain how teamwork is applied to Hoshin Kanri in your organisation?

SP2 Specific organisational changes identified per proposition **SP1** will be implemented primarily to improve the competitive performance of the organisation in terms of the performance constructs identified in Section 5.2.1.3 and continuously to improve on the lean transformation process in order to: facilitate cross-functional team and eventually self-directed work teams; empower employees to implement the lean techniques; reduce functional and leadership impediments that block lean transformation; and cultivate new organisational behaviours that will lead to improved lean performance and to a creative and constructive lean culture.

SP2Q1 Could you explain why specific organisational structure changes were made in to accommodate lean implementation in terms of: teamwork; empowerment of employees; leadership changes; any other changes that are significant in terms of the lean programme?

SP2Q2 Could you explain why organisational behaviour has changed in order to accommodate lean implementation in terms of commitment, communications, respect for employees, leadership behaviour, attitudes of employees, other?

SP3.1 The organisational behaviour will, at the outset of the transformation process, be characterised by a high degree of uncertainty, speculative communications, and a lack of commitment, negative attitudes, and leaders who are reluctant to relinquish power.

SP3.1Q1 Can you recall how you felt when lean was introduced to you organisation? How did others feel?

SP3.2 After the lean process and the lean strategy have been thoroughly discussed by the leaders of the organisation and after thorough development and training has been implemented with total employee involvement, the organisational behaviours will change as follows: commitment will become more affective, with a major portion of the employee complement committing to organisational vision, mission, goals and objectives; perception of leadership will improve from disillusionment to understanding why the lean process is required; participation and involvement will improve, with employees providing creative and effective solutions to achieve flow and pull in the organisation and continuously to improve on routines and standardised work; roles and responsibilities will change, with employees displaying a willingness to take on more than their respective original functions and job descriptions; knowledge of lean process will improve to a total understanding and

appreciation of how full implementation of all the lean techniques leads to ever-increasing organisational performance; attitudes will change from passive to active participation and involvement in finding solutions rather than creating problems; respect will improve with employees being recognised and rewarded for both their individual and team contributions.

SP3.2Q1 Do you feel that the lean programme has been fully implemented? Please elaborate on how you see this in terms of organisational behaviours regarding: employee commitment; how people feel about the leadership of the organisation; participation of employees regarding lean disciplines and techniques; changes in roles and responsibilities from before lean; knowledge of lean disciplines; changes in attitudes towards lean; respect shown by management towards the employees of the organisation; and any other changes in behaviour that you specifically have witnessed?

SP4 As employees and leadership become more familiar with the lean transformation process organisational behaviour will change, with the inevitable change in organisational culture and the necessary organisational structural changes. New learning will take place in terms of the work teams implementing the lean techniques identified in process Figure 5.2.

SP4Q1 Having discussed changes in organisational structure and behaviour for your organisation, how would you describe the change in organisational culture since lean implementation?

SP5.1 The best organisational structure will lead to the optimisation of self-directed teamwork and the elimination of functional and leadership impediments to lean implementation. Self-directed work teams will be maximally empowered to fulfil a major portion of the required roles and responsibilities for the day-to-day running of the organisation.

SP5.1Q1 Do you think that your organisation has self-directed teams working at implementing and continuously improving what they do? Are you able to point out examples of this? Do you think that these teams are empowered to a substantial level in terms of decisions impacting the organisation? To what extent would you say has self-directed teams taken over the roles and responsibilities in the organisation?

SP5.2 The best organisational structure will fully accommodate a cellular format, with fully empowered self-directed work teams, well able to implement all the identified lean disciplines and techniques.

SP5.2Q1 Lean theory suggests that organisations should restructure along the value stream

of the organisation. Do you think that your organisation has achieved this? If so, how has the organisation achieved this in terms of restructuring and working in specific ways? Do you think that teamwork has played a significant role? Can you expand on this?

SP6 The organisation will have to undergo the redesign as indicated per **SP5.1** and **SP5.2** in order to accommodate effective lean implementation in terms of Hoshin Kanri and policy deployment and value stream mapping developed between leader and employees, enabling quick and effective communications that will lead to a competitive global organisation, implementing and continuously improving the lean techniques by way of empowered self-directed teamwork engaged in: problem-solving; Kaizen; distinguishing value; reducing the seven wastes; five S; TPM; visual management; standard work; and the same self-directed work teams operating manufacturing cells engaged in: Taguchi; cycle time reduction; one-piece flow; Kanban; SMED; Poka-yoke and Jidoka; and Heijunka.

SP6Q1 Has your organisation approached lean as a total strategy in terms of Hoshin Kanri and policy deployment? Could you explain how and why this was done? In hindsight, what and how will you do things differently? Can you identify the lean disciplines and techniques that have been implemented by way of teamwork in any form in your organisation?

SP6Q2 If teamwork was extensively utilised with your lean implementation programme, please explain what these teams are or were and what their respective roles and responsibilities are or were? Did these teams participate in lean implementation regarding disciplines and techniques? Specifically which lean techniques have featured prominently? Could you expand on how and why these techniques have featured prominently?

SP6Q3 Are the teams operating in manufacturing cells self-directing in terms of achieving flow and pull? Are you able to provide examples of lean techniques being applied to cellular manufacturing such as: Taguchi; cycle time reduction; one-piece flow; Kanban; SMED; Poka-yoke and Jidoka; and Heijunka?

APPENDIX E - QUESTIONNAIRE FOR INDIVIDUAL INTERVIEWS

OPENING REMARKS

Thank you so much for agreeing to participate in this research study. The questions that we will be discussing involve the research into your lean implementation programme and the study is focusing on organisational structure and behaviour aspects relative to lean disciplines, techniques and systems. Please feel free to answer the questions in terms of your particular viewpoint or how you feel about the current state of the programme.

Note that your name will not be mentioned during and after the interview is concluded. You need not fear that confidentiality will be breached in any way, so please answer without prejudice or concern.

Some of the questions consist of a set of questions to determine influences, links and relationships. In terms of team response, please answer each of these individual questions through consensus. Please feel free to make recommendations on how you as a team see particular issues and how you would go about resolving same.

The coding of the question or question set are as follows:

MP-Main research proposition; SP- Sub research proposition; Q-Question or question set linking data to a particular research proposition; 1/2-Question or question set number.

QUESTIONS LINKING DATA TO THE RESEARCH PROPOSITIONS

MP1Q1 Could you please explain your position in the organisation?

MP1Q2 When, in your opinion, did your organisation commence with the lean implementation process?

MP1Q3.1 This research specifically looks at the influence of lean thinking on the organisational structure and behaviour. What are your particular views concerning organisational restructuring or the changes that the organisation has undergone, since the implementation of lean thinking?

MP1Q3.2 This research, as explained above, specifically looks at the influence of lean thinking on the organisational structure and behaviour. What are your particular views concerning how people in the organisation have responded, behaviourally, to the organisational changes?

MPQ3.3 Would you be able to be more specific about organisational behaviour changes in terms of attitudes of employees?

MPQ3.4 Would you be able to be more specific about organisational behaviour changes in terms of commitment of employees?

MPQ3.5 Would you be able to be more specific about organisational behaviour changes in terms of how employees feel about the lean vision, mission, goals and objectives?

MP2Q1.1 Would you be able to elaborate on how the employees of the organisation have been involved in the lean implementation process and could you be specific regarding the particular lean techniques and / or disciplines utilised?

MP2Q1.2 Could you tell me more about the teamwork in the organisation and how it operates?

MP2Q1.3 Would you say that teams operating within the organisation have been empowered in any way regarding deciding on, for example, what and when to purchase things such as materials and tools or what to manufacture and how and when to manufacture? Could you also elaborate on team roles, responsibilities and authority levels?

SP1Q1 Could you elaborate on the process, how the organisation derived its manufacturing cells in terms of the utilisation of lean disciplines and techniques? Could you also explain why this particular process was followed?

SP1Q2 Could you explain how you achieved flow and pull in your organisation in terms of the specific lean techniques utilised to achieve this?

SP1Q3 Did you utilise teamwork to implement flow and pull in your organisation? Can you expand on this?

SP1Q4 Would you say your organisation has managed to implement manufacturing cells utilising the techniques associated with flow and pull? Could you expand on this?

SP1Q5 Are your manufacturing cells manned by work teams and can you explain how this works in terms of the control systems and how the employees in the manufacturing cells function regarding, for example, their roles and responsibilities or other attributes?

SP1Q6 Since the implementation of manufacturing cells would you say that Kaizen as a lean technique is effectively utilised? Could you expand on how it is being utilised and are you able to provide an example/s?

SP1Q7 Since the implementation of manufacturing cells would you say that the organisation has changed its organisational structure in any way to service these

manufacturing cells and help them function better? Would you say that these changes have helped to improve your customer service? Do you think there is an alternative and better way to achieve even higher levels of customer service?

SP1Q8 How would you describe your current organisational structure functionally since lean implementation? Could you explain how this organisational structure has changed since lean implementation? Is this the best organisational structure for lean operations? What would you do differently from the organisational structure to improve on the current situation?

SP1Q9 Could you describe which organisational functions or tasks are performed by work teams within the manufacturing cells?

SP1Q10 Has your organisation undergone significant change in terms of the number of hierarchical levels of the organisation? If so, how has it changed?

SP1Q11 What do you understand about Hoshin Kanri and policy deployment as far as your organisation is concerned? Are you able to explain how teamwork is applied to Hoshin Kanri in your organisation?

SP2Q1 Could you explain why specific organisational structure changes were made to accommodate lean implementation in terms of: teamwork; empowerment of employees; leadership changes; any other changes that are significant in terms of the lean programme?

SP2Q2 Could you explain why organisational behaviour has changed to accommodate lean implementation in terms of commitment, communications, respect for employees, leadership behaviour, attitudes of employees, other?

SP3.1Q1 Can you recall how you felt when lean was introduced to your organisation? How did others feel?

SP3.2 Q1 Do you feel that the lean programme has been fully implemented? Please elaborate how you see this in terms of organisational behaviours regarding; employee commitment; how people feel about the leadership of the organisation; participation of employees regarding lean disciplines and techniques; changes in roles and responsibilities from before lean; knowledge of lean disciplines; changes in attitudes towards lean; respect shown by management towards the employees of the organisation; and any other changes in behaviour that you specifically have witnessed?

SP4Q1 Having discussed changes in organisational structure and behaviour for your organisation, how would you describe the change in organisational culture since lean implementation?

SP5.1Q1 Do you think that your organisation has self-directed teams working at implementing and continuously improving what they do? Are you able to point out examples of this? Do you think that these teams are empowered to a substantial level in terms of decisions impacting the organisation? To what extent would you say has self-directed teams taken over the roles and responsibilities in the organisation?

SP5.2Q1 Lean theory suggests that organisations should restructure along the value stream of the organisation. Do you think that your organisation has achieved this? If so, how has the organisation achieved this in terms of restructuring and working in specific ways? Do you think that teamwork has played a significant role? Can you expand on this?

SP6Q1 Has your organisation approached lean as a total strategy in terms of Hoshin Kanri and policy deployment? Could you explain how and why this was done? In hindsight what and how will you do things differently? Can you identify the lean disciplines and techniques that have been implemented by way of teamwork in any form in your organisation?

SP6Q2 If teamwork was extensively utilised with your lean implementation programme, please explain what these teams are or were and what their respective roles and responsibilities are or were? Did these teams participate in lean implementation regarding disciplines and techniques? Specifically which lean techniques have featured prominently? Could you expand on how and why these techniques have featured prominently?

SP6Q3 Are the teams operating in manufacturing cells self-directing in terms of achieving flow and pull? Are you able to provide examples of lean techniques being applied to cellular manufacturing such as: Taguchi; cycle time reduction; one-piece flow; Kanban; SMED; Poka-yoke and Jidoka; and Heijunka?

APPENDIX F - DERIVING AT THE QUESTIONNAIRE FOR FOCUS GROUPS OR TEAMS

OPENING REMARKS

Thank you so much for agreeing to participate in this research study. The questions that we will be discussing involve the research into your lean implementation programme and the study is focussing on organisational structure and behaviour aspects relative to lean disciplines, techniques and systems. Please feel free to answer the questions in terms of your particular viewpoint or how you feel about the current state of the programme.

Note that no names will not be mentioned after the interview is concluded. You need not fear that confidentiality will be breached in any way. So please answer without prejudice or concern.

Some of the questions consist of a set of questions to determine influences, links and relationships. In terms of team response, please answer each of these individual questions through consensus. Please feel free to make recommendations on how you as a team see particular issues and how you would go about resolving same.

The coding of the question or question set are as follows:

MP-Main research proposition; SP- Sub research proposition; T-Team questionnaire meaning this questionnaire; Q-Question or question set linking data to a particular research proposition; 1/2-Question or question set number.

QUESTIONS LINKING DATA TO MAIN RESEARCH PROPOSITIONS

MP1 The implementation of lean thinking will significantly influence the organisational structure and behaviour and will compel the organisation to undergo significant changes regarding structural and behavioural characteristics. These characteristics may be determined by analysing and testing the identified hypotheses of the research area per Section 4.5 and by pattern matching.

MP1TQ1 Please explain what the roles and responsibilities of you group or team are in terms of the lean thinking programme, strategy or project? Would you say that the work you have done has impacted the organisation significantly? Can you be specific about this by quoting examples or by providing storyboard history in terms of a before and after lean projects? Could you explain how the organisation has changed due to your efforts and teamwork in terms of organisational structure? Please be as specific as possible by focusing on, for example: the functional changes; the change in the number of organisational levels; horizontal and vertical integration and communications; the locus of

decision-making; and whether team structures are significant in terms of cellular manufacturing. Please include any other observations not covered in the examples.

MP1TQ2 Could you explain how the organisation has changed due to your efforts and teamwork in terms of organisational behaviour? Please be as specific as possible by focusing on for example: employees' awareness of lean; how employees feel about the organisational leadership; the commitment of employees; the attitudes towards lean; respect and any other observation you as a team have noticed with the organisational changes occurring.

MP2 The implementation of lean thinking will significantly influence the organisational structure and behaviour as a result of the requirements of the lean disciplines and techniques that lead to: total employee involvement and employees having to work in cross-functional and work teams, leading to self-directed work teams to implement these techniques; the empowerment of employees to implement specific lean techniques that will influence the organisational leadership, structure and behaviour.

MP2TQ1 As a team, do you feel that all the employees are involved in lean? Would you be able to explain how they are involved with lean techniques and disciplines working as individuals or, for example cross-functional teams or self-directing terms? How have these particular changes influenced the organisational structure? Have you as a team, been given specific authorisation to implement your own ideas, improvements, and/ or lean projects? Could you explain by example how and why this has occurred? Has teamwork changed the organisational structure? If so, are you able to make a sketch of how the structure has changed? Are you able to link these changes to specific team empowerment and lean disciplines and techniques? Are you able to elaborate how and why these changes are linked to lean disciplines and techniques?

QUESTIONS LINKING DATA TO SUB RESEARCH PROPOSITIONS

SP1 The organisational structure will change fully to accommodate flow and pull, which will lead to organisational structures that will accommodate customer requirements in the form of manufacturing cells. This means that: lean techniques leading to flow and pull (refer to Figure 5.2) will be implemented using, at the outset, cross-functional teams to establish effective and efficient manufacturing cells; once established, self-directed work teams will follow Kaizen routines in order to optimise manufacturing cell effectiveness and efficiency; organisational functions required to accommodate the environment and to fulfil organisational operational requirements will be covered by self-directed work teams within the established manufacturing cells; the number of hierarchical levels will drop significantly

in order to accommodate a low locus of decision-making, Hoshin Kanri and to service self-directed work teams; and within the manufacturing cells, self-directed work teams will implement the lean techniques that will assist with manufacturing cell optimisation.

SP1TQ1 As a team are you able to demonstrate Kaizen, flow and pull lean techniques implementation? Has this resulted in cellular manufacturing? With these lean implementations, how and why has the organisational structure changed (please provide sketches of changes)? To what extent are teams working independently in terms of empowerment? Which organisational functions are now covered by teams working in the manufacturing cells? How are the manufacturing cells serviced by organisational functions?

SP2 Specific organisational changes identified per proposition **SP1** will be implemented primarily to improve the competitive performance of the organisation in terms of the performance constructs identified in Section 5.2.1.3 and continuously to improve on the lean transformation process in order to: facilitate cross-functional team and eventually self-directed work teams; empower employees to implement the lean techniques; reduce functional and leadership impediments that block lean transformation; and cultivate new organisational behaviours that will lead to improved lean performance and to a creative and constructive lean culture.

SP2TQ1 Based on your participation in teamwork, are you able to comment whether the reasons for organisational changes have occurred due to cross-functional and self-directed teamwork implementing lean disciplines and techniques? To what extent has empowerment of teams occurred and how has this changed the leadership of the organisation? Would you comment on whether this is the reason for the changes in leadership? Has the teamwork replaced functions performed by individuals in the organisation? Has this helped the lean implementation? Has this helped to improve organisational performance? To what extent has organisational performance improved specifically in terms of PBIT, Inventory turns, reduced rejects, sales, cost reductions or other since lean implementation?

SP3.1 The organisational behaviour will, at the outset of the transformation process, be characterised by a high degree of uncertainty, speculative communications, and a lack of commitment, negative attitudes, and leaders who are reluctant to relinquish power.

SP3.1TQ1 As a team, please comment on the organisational behaviour experienced when you commenced with the lean transformation process? Can you comment on leadership and employee behaviours with the announcement that lean are going to be introduced to

your organisation? Examples of organisational behaviour are commitment, attitudes and perceptions of lean as a means to transform the organisation. Please refer to other behaviours observed or experienced when the lean transformation process commenced.

SP3.2 After the lean process and the lean strategy have been thoroughly discussed by the leaders of the organisation and after thorough development and training has been implemented with total employee involvement, the organisational behaviours will change as follows: commitment will become more affective, with a major portion of the employee complement committing to organisational vision, mission, goals and objectives; perception of leadership will improve from disillusionment to understanding why the lean process is required; participation and involvement will improve, with employees providing creative and effective solutions to achieve flow and pull in the organisation and continuously to improve on routines and standardised work; roles and responsibilities will change, with employees displaying a willingness to take on more than their respective original functions and job descriptions; knowledge of lean process will improve to a total understanding and appreciation of how full implementation of all the lean techniques leads to ever-increasing organisational performance; attitudes will change from passive to active participation and involvement in finding solutions rather than creating problems; respect will improve with employees being recognised and rewarded for both their individual and team contributions.

SP3.2TQ1 Given the current state of your lean implementation programme, do you as a team feel that attitudes, commitment, knowledge of lean, respect for employees, participation or other behaviours have improved in the organisation? Please be specific on how organisational behaviours have changed regarding lean implementation.

SP4 As employees and leadership become more familiar with the lean transformation process organisational behaviour will change, with the inevitable change in organisational culture and the necessary organisational structural changes. New learning will take place in terms of the work teams implementing the lean techniques identified in process Figure 5.2.

SP4TQ1 Organisational Culture is sometimes defined as the way we do things around here. Do you as a team support this viewpoint? If so, have your organisational culture changed since lean implementation? Please elaborate on how it has changed.

SP5.1 The best organisational structure will lead to the optimisation of self-directed teamwork and the elimination of functional and leadership impediments to lean implementation. Self-directed work teams will be maximally empowered to fulfil a major

portion of the required roles and responsibilities for the day-to-day running of the organisation.

SP5.2 The best organisational structure will fully accommodate a cellular format, with fully empowered self-directed work teams, well able to implement all the identified lean disciplines and techniques.

SP6 The organisation will have to undergo the redesign as indicated per **SP5.1** and **SP5.2** in order to accommodate effective lean implementation in terms of Hoshin Kanri and policy deployment and value stream mapping developed between leader and employees, enabling quick and effective communications that will lead to a competitive global organisation, implementing and continuously improving the lean techniques by way of empowered self-directed teamwork engaged in: problem-solving; Kaizen; distinguishing value; reducing the seven wastes; five S; TPM; visual management; standard work; and the same self-directed work teams operating manufacturing cells engaged in: Taguchi; cycle time reduction; one-piece flow; Kanban; SMED; Poka-yoke and Jidoka; and Heijunka.

SP5.1/2/6TQ1 How would you as a team design your organisational structure in order to obtain maximum benefits from lean and to make your organisation the best in field relative to your competitors? Please provide a sketch for this particular organisational structure. Please comment on the implementation and utilisation of the lean techniques and organisational functions and roles and responsibilities.

APPENDIX G - QUESTIONNAIRE FOR FOCUS GROUPS OR TEAMS

OPENING REMARKS

Thank you so much for agreeing to participate in this research study. The questions that we will be discussing involve the research into your lean implementation programme and the study is focusing on organisational structure and behaviour aspects relative to lean disciplines, techniques and systems. Please feel free to answer the questions in terms of your particular viewpoint or how you feel about the current state of the programme.

Note that no names will be mentioned after the interview is concluded. You need not fear that confidentiality will be breached in any way. So please answer without prejudice or concern.

Some of the questions consist of a set of questions in order to determine influences, links and relationships. In terms of team response, please answer each of these individual questions through consensus. Please feel free to make recommendations on how you as a team see particular issues and how you would go about resolving same.

The coding of the question or question set are as follows:

MP-Main research proposition; SP- Sub research proposition; T-Team questionnaire, meaning this questionnaire; Q-Question or question set linking data to a particular research proposition; 1/2-Question or question set number.

QUESTIONS LINKING DATA RESEARCH PROPOSITIONS

MP1TQ1 Please explain what the roles and responsibilities of you group or team are in terms of the lean thinking programme, strategy or project? Would you say that the work you have done has impacted the organisation significantly? Can you be specific about this by quoting examples or by providing storyboard history in terms of a before and after lean projects? Could you explain how the organisation has changed due to your efforts and teamwork in terms of organisational structure? Please be as specific as possible by focusing on, for example: the functional changes; the change in the number of organisational levels; horizontal and vertical integration and communications; the locus of decision-making; and whether team structures are significant in terms of cellular manufacturing. Please include any other observations not covered in the examples.

MP1TQ2 Could you explain how the organisation has changed due to your efforts and teamwork in terms of organisational behaviour? Please be as specific as possible by focusing for example: employees' awareness of lean; how employees feel about the

organisational leadership; the commitment of employees; the attitudes towards lean; respect and any other observation you as a team have noticed with the organisational changes occurring.

MP2TQ1 As a team, do you feel that all the employees are involved in lean? Would you be able to explain how they are involved with lean techniques and disciplines working as individuals, or for example, cross-functional teams or self-directing teams? How have these particular changes influenced the organisational structure? Have you as a team, been given specific authorisation to implement your own ideas, improvements, and/ or lean projects? Could you explain by example how and why this has occurred? Has teamwork changed the organisational structure? If so, are you able to make a sketch of how the structure has changed? Are you able to link these changes to specific team empowerment and lean disciplines and techniques? Are you able to elaborate how and why these changes are linked to lean disciplines and techniques?

SP1TQ1 As a team are you able to demonstrate Kaizen, flow and pull lean techniques implementation? Has this resulted in cellular manufacturing? With these lean implementations, how and why has the organisational structure changed (please provide sketches of changes)? To what extent are teams working independently in terms of empowerment? Which organisational functions are now covered by teams working in the manufacturing cells? How are the manufacturing cells serviced by organisational functions?

SP2TQ1 Based on your participation in teamwork, are you able to comment on whether the reasons for organisational changes have occurred due to cross-functional and self-directed teamwork implementing lean disciplines and techniques? To what extent has empowerment of teams occurred and how has this changed the leadership of the organisation? Would you comment on whether this is the reason for the changes in leadership? Has the teamwork replaced functions performed by individuals in the organisation? Has this helped the lean implementation? Has this helped to improve organisational performance? To what extent has organisational performance improved specifically in terms of PBIT, inventory turns, reduced rejects, sales, cost reductions or other since lean implementation?

SP3.1TQ1 As a team, please comment on the organisational behaviour experienced when you commenced with the lean transformation process? Can you comment on leadership and employee behaviours with this announcement that lean are going to be introduced to your organisation? Examples of organisational behaviour are commitment, attitudes and

perceptions of lean as a means to transform the organisation. Please refer to other behaviours observed or experienced when the lean transformation process commenced.

SP3.2TQ1 Given the current state of your lean implementation programme, do you as a team feel that attitudes, commitment, knowledge of lean, respect for employees, participation or other behaviours have improved in the organisation? Please be specific on how organisational behaviours have changed regarding lean implementation.

SP4TQ1 Organisational Culture is sometimes defined as the way we do things around here. Do you as a team support this viewpoint? If so, has your organisational culture changed since lean implementation? Please elaborate on how it has changed.

SP5.1/2/6TQ1 How would you as a team design your organisational structure to obtain maximum benefits from lean and to make your organisation the best in field relative to your competitors? Please provide a sketch for this particular organisational structure. Please comment on the implementation and utilisation of the lean techniques and organisational functions and roles and responsibilities.

**APPENDIX H - COMPLETED QUESTIONNAIRE FOR THE CASE STUDY RESEARCH FOR CONDUCTING INTERVIEWS WITH FOCUS
GROUPS OR TEAMS PER APPENDIX G WITH F01 ORGANISATION**

OPENING REMARKS

Thank you so much for agreeing to participate in this research study. The questions that we will be discussing involve the research into your lean implementation programme and the study is focusing on organisational structure and behaviour aspects relative to lean disciplines, techniques and systems. Please feel free to answer the questions in terms of your particular viewpoint or how you feel about the current state of the programme.

Note that no names will be mentioned after the interview is concluded. You need not fear that confidentiality will be breached in any way. So please answer without prejudice or concern.

Some of the questions consist of a set of questions in order to determine influences, links and relationships. In terms of team response, please answer each of these individual questions through consensus. Please feel free to make recommendations on how you as a team see particular issues and how you would go about resolving same.

The coding of the question or question set are as follows:

MP-Main research proposition; SP- Sub research proposition; T-Team questionnaire, meaning this questionnaire;; Q-Question or question set linking data to a particular research proposition; 1/2-Question or question set number.

QUESTIONS LINKING DATA RESEARCH PROPOSITIONS

Date	10	04	2014
Organisation number	F	0	1

Proposition and question link	Question-Please note some questions are linked together in terms of the attribute being researched,	Please answer per each question and by cell below:
MP1TQ1	Can you please explain what the roles and responsibilities of your group or team are in terms of the lean thinking programme, strategy or project?	Please refer the organogram of the organisation and the individual interviews the researcher had conducted with our employees.
	Would you say that the work you have done as a team, has impacted the organisation significantly and	We are implementing lean in the manufacturing area under the leadership of the plant manager and with the support of the corporate Kaizen group.
	Can you be specific about this by quoting examples or by providing storyboard history in terms of a before and after lean projects?	There are empirical evidence of Kaizen projects that were launched with the corporate Kaizen team for example, the distribution Kaizen and the product group Kaizen.

Proposition and question link	Question-Please note some questions are linked together in terms of the attribute being researched,	Please answer per each question and by cell below:
	Could you explain how the organisation has changed due to your efforts and teamwork in terms of organisational structure; and	The organisation has not changed significantly over the past two years. We have had positional changes such as the managing director, the plant manager and the engineering manager and export manager.
	can you please be as specific as possible by focusing on, for example:	
	the functional changes;	No functional changes other than the structural change of the purchasing department reporting to the industrial engineering manager.
	the change in the number of organisational levels;	No changes
	horizontal and vertical integration and	The organisation has a deep structure, but in South Africa cross and vertical integration is fairly well developed due to the open door policy and the approachability demonstrated by various senior managers.
	communications;	We have free flowing communications between the different levels both horizontally and cross-functionally.
	the locus of decision-making; and	The locus of decision making rest with the management team. We have given authorisation for the purchasing of consumables up to supervisory level. Programme setters are allowed to make improvements which is later incorporated into our standard operating procedures.

Proposition and question link	Question-Please note some questions are linked together in terms of the attribute being researched,	Please answer per each question and by cell below:
	Whether team structures are significant in terms of cellular manufacturing.	This process has commenced but more training and development needs to be done.
	Please Include Any other observations not covered in the examples.	Not covered
MP1TQ2	Could you explain how the organisation has changed due to your efforts and teamwork in terms of organisational behaviour?	The organisation has not changed structurally. There has been some positional changes. Behaviourally, people are accepting the changes in a more positive way. Teamwork is mainly at departmental level.
	Please be as specific as possible, regarding how you as a team have noticed organisational changes in terms of for example:	
	employees' awareness of lean;	Lean awareness: Awareness mainly in manufacturing, up to supervisory levels. Senior management has a good understanding but further training and development is planned with the lean roll out plan.
	how employees feel about the organisational leadership;	Organisational leadership: Research has indicated that employees have confidence in the leadership of the organisation. Leaders are well respected and employees feel respected by the leadership.
	Employee commitment:	Employees are committed on a continuance basis but there are pockets where employees have contributed creatively to the process.

proposition and question link	Question-Please note some questions are linked together in terms of the attribute being researched,	Please answer per each question and by cell below:		
	Any other changes observed.	Other changes: Not covered.		
MP2TQ1	As a team, do you feel that all the employees are involved in lean?	Employees are involved in lean in manufacturing up to supervisory level.		
	Would you be able to explain how they are involved with lean techniques and disciplines working as individuals, or for example, cross-functional teams or self-directing teams and	Working alone	Cross-functional-team	Self-directed-team
		At the moment working as individuals. Departmental teamwork is encouraged.	Senior management is a cross-functional team.	No example as yet-working towards this.
	How have these particular changes influenced the organisational structure?	The organisation has some improvements in visual management, productivity and service to customer. Housekeeping has improved remarkably and Kaizen initiatives have improved the flow of work.		
	Have you as a team, been given specific authorisation to implement your own ideas, improvements, and/or lean projects and	We have total authority in terms of the Southern African organisation as the senior management group.		
	Could you explain by example how and why this has occurred?	How did authorisation occur?	Why did authorisation occur?	
		Na	Na	

proposition and question link	Question-Please note some questions are linked together in terms of the attribute being researched,	Please answer per each question and by cell below:		
	Has teamwork changed the organisational structure and If so,	Would say not, as all initiatives are currently with the management team.		
	Are you able to make a sketch of how the structure has changed?	Changes to organisational structure due to teamwork: No changes since eighteen months ago as explained.		
	Are you able to link these changes to Specific Team Empowerment and lean disciplines and techniques?	Team empowerment	Lean disciplines	Lean techniques
		No	No	Mainly Kaizens, visual management, Value stream mapping, five s and problem-solving. Some Focus on improving flow in the organisation with work cells.
	Are you able to elaborate on how and why these changes are linked to lean disciplines and techniques?	How linked to lean disciplines and techniques		Why linked to lean disciplines and techniques
		Na		Na
SP1TQ1	As a team are you able to demonstrate Kaizen, flow and pull lean techniques implementation?	We have flow examples but not pull due to the concerns we have regarding Kanban and our current suppliers.		

Proposition and question link	Question-Please note some questions are linked together in terms of the attribute being researched,	Please answer per each question and by cell below:	
	Has this resulted in cellular manufacturing?	We have an assembly cell and our rubber and chrome plants are operating as cells but supplier issues need to be resolved before proper flow and pull can be established.	
	With these flow and pull lean implementations, how and why has the organisational structure changed (please provide sketches of changes)?	How has the organisation changed?	Why has the organisation changed?
		No changes have occurred.	No changes have occurred.
SP1TQ2	To what extent are teams working Independently In Terms of empowerment?	No examples of this at current time.	
	Which organisational functions are now covered by teams working in the manufacturing cells?	None	
	How are the manufacturing cells Served By organisational functions?	Planning determine the workload.	
SP2TQ1	Based on your participation in teamwork, are you able to comment on whether the reasons for organisational changes have occurred due to:		
	cross-functional and	Cross- functional-teamwork: Not really	

proposition and question link	Question-Please note some questions are linked together in terms of the attribute being researched,	Please answer per each question and by cell below:					
	self-directed teamwork implementing lean disciplines and techniques	Self-directed-teamwork: Not at current time.					
	To what extent has empowerment of teams occurred and	Empowerment: None, other than mentioned.					
	How has this changed the leadership of the organisation?	Leadership changes: As discussed mainly positional changes and some changes regarding branch managers.					
	Has the teamwork replaced functions performed by individuals in the organisation and	Functions being performed by teams: No					
	Has this helped the lean implementation?	Not applicable.					
SP2TQ2	To what extent has organisational performance improved specifically in terms of PBIT, inventory turns, reduced rejects, sales, cost reductions or other since lean implementation?	PBIT	Inventory turns	rejects	sales	costs	other
SP3.1TQ1	As a team, please comment on the organisational behaviour experienced when you commenced with the lean transformation process. Can you comment specifically on leadership and employee behaviours with this announcement						

Proposition and question link	Question-Please note some questions are linked together in terms of the attribute being researched,	Please answer per each question and by cell below:	
		that lean is going to be introduced to your organisation? Examples of organisational behaviour are commitment, attitudes and perceptions of lean as a means to transform the organisation. Please refer to other behaviours observed or experienced when the lean transformation process commenced.	
		Behaviours	Employee behaviours
		Commitment behaviours	Research showed that people were Generally not so apprehensive about lean changes. Apprehension came from concerns how things will progress with the new management appointments that were made.
		Attitudinal behaviours:	Attitudes of employees were specifically positive as can be Determined from examples of responses from individuals
		Leadership behaviours	
		New leaders were found to be very approachable and people felt recognised and respected. Open door communication was welcomed by most of the employees.	
		Attitudes of employees towards leadership were specifically positive as can be determined from Individual examples. Some examples show concerns but Management has through negotiation and regular meetings with shop stewards, been able to improve on relationships.	

Proposition and question link	Question-Please note some questions are linked together in terms of the attribute being researched,	Please answer per each question and by cell below:	
	Perceptions of lean:	Although not understood at first, there is increasing appreciation from employees for the lean initiatives.	The senior leadership have a good grasp of lean disciplines and techniques. How these disciplines and techniques are to be rolled out is being determined in a roll out plan
	Other behaviours	Not discussed.	Not discussed
SP3.2TQ1	Please answer specifically, given the current state of your lean implementation programme, whether you as a team feel that organisational behaviours have improved or changed in any way in the organisation regarding:		
	attitudes;	We feel attitudes have improved with efforts to open up to feedback from employees, Specifically we are referring to our meetings with NUMSA, green areas in the workshops and our quarterly tank talk with the total organisation.	
	commitment;	Commitment has improved with lean implementation, but more work needs to be done to cultivate affective commitment from employees to participate more in flow and pull projects.	
	respect for employees;	We have always respected our employees and our leadership style is participative. We as a team listen when we are approached and we try and keep an open mind at all times.	
	knowledge of lean;	Our knowledge of lean is based on some training we have had from our corporate Kaizen people. At current time most of our lean knowledge is	

Proposition and question link	Question-Please note some questions are linked together in terms of the attribute being researched,	Please answer per each question and by cell below:
		with manufacturing and to some extent our engineering team. With our lean roll out plan we will include all employees in lean training.
	participation; or	Most of the participation is from all managers up to supervisory level. Pockets of participation is starting to occur with workers and staff. We also have a suggestion scheme to entice workers to actively participate in our Kaizen programme.
	Other behaviours?	Not discussed
SP4TQ1	Culture is sometimes defined as the way we do things around here.	
	Do you as a team support this viewpoint?	We do
	Has your organisational culture changed since lean implementation?	Our culture has become a more participative culture. We have a strong culture of survival, adaptation and growth.
	Please elaborate on how it has changed.	
SP5.1/.2/6TQ1	How would you as a team design your organisational structure to obtain maximum benefits from lean and to make your organisation the best in field relative to your competitors?	Considerations and views: Difficult to answer at this stage, part of our lean, three year roll out plan. We expect that as progress is made we will have to establish a lean structure within the current matrix structure. We foresee changes to planning distribution and dispatch, but still too early to finalise.

<p>Proposition and question link</p>	<p>Question-Please note some questions are linked together in terms of the attribute being researched,</p>	<p>Please answer per each question and by cell below:</p>
	<p>Please provide a sketch for this particular organisational structure.</p>	<p>Sketch of best organisational structure in your opinion: Not considered at this time.</p>
	<p>Please comment on the implementation and utilisation of the lean techniques and</p>	<p>Comments regarding sketch above: Not considered at this time.</p>
	<p>Organisational functions and roles</p>	<p>Clearly indicate the functions roles and responsibilities:</p>

APPENDIX I - RESPONSES RECEIVED FROM INDIVIDUALS' PARTICIPATION IN THE RESEARCH-ORGANISATION F01

(Appendix E changed to line question format)

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1.1	Since the takeover 2009 to 2010, the functional structure changed to a matrix structure. Positional changes have since occurred involving the managing director, the plant manager, the engineering manager and the export manager. A service centre manager was appointed to improve on customer service.	LV01LL, PC01L	PG01LF	MM01S, PN01LF	
3.1.2	There are no changes to the organisational structure over the last eighteen months. The positional changes are the managing director, the plant manager, the project manager, the distribution manager and the engineering manager. The Industrial engineering manager has temporarily taken over the purchasing function. The master scheduler is a promotion when the previous person left.	BK01S, DF01S,	AS01M, SR01LF, JH01L	PP01M, AM01M, EV01S, TN01S, ME01L, BS01L, AW01L, SB01SL	GM01S, SN01L, MV01M, AM01SF
3.1.3	Positional changes at the top. Not aware of any other structural changes. Purchasing department has been moved to industrial engineering.			JL01S,JC01L, ZB01S, HM01S, PM02S, MT01M	SB01S, PM01L

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1.4	There are no changes to the organisational structure over the last eighteen months. The positional changes are the managing director, the plant manager, the project manager, the distribution manager and the engineering manager. The Industrial engineering manager has temporarily taken over the purchasing function. New recruits are appointed if they have lean experience.		SM01S	MT01M	
3.1.5	Positional changes at the top. Not aware of any other structural changes. Purchasing department has been moved to industrial engineering. Have appointed a night shift supervisor.				MJ01M
3.1.6	There are no changes to the organisational structure over the last eighteen months. The positional changes are the managing director, the plant manager, the project manager, the distribution manager and the engineering manager. The Industrial engineering manager has temporarily taken over the purchasing function. The master scheduler.....				
3.1.7	There are no changes to the organisational structure over the last eighteen months. The positional changes		MM01L		

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	are the managing director, the plant manager, the project manager, the distribution manager and the engineering manager. The Industrial engineering manager has temporarily taken over the purchasing function. The master scheduler is a promotion when the previous person left.				
3.1.8	Positional changes in management. Export manager replaced.				AS01LE
3.1.9	Positional changes plant manager, managing director, export manager. Sales manager. Additional branches. Some new capital investments, acquiring a core making machine.		RB01MF		
3.1.10	No comment.				
3.1.11	Alignment but no real restructuring. Positional changes occurred.			GS01SA	
3.1.12	Positional changes and the Kaizen programme.		BD01SS		
3.1.13	Company is going in the right direction. Improvement over the last four years.				CM01L, TR01S, CH01LS, EM01L
3.1.14	No knowledge too new with the organisation.			DT01SQ	
3.1.15	Drastic positional changes at the top.	NF01LI			

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1.16	Positional changes and planning department now cross-functionally integrated with export sales. Symbiotic relationship with engineering.	RM01SE			
3.1.17	Positional changes, no structural changes.	CJ01SEN, JC01LS	DM01LF, JH01LS, RL01MEN, DK01SEN, PJ01SEN, JV01SEN	DB01SEN	PM01SS
3.1.18	Positional changes plant manager. Managing director, national sales manager a promotion, three area managers appointed, New export manager. Establishing branch in another remote Southern African country.		MV01MS		
3.1.19	Matrix structure is a paradigm shift because you are given responsibility without authority.	AJ01LA			
3.1.20	Do not know,				JM01SEN
3.1.21	Not Aware of lean process				AT01M, MN01ST, AG01L, NG01SS,

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.2.1	Difficult to assimilate, people sees it as an issue. The matrix de-leans the organisation.	LV01LL			AT01M, MN01ST, AG01L, NG01SS,
3.2.2	High level of resistance to the changes. People see changes as being detrimental to their future	BK01S	PG01LF	AM01M, EV01S, GS01SA, DB01SEN	MV01M, MJ01M
3.2.3	Positive about the lean programme. Example of flow, quality, response time and planning improvements.		SM01S, JH01LS	JL01S, HM01S, BS01L, AW01L	GM01S, AM01SF, TR01S, PM01SS
3.2.4	Discipline has brought changes, safety rules dictate. For example: Drinking tea on the shop floor allowed before, but no more.				SB01S
3.2.5	Resistance at first. Now more acceptance with involvement.			ZB01S, TN01S	CM01L
3.2.6	Senior management want to go with it. Older managers still resisting. Middle management has a good understanding. Operational management has limited knowledge. Workers resist changes and want to be rewarded to accommodate changes.	DF01S, RM01SE	SD01LF, RL01MEN		
3.2.7	Fear and apprehension initially due to senior management changes. People were uncertain. Workers against the changes.		AS01M, RB01MF	PP01M, SB01LS	2EM01L

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.2.8	Not much. Do not know. No comment		MM01S, GA01LS, DS01SQ		
3.2.9	Like hitting a brick wall. We are not told where we are, where we are going and how we are going to get there.			JC01L	
3.2.10	Workers were not consulted on changes. We were just informed.			DB01SEN	SN01L
3.2.11	Mixed feeling most people accept the changes.			MT01M	PM02S, CH01LS
3.2.12	Negative response to changes. Old school/ new school politics. Service delivery and issue. German managing director made some changes.	PC01L			
3.2.13	Initially insecure but changes worked out well.				AS01LE
3.2.14	Sceptical, but now assured.			PN01LF	
3.2.15	Positive responses by most people but some resistance from older long service people.			BD01SS	
3.2.16	Middle management positive and highly motivated as are the supervisors.		JH01L		
3.2.17	Culture shock for the organisation.	NF01LI			
3.2.18	Welcome changes.		DV01LF		EM01L

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.2.19	Matrix structure an issue in terms of achieving cooperation and teamwork.	CJ01SEN			
3.2.20	Unions dislike changes. Workers' performance are measured individually, evokes a negative reaction.	JC01LS			
3.2.21	Negative climate and last five months, more so due to work pressure.				AK01SE
3.2.22	Senior management positive. Middle management optimistic but negative. Workers are negative about the changes		DK01SEN		
3.2.23	Seen as part of the continuous improvement programme. Most departments were accommodating.		PJ01SEN		
3.2.24	Management is committed to the improvement process. Production is stable.		JV01SEN		
3.2.25	Most people are negative. Lack of teamwork Has deteriorated last six months. Uncertainty is profound.		MV01MS		
3.2.26	Wait and see approach by the organisation.	AJ01LA			
3.2.27	New to the organisation. Expected more training.				JM01SEN

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.3.1	Senior management are positive and are prioritising what they have to do within all the changes to the organisation. Middle management have accepted the changes and are working to achieve the results. Supervisors have positively responded to the changes. Workers are a closed book.	LV01LL			SN01L
3.3.2	Negative attitudes by the workers due to seeing all changes as detrimental for their future.	BK01S,	AS01M, RB01MF, PG01LF, RL01MEN	AM01M, EV01S, ME01L, 2GS01SA, DB01SEN	MV01M, MJ01M, CH01LS, AK01SE
3.3.3	Positive attitude due involvement and for example, to healthy competition amongst production units due to prompt feedback received regarding production numbers. For example, my superior is open to my suggestions.		SM01S	JL01S, AW01L , SB01LS, SB01LF, GA01LS, GS01SA	AS01LE
3.3.4	Attitudes have improved since worker suggestions sometimes accepted and then implemented with teamwork or people working together.			ZB01S	SB01S
3.3.5	Workers show resistance but this is culture related. Workers' counter proposals delay implementation.	DF01S	SR01LF		

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	Climate of having to negotiate for changes and workers want to be rewarded for changes.				
3.3.6	Workers are positive, keen to improve and grow with the organisation. Keen to provide customer satisfaction. Example of a dispatch worker who has amazing product knowledge and who is always bending backwards to help customers and sales people.			MM01S, BS01L, PN01LF	GM01S, AM01SF, PM01SS
3.3.7	No comment.			PP01M, DT01SQ	
3.3.8	Brick wall do not know where we are going.			JC01L	
3.3.9	Workers mixed feelings, confusion. Reason for changes not clear.			2GA01LS	PM01L
3.3.10	Varies from positive to some feeling not appreciated.			HM01S	
3.3.11	People are responding well to for e.g. safety, green areas, five s and problem-solving.				PM02S, TR01S
3.3.12	Poor attitude in distribution. Workers not helping a bad situation. Some sabotage but since October 2013 to current date the situation has improved.			TN01S	
3.3.13	No change		JH01L	MT01M	

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.3.14	Negative attitude since people expect that they will lose their jobs as the change process provides improvements.	PC01L			
3.3.15	Positive shop floor changes. Union an issue. Negative feeling in value chain department because of temporary change of purchasing to industrial engineering.		MM01L		
3.3.16	Positive responses by most people but some resistance from older long service people.		BD01SS		
3.3.17	People accept the changes now. They are looking for money with the changes.				CM01L
3.3.18	Initially workers resisted the changes, but due to creative contributions, participation and the observed benefits, they are accepting the changes. Pay remains an issue.		JH01L		
3.3.19	Initially workers resisted the changes, but due to creative contributions, participation and the observed benefits, they are accepting the changes. Pay remains an issue.		JH01L		
3.3.20	Culture shock initially but has improved on the shop floor. Offices are lagging behind.	NF01LI			

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.3.21	Management has a positive attitude. Workers have slowly changed their attitudes for the better. They however, do not take pride in their work.	RM01SE			
3.3.22	Initially system change to JDE caused a negative response but has now improved.		DM01LF		
3.3.23	Workers are bound by main agreement and their attitude reflects this.	CJ01SEN			
3.3.24	Management has a positive attitude thanks to managing director's influence. Senior structure best since takeover. Workers has a negative attitude due to measurement of performance.				EM01L
3.3.25	Senior management positive. Middle management optimistic but negative. Workers are negative about the changes		DK01SEN		
3.3.26	Borderline negative attitude due to people not easily accepting changes and also due to the perception that changes are not required.		JV01SEN		
3.3.27	Senior management has a positive attitude. Know what they are doing. Unique matrix organisation but a good team. Middle management positive attitude but frustrated by factory performance.		MV01MS		

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.3.28	Senior management is positive. Middle management was negative, due to uncertainty caused by the matrix (Cover your backside attitudes). Supervisors look at the situation as an opportunity to improve. Workers same as before negative attitudes.	AJ01LA			
3.3.29	Employees are unhappy since their voices are not heard.				JM01SEN

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.4.1	Senior management affectively committed. Middle management are some affectively committed or committed as "I just work here". Supervisors are some affectively committed to just coming to work.	LV01LL,	MM01L		AM01SF
3.4.2	Senior management is affectively committed. Middle management is some affectively committed some job security and salary. Operational management are some affectively committed and some committed to having a secure job. Workers are not committed and	BK01S, PC01L	PG01LF, BD01SS, DK01SEN	EV01S, ME01S, PN01LF	

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	are resisting the changes. Workers are bewildered by the changes.				
3.4.3	Highly committed since we are going places. Some frustration: because we have to wait for materials or production that impact our performance; planning do not have product knowledge.			JL01S, GA01LS, GS01SA	AS01LE
3.4.4	80% to 90% of workers committed to the changes but 20% disagree because of economic hardship. Workers on their guard since their work is being audited.			BS01L, AW01L	SB01S
3.4.5	Workers resisted but now go along with changes		AS01M	JC01L, MT01M	SN01L
3.4.6	Worker commitment 50% for and 50% against.			ZB01S, PP01M, 2GS01SA	CH01LS
3.4.7	Top management completely committed financially incentivised. Middle management financially committed with a portion, work satisfaction. Operational management and operators is financially committed.	DF01S	RB01MF		
3.4.8	Workers are committed because they are keen to learn and willing to provide opinions and ideas and		SM01S	MM01S, SB01LS	GM01S

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	they are willing to change for the better. Positive suggestion to do duty on switchboard.				
3.4.9	No comment.			AM01M, DT01SQ	TR01S
3.4.10	Workers are committed since the changes may be for the better.				PM01L
3.4.11	Workers are committed but feel that they are not appreciated.			HM01S	
3.4.12	Workers are responsively committed.				PM02S
3.4.13	Poor commitment in distribution, but has now improved with the problems being resolved.			TN01S	
3.4.14	Workers committed to coming to work and receiving their pay. People looking for job security and stability.		PJ01SEN	DB01SEN	MV01M, PM01SS, EM01L
3.4.15	Management is work committed. Regarding workers, look at reward system. Recognition but no rewards.				MJ01M
3.4.16	Senior and middle management affectively committed. Supervisors, some old school, find changes difficult. Commitment is job security related. Workers seek rewards for changes, but commitment is to have and keep a job.		SR01LF		

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.4.17	Senior and middle management affectively committed. Supervisors some old school find changes difficult commitment is job security related. Workers seek rewards for changes, but commitment is to have and keep a job. Three groups of 180 workers: 70 old people will change with education and development; 90 just concerned with pay; 20 will do anything for the company, affectively committed.				CM01L
3.4.18	Affective commitment at the middle management level. Of the 120 workers see affective commitment from most (80%) with active participation in the Kaizen events.		JH01L		
3.4.19	Management and supervisors are affectively committed but workers want to keep their jobs.	NF01LI			
3.4.20	Sales people are affectively committed and willing to go the extra mile. Production still need to get the workers committed to take pride in their work.	RM01SE, JC01LS			
3.4.21	Affectively committed. In financial department, for example: creative work done at remote Southern African facility with Pastel integrated with JDE.		DM01LF		

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.4.22	Less than 5% or a limited few are affectively committed. Workers just come to work.	CJ01SEN	JH01LS		
3.4.23	Workers have a don't care attitude, despite deadlines and understanding the consequences.				AK01SE
3.4.24	Engineers are highly committed due to personal goals in line with innovation.		RL01MEN		
3.4.25	Normative commitment the norm at the organisation. People are not committed just need their salary and further commitment is not valued.		2DK01SEN, JV01SEN,		
3.4.26	Most people are normatively committed. Only one senior manager is affectively committed.		MV01MS		
3.4.27	Senior managers are affectively committed. Remainder are normatively committed, requiring job security.	AJ01LA			
3.4.28	Affectively committed because love the job.				JM01SEN

MP1Q3.5	Would you be able to be more specific about organisational behaviour changes in terms of how employees feel about the vision, mission, organisational goals and objectives?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.5.1	There is varied alignment at the senior management level. Others are as per the commitment described.	LV01LL,			
3.5.2	Hoshin kanri has been done cascading objectives to the lowest levels in the organisation.	BK01S			
3.5.3	Acceptance where the organisation is going.	NF01LI	SM01S, AS01M, PG01LF, JH01L, JH01LS, PJ01SEN	JL01S, ZB01S, AM01M, HM01S, ME01L, AW01L, SB01LS	AS01LE, AM01SF, CM01L
3.5.4	Workers agree with the changes. Organisation is on the right track.			JC01L, MMO1S, MT01M, PN01LF	SB01S, GM01S, CH01LS
3.5.5	Long term viability. Lean culture will ensure competitiveness.	DF01S			
3.5.6	People not committed to the vision because of the way it was communicated. Objectives not really drilled in. Nobody lives the vision.	CJ01SEN		PP01M	
3.5.7	Workers are positive.	SN01L			

MP1Q3.5	Would you be able to be more specific about organisational behaviour changes in terms of how employees feel about the vision, mission, organisational goals and objectives?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.5.8	Unsure about the vision, because workers are not empowered.				PM01L
3.5.9	Understood up to supervisor level.			EV01S	
3.5.10	Some acceptance.				PM02S
3.5.11	Do not know			TN01S, BS01L, GS01SA, DT01SQ	MJ01M, TR01S, JM01SEN
3.5.12	Workers are negative and uncertain about their future.			GA01LS	MV01M
3.5.13	People are still negative to changes. Expectation that the organisation will reduce heads.	PC01L			
3.5.14	There is awareness, but most people not effected by the vision.		MM01L, RB01MF	BD01SS, DB01SEN	
3.5.15	Management is trying to sell the vision to workers but it is difficult because of long service people not appreciating the changes.		SR01LF		
3.5.16	No comment.	RM01SE			
3.5.17	Management up to supervisor level committed.		DM01LF		
3.5.18	No discussion regarding the vision. Maybe people too scared to talk about it.				PM01SS
3.5.19	Only the senior management team aware of the vision.			JC01LS	

MP1Q3.5	Would you be able to be more specific about organisational behaviour changes in terms of how employees feel about the vision, mission, organisational goals and objectives?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.5.20	Workers have no knowledge of the vision or lean.		RL01MEN		EM01L
3.5.21	Export department inspired by the vision, 70% Awareness.				AK0SE
3.5.22	Employees have nothing good to say about the organisation.		DK01SEN		
3.5.23	Lean accepted but not all the employees understand the benefits.		JV01SEN		
3.5.24	Nobody lives the vision.		MV01MS		
3.5.25	Five key success factors of the vision is not well shared by the organisation.	AJ01LA			

MP2Q1.1	Would you be able to elaborate how the employees of the organisation has been involved in the lean implementation process?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	At this stage only the manufacturing people involved in the lean process. More can be done to involve the total organisation.	LV01LL	RB01MF,	SB01LS, PN01LF	
1.1.2	Cascading of objectives with measures, Point Kaizens, five S, visual management, problem-solving, making sure work is done to standard operating procedures.	BK01S, AS01M	SM01S, MM01L	PP01M, ME01L, MT01M, BS01L, AW01L	GM01S, AM01SF

MP2Q1.1	Would you be able to elaborate how the employees of the organisation has been involved in the lean implementation process?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.3	Pulling materials and improving set-ups through requests for improved tooling.			JL01S	
1.1.4	Workers help to support the changes. Workers engage management.			MM01S	SB01S
1.1.5	People have been forced to do things. But have now accepted the changes.			JC01L, ZB01S	
1.1.6	Workers have been asked to participate and support the organisation in terms of international competitiveness, expanding the product range and to achieve growth.				
1.1.7	Some training done e.g. defect awareness.			AM01M	TR01S
1.1.8	Unable to comment. Do not know.	JV01LS	PG01LF, DM01LF, JH01LS, RL01MEN, PJ01SEN, MV01MS	TN01S, GS01SA, DB01SEN	SN01L, PM01L, MJ01M, CM01L, EM01L, AK01SE, JM01SEN
1.1.9	Workers have been involved in the standard operating procedures. Many pictures have been taken.			HM01S	
1.1.10	Only up to supervisor level.			EV01S	
1.1.11	One rotor cell had been established with PM02S			DT01QS	PM02S

MP2Q1.1	Would you be able to elaborate how the employees of the organisation has been involved in the lean implementation process?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.12	Mainly Kaizens. Five s.				
1.1.13	Only some key individuals involved and not the workers.	PC01L	MM01L		
1.1.14	Meetings were held and process well communicated.	RM01SE	SR01LF		MJ01M
1.1.15	Workers have been involved or they have been made aware.		BD01SS		
1.1.16	We invite workers to participate in Kaizen events. We ask them what they regard as issues and solutions. Implementing their solutions lead to a complete mind set change.		JH01L		
1.1.17	Workers are actively participating.	NF01LI			
1.1.18	Mainly manufacturing participation. Engineering participated in the NPD cell that is currently not utilised.	CJ01SEN,			
1.1.19	Employees are not actively involved, Suggestions are ignored and normal work is driven.		DK01SEN		
1.1.20	Daily green areas meeting creates effective communication channel.		JV01SEN		
1.1.21	Chicken attitude to Kaizen process. Workers are not really committed to the process	AJ01LA			

MP2Q1.2.1	Could you be specific regarding the lean techniques that have been utilised with employee involvement?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1.1	Not sure.	LV01LL	RB01MF,	SB01LS	
1.2.1.2	Hoshin kanri with measures, Point Kaizens, five S, visual management, problem-solving, value stream mapping, making sure work is done to standard operating procedures. Green areas.	BK01S, AS01M	SM01S, JH01L	JC01L, ZB01S, PP01M, HM01S, EV01S, ME01L, MT01M, AW01L	AM01SF
1.2.1.3	One-piece flow and set-up time and run time reduction and working extra shifts to deal with bottle necks.			JL01S	
1.2.1.4	Teamwork and standard operating procedures				SB01S
1.2.1.5	Communications, green areas, Kaizen and problem-solving.				DF01S
1.2.1.6	People are asking questions on the way we do things and they are engaging management.			MM01S	
1.2.1.7	No comment.			AM01M, GA01LS	
1.2.1.8	Unable to comment.	PC01L, NF01LI, JC01LS	DM01LF, JH01LS, RL01MEN, PJ01SEN, MV01MS	TN01S, PN01LF, DB01SEN	SN01L, PM01L, MJ01M, CM01L, EM01L, AK01SE, JM01SEN
1.2.1.9	Cellular manufacturing and teamwork.				PM02S

MP2Q1.2.1	Could you be specific regarding the lean techniques that have been utilised with employee involvement?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1.10	Kaizens, problem-solving and five s, objectives, and visual management.		BD01SS, SR01LF		MV01M, AS01LE, GS01SA, CH01LS
1.2.1.11	Limited employee involvement.			BS01L	
1.2.1.12	Think it is standard operating procedures and changing the mind-set and an open door policy.		PG01LF		
1.2.1.13	Defect awareness.				TR01S
1.2.1.14	Kaizens and five s.	AJ01LA			PM01SS
1.2.1.15	Nonspecific - Filtering communications first year was low - mainly explaining why things are being implemented.	RM01SE			
1.2.1.16	NPD cell incorporated most lean disciplines including flow and pull.	CJ01SEN			
1.2.1.17	Kaizen takes place at senior management level. Poka joke and Jidoka discussed.		DK01SEN		
1.2.1.18	Visual management is an effective technique.		JV01SEN		
1.2.1.19	Visual management is an effective technique.		JV01SEN		

MP2Q1.2	Could you tell me more about the teamwork in the organisation and how it works?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1	There is a lack of teamwork in the organisation. Need to develop this more. Supervisors control workers.	LV01LL, PC01L, RM01SE	PG01LF, JH01LS	MT01M, AW01L	SN01L
1.2.2	There is a senior management team that work cross-functionally to review current problems that the organisation has. There is a middle management and supervisors cross-functional team at shop floor level. Corporate provides facilitation for short term Kaizen teams to improve flow. Example of NPD cell.	BK01S	SM01S, RH01L	PP01M, EV01S, BS01L, SB01LS, GS01SA	
1.2.3	Would say that the management has a team and supervisors work as a team. Work teams in work areas and departments act as teams.		AS01M	JL01S	GM01S
1.2.4	It is important that people work as a team to improve their skills.			MM01S	SB01S
1.2.5	Tight control get told what to do.			JC01L	
1.2.6	People agreeing to work extra hours is teamwork.			ZB01S	
1.2.7	Teamwork in three areas: plant upgrade; product changes; and business development. Corporate assists with three specialist areas three to four times per annum: business; lean and Kaizen. Established teams are dispatch, receiving, Botswana, Solar and the Kaizen team.	DF01S	MM01L		

MP2Q1.2	Could you tell me more about the teamwork in the organisation and how it works?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.8	Good, daily meeting with planning, purchasing, and all production staff.		BD01SS	AM01M	
1.2.9	Department meetings driven by managers. Some teams work well.	AJ01LA	RB01MF	PN01LF, DB01SEN, PJ01SEN	PM01L, MJ01M, AS01LE, AM01SF
1.2.10	More a collaborative process than teamwork.			HM01S	
1.2.11	Cellular manufacturing is like teamwork.			ME01L	PM02S
1.2.12	See distribution as the team with the manager the leader.			TN01S	
1.2.13	Still a work in progress.				MV01M
1.2.14	Planning team meets Monday morning to discuss delivery issues.			GA01LS	
1.2.15	Departmental teams and interdepartmental teams. Finance not involved.		SR01LF		
1.2.16	Do not know.	NF01LI		DT01SQ, EM01L	CM01L, TR01S, JM01SEN
1.2.17	Remote Southern African facility example of effective teamwork and people working well together to provide effective financial control. Lead by financial accountant at F01.		DM01LF		
1.2.18	Matrix organisation tends to create silos and as such, limits teamwork.	CJ01SEN			

MP2Q1.2	Could you tell me more about the teamwork in the organisation and how it works?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.19	Export team meet with planning production and dispatch.				PM01SS, AK01SE
1.2.20	Matrix organisation tends to create silos and limits teamwork as such. Sales, warehouse, planning and distribution meet as a cross-functional team. Politics is an issue.	JC01LS			
1.2.21	Management teams exist as a team.		RL01MEN		
1.2.22	Very little teamwork. Discussion is not encouraged. Would appreciate team exposure.		DK01SEN		
1.2.23	There is effective coordination between departments but communications is still a problem.		JV01SEN		
1.2.24	Sales product managers are a good team.		MV01MS		

MP2Q1.3	Would you say that teams operating within the organisation have been empowered in any way regarding deciding on, for example, what and when to purchase things such as materials and tools or what to manufacture and how and when to manufacture?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1	Not sure but think that empowerment is up to supervisory level.	LV01LL			

MP2Q1.3	Would you say that teams operating within the organisation have been empowered in any way regarding deciding on, for example, what and when to purchase things such as materials and tools or what to manufacture and how and when to manufacture?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.2	Yes, with Budget expenses, supervisors have signing authority up to R5000. The idea is to eliminate all constraints and to speed up production.	BK01S	JH01L	PP01M	
1.3.3	We are empowered up to supervisor level.		SM01S	JL01S, AM01M, BS01L	
1.3.4	People are not empowered, they have to obtain permission from supervisors.		AS01M	JC01L, ZB01S, MM01S,	SB01S, PM01L, GM01S
1.3.5	Department heads are the team leaders and approve expenses.	DF01S			
1.3.6	Buyers have been empowered to change suppliers.				SNOIL
1.3.7	No.	RM01SE, CJ01SEN, AJ01LA	RB01MF, PG01LF, SR01LF, JH01LS, RL01MEN, JV01SEN, MV01MS	HM01S, ME01L, MT01M, AW01L, SB01LS	MV01M, AM01SF, TR01S, CH01LS, PM01SS, AK01SE
1.3.8	Empowerment of senior, middle and operational management, but now starting in the rotor cell.	NF01LI		EV01S	

MP2Q1.3	Would you say that teams operating within the organisation have been empowered in any way regarding deciding on, for example, what and when to purchase things such as materials and tools or what to manufacture and how and when to manufacture?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.9	Give lots of attention to workers and listen well to their input.			TN01S	
1.3.10	Not done, has to be developed. Example where forklift driver reported the making of items that had lots of inventory illustrates worker's willingness to support the organisation.	PC01L			
1.3.11	Not really, depends on the team involved.		MM01L	PN01LF	AS01LE
1.3.12	Planning team meets Monday morning to discuss delivery issues. Team is empowered to make decisions how to resolve delivery issues.			GA01LS	
1.3.13	Special Kaizen NPD project team had decision powers for deciding financial aspects and how to design and improve. But this involved senior management.			GS01SA	
1.3.14	Decisions made by planning.		BD01SS		
1.3.15	No comment / do not know.		PJ01SEN	DT01SQ, DB01SEN	CM01L, EM01L
1.3.16	Remote Southern African financial team - cleaner promoted to buyer, Another cleaner prompted to receptionist to debt collector.		DK01SEN		

MP2Q1.3	Would you say that teams operating within the organisation have been empowered in any way regarding deciding on, for example, what and when to purchase things such as materials and tools or what to manufacture and how and when to manufacture?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.17	Empowered since allowed to design new products.				JM01SEN

MP2Q1.3.1	Could you also elaborate on team roles, responsibilities and authority levels?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1.1	Little is known. Would say that it has not been implemented.	LV01LL			
1.3.1.2	Cross-functional teams with members representing their respective functions or departments. An example is, logistics, production, quality, engineering etc.	BK01S			
1.3.1.3	Not really or not sure.	NF01LI	MM01L, BD01SS, JH01LS, JV01SEN	JL01S,PP01M, HM01S, ME01L, MT01M, AW01L, SB01LS	GM01S, CH01LS. EM01L, AK01SE
1.3.1.4	It is important that rolls and responsibilities are adopted for teamwork.			ZB01S, TN01S	SB01S
1.3.1.5	Work teams select their own leaders		AS01M		

MP2Q1.3.1	Could you also elaborate on team roles, responsibilities and authority levels?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1.6	Teamwork in three areas: plant upgrade; product changes; and business development. Corporate assists with three specialist areas three to four times per annum: business; lean and Kaizen. Established teams are dispatch, receiving, Botswana, Solar and Kaizen.	DF01S			
1.3.1.7	Master schedule meeting all work together to report to branches when production will be ready.				AM0M
1.3.1.8	No comment.		SM01M, SR01LF	ME01L, DT01SQ, DB01SEN	MJ01M, AM01SF, CM01L, TR01S
1.3.1.9	JL01S is managing this well in his area of the rotor shop.			EV01S	
1.3.1.10	Operators free to make suggestions with cellular manufacturing. Supervisor supports new innovations.				PM02S
1.3.1.11	Work in progress.	PC01L			MV01M
1.3.1.12	Team support each other in terms of availability and meeting the team objectives rolls change in some cases.			PN01LF	AS01LE
1.3.1.13	Departmental teams. Person in charge act as chairperson		RB01MF		

MP2Q1.3.1	Could you also elaborate on team roles, responsibilities and authority levels?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1.14	Special Kaizen NPD project team had senior engineering manager acting as leader and scribe.			GS01SA	
1.3.1.15	Roles and responsibility changes at remote Southern African facility, cleaners now promoted to buyer and debt collector respectively.		DM01LF		
1.3.1.16	Managing director leads either direct reports and coordinates with dotted line reports.	CJ01SEN			
1.3.1.17	Team roles are the functions represented at team sessions.	JC01LS	RL01MEN, DK01SEN, PJ01SEN, MV01MS		PM01SS
1.3.1.18	Do not know.				JM01SEN

SP1Q1	Could you elaborate on the process, how the organisation derived its manufacturing cells in terms of the utilisation of lean disciplines and techniques?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1	Little is known. Would say that it has not been implemented.	LV01LL			
1.2	Focus was on tact versus takt. We worked as a cross-functional team consisting of engineering, production, quality and maintenance	BK01S		JC01L	

SP1Q1	Could you elaborate on the process, how the organisation derived its manufacturing cells in terms of the utilisation of lean disciplines and techniques?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3	Utilised one-piece flow. Work is done together with Industrial Engineering to get parts to store as quick as possible.			JL01S	
1.4	Unable to.	DF01S, PC01L, RM01SE, JC01LS, AJ01LA	MM01L, RB01MF, PG01LF, BD01SS, DM01LF, JH01LS, RL01MEN, MV01MS	ZB01S, MM01S, PP01M, AM01M, TN01S, BS01L,AW01L, SB01LS, PN01LF, GA01LS, GS01SA, DT01SQ, DB01SEN	SB01S, GM01S, SN01L, PM01L, MV01M, MJ01M, AS01LE, AM01SF, CM01L, TR01S, CH01LS, PM01SS, EM01L, AK01SE, JM01SEN
1.5	Based it on the routing and trying to achieve one-piece flow.		AS01M	ME01L	
1.6	Still getting there		SM01S		
1.7	No cells at the moment, more line production.			HM01S	
1.8	Cells are being developed by the industrial engineering manager and the plant manager. It is being based on reduced movement, one-piece flow and set-up time reduction.			EV01S	

SP1Q1	Could you elaborate on the process, how the organisation derived its manufacturing cells in terms of the utilisation of lean disciplines and techniques?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.9	Principle of a chain				PM02S
1.10	Utilised value stream mapping.			MT01M	
1.11	Has not really happened.		SR01LF		
1.12	Not fully developed as cells yet, but we have done work on cellular manufacturing in the rubber plant, machine shop and assembly.		JH01L		
1.13	Cross-functional job shop environment. No cells.	NF01LI			
1.14	NPD cell designed to lean principles. Most lean techniques were utilised to achieve flow and pull. Single piece flow, Kanban and five s.	CJ01SEN			
1.15	NPD cell was not effective. One person tried to run the entire cell. Doomed to failure due to many changes, warehouse issue.		DK01SEN		
1.16	Pump assembly was envisioned to be a cell, has never been fully implemented. but		PJ01SEN		
1.17	Kaizen approach with product requirements breakdown of each data pack.		JV01SEN		

SP1Q1.1	Could you also explain why this particular process was followed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	Little is known. Would say that it has not been implemented.	LV01LL		WJM01L	
1.1.2	Based on my past and lean experience. To achieve continuous flow,	BK01S,			
1.1.3	Industrial Engineering know how and why, one-piece flow is being utilised.			JL01S	
1.1.4	Unable to	DF01S, PC01L, NF01LI, RM01SE, JC01LS	MM01L, RB01MF, PG01LF, BD01SS, SR01LF, DM01LF, JH01LS, RL01MEN, MV01MS	ZB01S, PP01M, , AM01M, TNO1S, ME01S, ME01L, BS01L, AW01L, SB01LS, PN01LF, GA01LS, GS01SA, DT01SQ, DB01SEN	SB01S, GM01S, SN01L, PM01L, MV01M, MJ01M, AS01LE, AM01SF, CM01L, TR01S, CH01LS, PM01SS, EM01L, AK01SE, JM01SEN
1.1.5	Sequencing and line balancing.			JC01L	
1.1.6	To reduce lead times. To improve flow.		AS01M, PJ01SEN	MM01S, MT01M	
1.1.7	Still getting there		SM01S		
1.1.8	No cells at the moment, more line production.		JH01L	HM01S	

SP1Q1.1	Could you also explain why this particular process was followed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.9	Cells are being developed by the industrial engineering manager and the plant manager. It is being based on reduced movement, one-piece flow and set-up time reduction.			EV01S	
1.1.10	JL01S is managing this well in his area of the rotor shop where cellular manufacturing has been achieved.				PM02S
1.1.11	To launch NPD production and to achieve an effective flow process.	CJ01SEN			
1.1.12	Corporate demanded that NPD product be run as a cell.		DK01SEN		
1.1.13	Kaizen approach with product requirements breakdown of each data pack. In pursuit of becoming a lean organisation.		JV01SEN		
1.1.14	Driven through the matrix structure.	AJ01LA			

SP1Q2	Could you explain how you achieved flow and pull in your organisation in terms of the specific lean techniques utilised to achieve this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1	Not achieved.	LV01LL, RM01SE	SM01S, MM01L, SR01LF, JH01L,	JC01S, ME01L, BS01L, DT01SQ	MV01M

SP1Q2	Could you explain how you achieved flow and pull in your organisation in terms of the specific lean techniques utilised to achieve this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			DM01LF, DK01SEN, JV01SEN		
2.2	TAKT versus TACT. Each cell designed to be in rhythm with the market. Ergonomics being considered.	BK01S,			
2.3	More flow work - planning loads so that we can see next three jobs ahead. Production in yard is two to three weeks ahead.			JL01S	
2.4	No do not know.	DF01S, PC01L	RB01MF, PG01LF, RL01MEN, PJ01SEN, MV01MS	ZB01S, MM01S, PP01M, AM01M, HM01S, AW01L, SB01LS, PN01LF, GA01LS, GS01SA, DB01SEN	GM01S, SB01S, SN01L, PM01L, MJ01M, AS01LE, AM01SF, CM01L, TR01S, CH01LS, PM01SS, PM01SS, EM01L, AK01SE, JM01SEN
2.5	In progress		AS01M		
2.6	More push than pull.	AJ01LA		EV01S, TN01S	PM02S
2.7	Did the layout work.			MT01M	
2.8	Trying to implement it on assembly since it is the best solution for the variability of configurations required.		BD01SS		

SP1Q2	Could you explain how you achieved flow and pull in your organisation in terms of the specific lean techniques utilised to achieve this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.9	Form of a hybrid Kanban process.	NF01LI			
2.10	Was attempted but not finalised.	CJ01SEN			
2.11	To some extent distribution is pulling from the warehouse.	JC01LS			

SP1Q3	Did you utilise teamwork to implement flow and pull in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1	No because I do not think we have achieved cellular manufacturing.	LV01LL		JC01L,ZB01S,BS01L	
3.2	Have been trialled with one team on the NPD cell, but there are still some outstanding issues.	BK01S,			CH01LS
3.3	Yes, we do but more in terms of production scheduling and setters using the same tools to reduce set-up.			JL01S	
3.4	Yes (but no detail.)				SB01S
3.5	No	DF01S, PC01L, NF01LI, RM01SE, DM01LF	AS01M, SM01S, MM01L, RB01MF, SR01LF, JH01L,	MM01S, PP01M, HM01S, EV01S, TN01S, ME01S, MT01M, GA01LS, GS01SA, DT01SQ, DB01SEN	GM01S, SN01L, PM01L, MV01M, MJ01M, AW01L, AM01SF, PM01SS,

SP1Q3	Did you utilise teamwork to implement flow and pull in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			JH01LS, RL01MEN, PJ01SEN, JV01SEN, MV01MS		AK01SE, DK01SEN
3.6	We are discussing teamwork for pull.				AM01M
3.7	Push control at the moment.	AJ01LA	PG01LF		PM02S
3.8	Do not know.			SB01LS, PN01LF	AS01L, CM01L, TR01S, EM01L, JM01SEN
3.9	Yes for the assembly team we had a meeting to get every one's buy in.		BD01SS		
3.10	Attempted for NPD cell.	CJ01SEN			
3.11	Yes the warehouse and distribution is a team.	JC01LS			

SP1Q3.1	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1.1	No because cellular manufacturing has not been achieved	LV01LL		JC01L,ZB01S,BS01L	

SP1Q3.1	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1.2	We have issues because MRP has not been switched on. At the moment we are in push production. In manufacturing we are in pull.	BK01S,			CH01LS
3.1.3	Teamwork between production planning and the setters that change for the next job. Also setters using the same tools to reduce set-up.			JL01S	
3.1.4	No comment				SB01S
3.1.5	No	DF01S, PC01L, NF01LI, RM01SE, DM01LF	AS01M, SM01S, MM01L, RB01MF, SR01LF, JH01L, JH01LS, RL01MEN, PJ01SEN, JV01SEN, MV01MS	MM01S, PP01M, HM01S, EV01S, TN01S, ME01S, MT01M, GA01LS, GS01SA, DT01SQ, DB01SEN	GM01S, SN01L, PM01L, MV01M, MJ01M, AW01L, AM01SF, PM01SS, AK01SE, DK01SEN
3.1.6	We are setting levels and targets. Sorting out old orders.				AM01M
3.1.7	Push control at the moment.	AJ01LA	PG01LF		PM02S

SP1Q3.1	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1.8	Do not know.			SB01LS, PN01LF	AS01L, CM01L, TR01S, EM01L, JM01SEN
3.1.9	Yes for the assembly team we had a meeting to get every one's buy in.		BD01SS		
3.1.10	Attempted for NPD cell but the project abandoned due to external factors.	CJ01SEN			
3.1.11	There is a team that works closely together between distribution and the warehouse.	JC01LS			

SP1Q4	Would you say your organisation has managed to implement manufacturing cells utilising the techniques associated with flow and pull?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.1	No.	LV01LL, DF01S, PC01L, NF01LI, RM01SE, CJ01SEN, JC01LS	SM01S, MM01L, RB01MF, SR01LF, JH01L, RL01MEN, DK01SEN, PJ01SEN,	ZB01S, MM01S, HM01S, EV01S, MT01M, BS01L, AW01L, GA01LS, DB01SEN	SB01S, MV01M, AM01SF, PM01SS, AK01SE

SP1Q4	Would you say your organisation has managed to implement manufacturing cells utilising the techniques associated with flow and pull?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			JV01SEN, MV01MS		
4.2	Yes	BK01S	AS01M		
4.3	No comment		PG01LF	JL01S, JC0L, PN01LF	GM01S, CM01L, CH01LS
4.4	Yes			PP01M	
4.5	No knowledge	AJ01LA	DM01LF, JH01LS	AM01M, TN01S, SB01LS, GS01SA, DT01SQ	
4.6	No, routings to identify the flow, was used.			ME01L	
4.7	Yes we have in assembly.				

SP1Q4.1	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.1.1	Do not think cellular production has been achieved yet.	LV01LL, DF01S, PC01L, NF01LI, RM01SE,	SM01S, MM01L, RB01MF, SR01LF, JH01L,	ZB01S, MM01S, HM01S, EV01S, MT01M, BS01L, AW01L,	SB01S, MV01M, AM01SF, PM01SS, AK01SE

SP1Q4.1	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
		CJ01SEN, JC01LS	RL01MEN, DK01SEN, PJ01SEN, JV01SEN, MV01MS	GA01LS, DB01SEN	
4.1.2	Yes we have but we are still in a push situation. Production is pulling. The techniques we are utilising involve sequenced flow, and line balancing TAKT and TACT.	BK01S	AS01M	PM02S	
4.1.3	No comment		PG01LF	JL01S, JC0L, PN01LF	GM01S, CM01L, CH01LS
4.1.4	One-piece flow was utilised as a technique.			PP01M	
4.1.5	No knowledge	AJ01LA	DM01LF, JH01LS	AM01M,TN01S, SB01LS, GS01SA, DT01SQ	
4.1.6	Routings indicate the process flow clearly.			ME01L	
4.1.7	Assembly operations arranged as a flow line.		BD01SS		

SP1Q 5	Are your manufacturing cells manned by work teams and.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
5.1	No since we do not really have manufacturing cells.	LV01LL	SM01S, JH01L	HM01S	
5.2	No	BK01S, NF01LI, RM01SE, CJ01SEN	MM01L, RB01MF, SR01LF, RL01MEN, DK01SEN, PJ01SEN, JV01SEN	ZB01S, MM01S, PP01M, MT01M, AW01L, DT01SQ, DB01SEN	GM01S, PM01L, MV01M, AM01SF, PM01SS
5.3	Not really, more by area.			JL01S	SB01S
5.4	Only one cell has a team.			JC01L	
5.5	Work areas are set-up in cells and are manned by operator teams.	DF01S	AS01M	AM01M	SN01L
5.6	Yes, rotor shop, product type and assembly have cells.			EV01S, ME01L, BS01L	PM02S
5.7	Do not know.	PC01L, JC01LS, AJ01LA	PG01LF, DM01LF, MV01MS	TN01S, PN01LF, GA01LS, GS01SA	MJ01M, AS01LE, CM01L, TR01S, CH01LS, EM01L, AK01SE, JM01SEN
5.8	Yes the assembly workers are viewed to be a team.		BD01SS		
5.9	Yes.		JH01LS		

SP1Q5.1	.....can you explain how this works in terms of the control systems and .....	.Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
5.1.1	No since we do not really have manufacturing cells.	LV01LL			
5.1.2	No.	PC01L, NF01I, RM01SE, CJ01SEN, JC01LS, AJ01LA	SM01S, MM01L, RB01MF, PG01LF, SR01LF, JH01L, DM01LF, RL01MEN, DK01SEN, PJ01SEN, JV01SEN	ZB01S, MM01S, PP01M, HM01S, TN01S, MT01M, BS01L, AS01LE, AW01L, PN01LF, GA01LS, GS01SA, DT01SQ, DB01SEN	GM01S, SN01L, PM01L, MV01M, MJ01M, AM01SF, CM01L, TR01S, CH01LS, PM01SS, EM01L, AK01SE
5.1.3	Not really, more by area.			JL01S	SB01S
5.1.4	Planning loads the cell.			JC01L	
5.1.5	Controlled by supervisor.	DF01S	AS01M	AM01M	
5.1.6	Push control.	BK01S		EV01S, ME01L	
5.1.7	Supervisor controls the team.		JH01LS		PM012S
5.1.8	The assembly cell is still controlled by planning.	BD01SS			
5.1.9	Do not know.		MV01MS		JM01SEN

SP1Q5.2	.....how the employees in the manufacturing cells function regarding, for example, their roles and responsibilities or other attributes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
5.2.1	No, since we do not really have manufacturing cells.	LV01LL, RM01SE, CJ01SEN	JH01L	DT01SQ	
5.2.2	No, or no comment, or do not know	PC01L, NF01I, JC01LS, AJ01LA	SM01S, MM01L, RB01MF, PG01LF, SR01LF, DM01LF, RL01MEN, DK01SEN, PJ01SEN, JV01SEN, MV01MS	ZB01S,PP01M, AM01M, TN01S, MT01M, AW01L, SB01LS, PN01LF, GA01LS, GS01SA, DB01SEN	SN01L, PM01L, MV01M, MJ01M, AS01LE, AM01SF, CM01L, TR01S, CH01LS, PM01SS, EM01L, AK01SE, JM01SEN
5.2.3	Not really, more by area. Do what they are told to do.		AS01M	JL01S	SB01S, GM01S
5.2.4	Team is flexible.			JC01L	
5.2.5	Departmental, they create their own environment.	DF01S			
5.2.6	People have more than one task.			MM01S	
5.2.7	Departmental teams not teams in cells.			HM01S	
5.2.8	JL01S has identified specific workers for specific rolls in the rotor shop.			EV01S, BS01L	

SP1Q5.2	.....how the employees in the manufacturing cells function regarding, for example, their roles and responsibilities or other attributes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
5.2.9	Team alternate roles of operating, transport, and inspection.				PM02S
5.2.10	Supervisor runs the team. Team exchange tasks and do their own testing.	BK01S	BD01SS	ME01L	
5.2.11	They work to their respective job descriptions,		JH01LS		

SP1Q6	Since the implementation of manufacturing cells would you say that Kaizen as a lean technique is effectively being utilised?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
6.1	Kaizen is being utilised with some of the lean work but we have not really achieved cellular manufacturing.	LV01LL	JH01L	HM01S, AW01L, DT01SQ	
6.2	Yes	BK01S, DF01S, AJ01LA	AS01M	JC01L, MM01S, PP01M, AM01M, MT01M, SB01LS	GM01S, MV01M, TR01S
6.3	We have used Kaizen but we need to do more. People see the benefits of working as a team.			JL01S	SB01S
6.4	No.	NF01LI, RM01SE, CJ01SEN	RL01MEN, DK01SEN, PJ01SEN, JV01SEN	ZB01S	
6.5	Still getting there with cells.		SM01S	BS01L	

SP1Q6	Since the implementation of manufacturing cells would you say that Kaizen as a lean technique is effectively being utilised?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
6.6	Do not know.	PC01L, JC01LS	MM01L, RB01MF, PG01LF, DM01LF, JH01LS, MV01MS	EVO1S, TN01S, PN01LF, GA01LS, DB01SEN	SNOIL, PM01L, AM01SF, CM01L, CH01LS, PM01SS, EM01L, JM01SEN
6.7	Yes, it has been done to increase production.				PM02S
6.8	Yes to improve the machines and the floor condition.			ME01L	
6.9	Yes in team Kaizens that we participated in.			GS01SA	AS01LE
6.10	Yes in a reduction of the seven wastes in the rubber plant exercise.		BD01SS		
6.11	More generally used, not for cells at the current time.		SR01LF		

SP1Q6.1	Could you expand on how it is being utilised and are you able to provide an example/s?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
6.1.1	No not for manufacturing cells.	LV01LL, RM01SE, CJ01SEN	MM01M, JH01L, RL01MEN, DK01SEN	ZB01S, HM01S, AW01L, DT01SQ	

SP1Q6.1	Could you expand on how it is being utilised and are you able to provide an example/s?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
6.1.2	We are using point Kaizens. Teams are given objectives to achieve 24 Kaizens per annum or two per month.	BK01S,	AS01M	GM01S	
6.1.3	Yes the rubber shop Kaizen.			JL01S	
6.1.4	No comment or do not know.	PC01L, NF01LI, JC01LS	SM01S, RB01MF, PG01LF, SR01LF, DM01LF, JH01LS, PJ01SEN, JV01SEN, MV01MS	JC01L, MMO1S, AM01M, EV01S, TN01S, BS01L, SB01LS, PN01LF, GA01LS, DB01SEN	SB01S, SN01L, PM01L, MJ01M, AM01SF, CM01L, TR01S, CH01LS, PM01SS, EM01L, AK01SE, JM01SEN
6.1.5	Yes, the stores, but have to do more.	DF01S			
6.1.6	Flow and pull Kaizens.			PP01M, GS01SA	
6.1.7	Yes it has been done to increase production.				PM01S
6.1.8	Yes to improve the machines and the floor condition.			ME01L	
6.1.9	To improve the flow.				MV01M, AS01LE
6.1.10	Longer table improved flow.			MT01M	
6.1.11	Reduced seven wastes in the rubber plant and assembly.		BD01SS		
6.1.12	Dictated by the matrix.	AJ01LA			

SP1Q7	Since the implementation of manufacturing cells would you say that the organisation has changed its organisational structure in any way to service these manufacturing cells and help them function better?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.1	No.	LV01LL, DF01S, PC01L, NF01LI, RM01SE, CJ01SEN, JC01LS	MM01L, BD01SS, SR01LF, JH01L, JH01LS, RL01MEN, DK01SEN, PJ01SEN	MM01S, PP01M, TN01S, MT01M, BS01L, AW01L, GA01LS, GS01SA, DB01SEN	GM01S, PM01L, MV01M, CH01LS, AK01SE
7.2	Purchasing is being transferred to industrial engineering to improve on raw material supplies. We are using two way radios to link production, planning, maintenance and quality.	BK01S	AS01M		
7.3	Not aware of any structural changes.		SM01S, PG01LF	JL01S, JC01L, ZB01S, EV01S	PM02S
7.4	Not sure.			ME01L, SB01LS, PN01LF	SB01S, MV01M
7.5	Purchasing moved to industrial engineering may help.				SNOIL

SP1Q7	Since the implementation of manufacturing cells would you say that the organisation has changed its organisational structure in any way to service these manufacturing cells and help them function better?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.6	Would like do this, but it would mean total integration with other departments.			HM01S	
7.7	Do not know.		MV01MS		AS01LE, AM01SF, CM01L, TR01S, PM01SS, EM01L, JM01SEN
7.8	Cross-functional team developed the NPD and solar cell.	AJ01LA			

SP1Q7.1	Would you say that these changes have helped to improve your customer service?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.1.1	No structural changes made.	LV01LL, DF01S, RM01SE, CJ01SEN	SM01S, MM01L, RB01MF, SR01LF, RL01MEN, DK01SEN, PJ01SEN, JV01SEN	ZB01S, MM01S, PP01M, TN01S, MT01M, DB01SEN	GM01S, MV01M

SP1Q7.1	Would you say that these changes have helped to improve your customer service?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.1.2	Yes productivity has improved from 40% to 76% and on-time delivery from 40% to 62%.	BK01S		AW01L	
7.1.3	Yes our backlog has been reduced by 50%.			JL01S	
7.1.4	Not sure	PC01L		ME01L, SB01LS, DT01SQ	JC01L,SB01S, MJ01M
7.1.5	We have reduced lead times from five to two days		AS01M		
7.1.6	Not yet improved.	AJ01LA	JV01SEN	AM01M, BS01L	PM01L, CH01LS, PM01SS
7.1.7	Purchasing to industrial engineering may help.				SNOIL
7.1.8	Has done, but we need to do more.			HM01S	
7.1.9	Yes it has, but it was not measured.			EV01S	
7.1.10	Do not know.		RB01MF, PG01LF, DM01LF, MV01MS	GA01LS, GS01SA	PS02S, AS01LE, AM01SF, CM01L, TR01S, EM01L, AK01SE, JM01SEN
7.1.11	Customers have become more open.			PN01LF	
7.1.12	Yes from 40% to 70%.		BD01SS		
7.1.13	No comment.	NF01LI	JH01L		
7.1.14	Service level has improved between 4% and 7%.		JH01LS		
7.1.15	Yes, teamwork has assisted with this.	JC01LS			

SP1Q7.1	Would you say that these changes have helped to improve your customer service?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
SP1Q7.2	Do you think there is an alternative and better way to achieve even higher levels of customer service?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.2.1	Not sure. Will have to think about it.	LV01LL	MM01L, PJ01SEN	AW01L, DB01SEN	
7.2.2	Yes. Review stocking levels, Utilise statistical forecasting to better determine customer requirements.	BK01S			
7.2.3	More lean and more training. Lean should be correctly implemented. Give lean a chance	CJ01SEN	MV01MS	JL01S, HM01S	
7.2.4	Not sure or no comment.	NF01LI, RM01SE, JC01LS	RB01MF, PG01LF, SR01LF, DM01LF, DK01SEN	PP01M, TN01S, ME01L, SB01LS, GA01LS	SB01S, MV01M, MJ01M, AS01LE, AM01SF, CM01L, TR01S, CH01LS, EM01L, JM01SEN
7.2.5	The cells working well, would like the total organisation working like this.			JC01L	
7.2.6	Tighter productivity control.			ZB01S	
7.2.7	Overall more in terms of the total business plan.	DF01S			
7.2.8	Implement flow and pull. Kanban is what is required.		AS01M	DT01SQ	GM01S
7.2.9	Work to a schedule improve communications between sales, planning and production and improve control.			MM01S	PM01SS

SP1Q8	How would you describe your current organisational structure functionally since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.1	Not sure. Mainly with the manufacturing department.	LV01LL			
8.2	No changes other than the change of purchasing to industrial engineering and all the changes mentioned.	BK01S	SM01S, MM01L	PP01M, AM01M,	GM01S, SN01L, PM01L
8.3	No changes.	CJ01SEN	ASM01, BD01SS, JH01LS, PJ01SEN	JL01S,JC01L ,ZB01S, MM01S, TN01S, MT01M, AW01L	SB01S,PM02S, MV01M, CH01LS
8.4	Group Kaizens are helping. Utilising the current structure better. In isolated areas and people are becoming more enthusiastic about the changes.	DF01S	RB01MF		
8.5	Emphasis is on process standardisation and continuous improvement.			HM01S	
8.6	Unable to comment or do not know.		DM01LF, RL01MEN	ME01L, SB01LS, DB01SEN	AS01LE, CM01L, EM01L, AK01SE, JM01SEN
8.7	Matrix structure with the challenge for cross-functional coordination and support.	PC01L		BS01L	
8.8	Since managing director and plant manager appointments there are some noticeable improvements.		PG01LF	PN01LF	MJ01M
8.9	In the last year more instructiveness, more awareness, more knowledge and skills. People helpful to explain for e.g. about the product.				AM01SF

SP1Q8	How would you describe your current organisational structure functionally since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.10	Was not aware of lean.			GA01LS	
8.11	Not working to well, confusion and no clear KPA's and KPI.s			GS01SA	
8.12	Cross-functional interaction is not really happening.		SR01LF		
8.13	Workers are working well together and are making suggestions.				TR01S
8.14	Not all employees involved in the lean process at current time. Those employees, involved are getting the information and skills.			DT01SQ	
8.15	Non-existent really.		JH01L		
8.16	More visibility, more information sharing and more cooperation.	NF01LI			
8.17	Working much better than before.	RM01SE			
8.18	Meetings and e mail communications. 80 to 90 % of answers so provided.				PM01SS
8.19	Does not work.		DK01SEN		
8.20	Working, but needs to improve and communicated.		JV01SEN		
8.21	Working well in terms of senior management. Sales teamwork well together highly motivated but frustrated by production.		MV01MS		
8.22	Fragmented and confused.	AJ01LA			

SP1Q8.1	Could you explain how this organisational structure has changed since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.1.1	Have explained that since the take over the matrix has evolved even more and in my opinion making lean difficult.	LV01LL			
8.1.2	No changes other than the change of purchasing to industrial engineering and all the changes mentioned.	BK01S	JH01L	PP01M, AM01M, DB01SEN	SN01L
8.1.3	No change.	DF01S, PC01L, RM01SE, CJ01SEN	AS01M, SM01S, BD01SS, JH01LS, DK01SEN, PJ01SEN, JV01SEN, MV01MS	JL01S, JC01L, ZB01S, MM01S, MV01M, MT01M, AW01L	SB01S, GM01S, PM01L, AS01LE, CH01LS
8.1.4	Do not know whether changes were relative to lean.				PM01L
8.1.5	Purchasing has moved to industrial engineering.		RB01MF	HM01S	
8.1.6	Positional changes only.	JC01LS, AJ01LA	MM01L, SR01LF, DM01LF, RL01MEN	EV01S, TN01S, BS01L, GS01SA, DT01SQ	PM01SS
8.1.7	Do not know.			ME01L, SB01LS, GA01LS	AM01SF, CM01L, TR01S, EM01L,

SP1Q8.1	Could you explain how this organisational structure has changed since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
					AK01SE, JM01SEN
8.1.8	Since managing director and plant manager appointments there are some noticeable improvements.				MJ01M
8.1.9	Much improved communications.			PN01LF	
8.1.10	For the better. Good learning experience to experience how the Americans think. Feel managing director is the change		PG01LF		
8.1.11	More individual empowerment and the work environment more conducive for effective production.	NF01LI			
8.1.12	Silos that are working closer together.	JC01LS			

SP1Q8.2	Is this the best organisational structure for lean operations?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.2.1	Have to think about it.	LV01LL	PG01LF, SR01LF		
8.2.2	Good enough for now.	BK01S	JV01SEN		
8.2.3	Not sure / Do not know		RB01MF	JL01S, EV01S,TN01S, GA01LS,	SB01S, GM01S, MV01M, MJ01M, AS01LE, CM01L, TR01S, CH01LS,

SP1Q8.2	Is this the best organisational structure for lean operations?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
				DT01SQ, DB01SEN	EM01L, AK01SE, JM01SEN
8.2.4	No	DF01S, PC01L, CJ01SEN, AJ01LA	AS01M, SM01S, MM01L, BD01SS, JH01L, RL01MEN, DK01SEN, PJ01SEN DM01LF	ZB01S, MM01S, JC01L, HM01S, MT01M, BS01L, AW01L	SN01L, PM01L, AM01SF
8.2.5	Standard structure leave as is.			PP01M	
8.2.6	The structure will stay as is.			AM01M	
8.2.7	Yes, cannot think of anything else.			SB01LS	PM02S, PM01SS
8.2.8	Organisation before better, flatter more direct.			ME01L	
8.2.9	Possibly.			PN01LF, GS01SA	
8.2.10	No comment.	NF01LI	JH01LS, MV01MS		
8.2.11	Yes and no	RM01SE			

SP1Q8.2	Is this the best organisational structure for lean operations?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.2.12	Yes since the functions of sales production and human resources together but engineering and finance still in silos.	JC01LS			

SP1Q8.3	What would you do differently from the organisational structure to improve on the current situation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.3.1	Have to think about it.	LV01LL	PG01LF		AM01SF, PM01SS
8.3.2	Nothing.	BK01S, JC01LS		PP01M, PN01LF, GA01LS,	
8.3.3	Not sure			JL01S, TN01S, ME01L, MT01M, BS01L, AW01L, SB01LS, DB01SEN	SB01S, GM01S, MV01M, MJ01M, AS01LE, CM01L, CH01LS, AK01SE
8.3.4	More quality training, improving people's time.			JC01L	
8.3.5	Less meetings, focus on quality.			ZB01S	
8.3.6	Appoint a lean champion to drive the lean programme.	DF01S	BD01SS		

SP1Q8.3	What would you do differently from the organisational structure to improve on the current situation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.3.7	Restructure planning. Develop cellular structures.		AS01M, SM01S		
8.3.8	Work towards ownership.			MM01S	
8.3.9	Planning spends more time with sales and sales spend more time with planning.			AM01M	
8.3.10	Integrate senior managers with lower levels. Flatten the structure.				SN01L
8.3.11	Get the systems in place.				PM01L
8.3.12	More integration of departments for e.g., Purchasing, planning and industrial engineering.			HM01S	
8.3.13	Do more training.			EV01S	
8.3.14	No comment	NF01LI		DT01SQ	PM02S, TR01S, EM01L
8.3.15	Well integrated functional structure to achieve common goals and strategy.	PC01L, CJ01SEN			
8.3.16	Change the innovation between sales and operations.		MM01L		
8.3.17	Appoint more finance people .Involve more and finance people.		RB01MF		
8.3.18	Remove dead wood where customers are not clearly assisted nothing is done.			GS01SA	

SP1Q8.3	What would you do differently from the organisational structure to improve on the current situation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.3.19	Rationalise the product mix. Reduce inventories, control expenditure. Pressurise sales for new business.		SR01LF		
8.3.20	We need to create cellular manufacturing and establish continuous flow.	RM01SE	JH01L		
8.3.21	There are areas that can be changed or improved.		DM01LF		
8.3.22	Dispatch and warehouse report to sales plus service.		JH01LS		
8.3.23	Flatten the structure and develop people.		RL01MEN, JV01SEN		
8.3.24	Too many bosses. Flatten the structure. Correct the culture. Redefine positions and departments.		DK01SEN		
8.3.25	Flatten the structure with teamwork.		PJ01SEN		
8.3.26	Improve feedback communication. Tank talk once per quarter is not enough.		MV01MS		
8.3.27	Align responsibility with authority in the organisation as a first step.	AJ01LA			
8.3.28	Do not know.				JM01SEN

SP1Q9	Could you describe which organisational functions or tasks are being performed by work teams within the manufacturing cells?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
9.1	None, Have discussed the lack of teamwork.	LV01L	PG01LF	DT01SQ	
9.2	None	BK01S, NF01LI, RM01SE, CJ01SEN, JC01LS, AJ01LA	AS01M, MM01L, RB01MF, BD01SS, SR01LF, JH01L, DK01SEN, PJ01SEN, MV01MS	JL01S, JC01L, MM01S, PP01M, AM01M, HM01S, ME01L, MT01M, AW01L, PN01LF	SB01S, SN01L, PM01L, MV01M, TR01S, PM01SS
9.3	Not sure			ZB01S, TN01S, SB01LS	MJ01M, CH01LS
9.4	Just in operations.	DF01S			
9.5	Workers are doing their own inspection.	PC01L	SM01S	BS01L	GM01S
9.6	There are work teams on the rotor and Desman cells.			EV01S	
9.7	Technical and task related jobs.				PM02S
9.8	Exports ran without a manager for six months on the basis of good teamwork but overload was an issue.				AS01LE
9.9	Do not know or no comment.		JH01LS, JV01SEN,	DB01SEN	AM01SF, CM01L, EM01L, JM01SEN

SP1Q9	Could you describe which organisational functions or tasks are being performed by work teams within the manufacturing cells?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
9.10	There are many departmental teams.			GA01LS	
9.11	Remote Southern African facility team is a good example.		DM01LF		
9.12	Kaizen teams				AK01SE
9.13	Rolls to do with teamwork		RL01MEN		

SP1Q10	Has your organisation undergone significant change in terms of the number of hierarchical levels of the organisation? If so how has it changed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
10.1	No.	LV01L,BK01S, DF01S, NF01LI, RM01SE, CJ01SEN, JC01LS, AJ01LA	AS01M, SM01S, RB01MF, PG01LF, BD01SS, SR01LF, JH01L, DM01LF, JH01LS, RL01MEN, DK01SEN,	JL01S, ZB01S,JC01L, MM01S, PP01M, AM01M, HM01S, EV01S, TN01S, ME01L, MT01M, BS01L, AW01L, SB01LS,	SB01S, GM01S, SN01L, PM01L, MV01M, MJ01M, AS01LE, AM01SF, CM01L, TR01S, CH01LS, PM01SS, EM01L, AK01SE

SP1Q10	Has your organisation undergone significant change in terms of the number of hierarchical levels of the organisation? If so how has it changed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			PJ01SEN, JV01SEN, MV01MS	PN01LF, GA01LS, GS01SA, DT01SQ, DB01SEN	
10.2	Reduced by one level three years ago.	PC01L	MM01L		
10.3	Flatter than before. Narrower not deeper.	NF01LI			
10.4	Do not know.				JM01SEN

SP1Q11	What do you understand about Hoshin Kanri and policy deployment as far as your organisation is concerned?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
11.1	Understand it now. Did not before this interview.	LV01L, PC01L	SR01LF	ZB01S, BS01L	GM01S, SN01L, PM02S
11.2	Policy deployment, cascading objectives to lowest levels.	BK01S	AS01M SM01S, JH01S		
11.3	Not sure	DF01S	BD01SS	JL01S, JC01L, PP01M, EV01S, TN01S	SB01S, PM01L, MV01M
11.4	People involvement.			MM01S	

SP1Q11	What do you understand about Hoshin Kanri and policy deployment as far as your organisation is concerned?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
11.5	No idea.	RM01SE, CJ01SEN, JC01LS	MM01L, RB01MF, SB01LS, PG01LF, DM01LF, JH01LS, RL01MEN, DK01SEN, PJ01SEN, JV01SEN, MV01MS	ME01L, MT01M, AW01L, PN01LF, GA01LS, GS01SA, DT01SQ, DB01SEN	MJ01M, AM01SF, CM01L, TR01S, CH01LS, PM01SS, EM01L, JM01SEN
11.6	No comment.	NF01LI			
11.7	Not used	AJ01LA			

SP1Q11.1	Are you able to explain how teamwork is applied to Hoshin Kanri in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
11.1.1	No.	LV01L, DF01S, PC01L, NF01LI, RM01SE,	AS01M, RB01MF, BD01SS, SR01LF,	ZB01S, MM01S, AW01L, GA01LS	SN01L, PM01L, DT01SQ, PM01SS

SP1Q11.1	Are you able to explain how teamwork is applied to Hoshin Kanri in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
		CJ01SEN, AJ01LA	RL01MEN, MV01MS		
11.1.2	Person's objectives is the team's objectives.	BK01S			
11.1.3	Not sure			JL01S, JC01L, PP01M, AM01M, EV01S, TN01S, MT01M, BS01L	SB01S, GM01S, MV01M
11.1.4	No comment made.		SM01S, DK01SEN	DB01SEN	
11.1.5	Strategic tool, but this has not happened.				HM01S
11.1.6	Worker involvement.				PM02S
11.1.7	No idea.	JC01LS	MM01L, SB01LS, PG01LF, DM01LF, JH01LS, PJ01SEN, JV01SEN	ME01L, PN01LF, GS01SA	MJ01M, AS01LE, AM01SF, TR01S, CH01LS, EM01L, AK01SE, JM01SEN
11.1.8	Objectives and teams but we need to develop this.			JH01L	

SP2Q1	Could you explain why specific organisational structure changes were made to accommodate lean implementation in terms of:	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	See comments below:				

SP2Q1.1	Teamwork;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	Mostly departmental teams.	LV01L,			
1.1.2	Senior management and middle management teams are working at Kaizens.	BK01S		JC01L, MM01M	MV01M
1.1.3	Supervisors is a team			JL01S	
1.1.4	Not sure or no comment.	RM01SE		ZB01S, AW01L, SB01LS, GA01LS, DB01SEN	SB01S, PM01L, SN01L, MJ01M, AM01SF, CM01L, CH01LS, EM01L, JM01SEN
1.1.5	None	DF01S, PC01L, NF01LI, CJ01SEN, JC01LS, AJ01LA	AS01M, SM01S, MM01L, RB01MF, BD01SS, JH01L, DM01LF,	MM01S, PP01M, HM01S, ME01S, MT01M, BS01L, PN01LF	GM01S,PM02S, AS01LE, AK01SE

SP2Q1.1	Teamwork;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			JH01LS, RL01MEN, DK01SEN, PJ01SEN, MV01MS		
1.1.6	Not fully implemented.			EV01S	
1.1.7	Distribution manager appointment helped to establish teamwork in the distribution department.			TN01S	
1.1.8	No, we need more of this.			PG01LF	
1.1.9	Open office plan was introduced.			GS01SA	
1.1.10	Green areas daily shop floor meetings.		SR01LF		TR01S
1.1.11	Poor interdepartmental cooperation.			DT01SQ	
1.1.12	Previous export team failed, led to change in management. Current team working well as a team and achieving the results.				PM01SS

SP2Q1.2	Empowerment;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1	No	LV01L, PC01L, NF01LI,	MM01L, RB01MF, BD01SS,	JC01L, MM01S, PP01M, AM01M,HM01S,	GM01S, PM01L, PM02S, MV01M, AK01SE

SP2Q1.2	Empowerment;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
		M01SE, CJ01SEN, JC01LS, AJ01LA	SR01LF, JH01L, DM01LF, JH01LS, RL01MEN, PJ01SEN, MV01MS	ME01L, MT01M, BS01L, AW01L, PN01LF, GA01LS, DB01SEN	
1.2.2	Shop floor has the right to stop and fix things that are wrong.	BK01S			
1.2.3	Empowerment up to supervisor level		AS01M	JL01S	
1.2.4	Not sure or no comment.		DK01SEN	ZB01S, TN01S, SB01LS, GS01SA, DT01SQ	SB01S, MJ01M, AM01SF, CM01L, TR01S, CH01LS, EM01L
1.2.5	We have brought in selected people at lower levels, from supervisor to middle management and given them training in Kaizens.	DF01S			
1.2.6	Buyers and inspectors have been empowered to change suppliers.		SM01S		SNOIL
1.2.7	Has commenced.			EV01S	
1.2.8	Trying our best. Needs future focus.		PG01LF		

SP2Q1.2	Empowerment;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.9	Export sales representatives empowered to resolve sales to Congo.				PM01SS
1.2.10	See it as involving employees in the decision making process.		JV01SEN		
1.2.11	Empowered to design a product without supervision.				JM01SEN

SP2Q1.3	Leadership changes; any.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1	Old wood is out.	LV01L			
1.3.2	Plant manager and managing director was appointed less than two years ago.	BK01S	MM01L, PG01LF	PN01LF, DB01SEN	TR01S
1.3.3	Positional changes	CJ01SEN, AJ01LA	BD01SS, JH01L, DM01LF, JH01LS, JV01SEN, MV01MS	JL01S, PP01M	GM01S, PM02S, MV01M, AS01LE, EM01L
1.3.4	Plant manager appointment has resulted in many changes for the better. For example, Green area, safety spectacles, ear plugs and floor demarcations.	NF01LI	SR01LF	JC01L, BS01L	SB01S

SP2Q1.3	Leadership changes; any.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.5	Not sure or no comment.	RM01SE, JC01LS	RB01MF, RL01MEN, DK01SEN, PJ01SEN	ZB01S, ME01L, MT01M, SB01LS, GA01LS, DT01SQ	PM01L, MJ01M, CM01L, CH01LS, JM01SEN
1.3.6	Industrial engineering manager appointment is a promotion. Botswana manger appointed.	DF01S			
1.3.7	Positional leadership changes only.	PC01L	AS01M, SM01S	MM01S, HM01S, EV01S, TN01S, AM01M, AW01L	SN01L
1.3.8	Sales technical running service department, purchasing moved to industrial engineering. Branch managers has more scope in the field.				AM01SF
1.3.9	Too many changes has resulted in uncertainty.			GS01SA	
1.3.10	Export manager replaced plus the export sales representative.				PM01SS
1.3.11	Industrial engineering manager has taken over purchasing from the supply chain manager.				AK01SE

SP2Q1.4	.....other changes that are significant in terms of the lean programme?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.1	No comment made.	LV01L, RM01SE, CJ01SEN, JC01LS, AJ01LA	SM01S, MM01L, RB01MF, PG01LF, BD01SS, JH01LS, DK01SEN, PJ01SEN, JV01SEN, MV01MS	JLI01S, AM01M, EV01S, TN01S, AW01L, SB01LS, DB01SEN	MV01M, AM01SF, CM01L, PM01SS, EM01L, AK01SE, JM01SEN
1.4.2	Would say there are more teams working at lean.	BK01S			
1.4.3	Plant manager has made lots of changes Glasses. Ear plugs and floor demarcations.				SB01S
1.4.4	No other changes as those covered in the questionnaire.	DF01S, PC01L	AS01M, DM01LF, RL01MEN,	JC01L,ZB01S, MM01S, AM01L, MT01M, BS01L, PN01LF, GA01LS	GM01S, SB01S, SN01L, PM01L, MJ01M, AS01LE, TR01S, CH01LS
1.4.5	Temporary change of purchasing to industrial engineering.			PP01M, HM01S	
1.4.6	Previously an operator, now operator setter with leadership role.				PM02S

SP2Q1.4	.....other changes that are significant in terms of the lean programme?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.7	Lean has improved the factory and flow has definitely improved.		SR01LF	GS01SA	
1.4.8	Workers are becoming more aware and involved with the five s audits being conducted on a weekly basis.			DT01SQ	
1.4.9	Capital investment from corporate and the vision has brought about major change for the organisation.		JH01L		
1.4.10	More visual aids and visibility.	NF01LI			

SP2Q2	Could you explain why organisational behaviour has changed to accommodate lean implementation in terms of:	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	See comments below.				

SP2Q2.1	Communications;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1.1	Daily green areas meetings have been initiated and the managing director does a quarterly tank talk to the total organisation.	LV01L, PC01L, CJ01SEN	MM01L, BD01SS, JH01L, JV01SEN	JL01S, BS01L, AW01L, GS01SA, TR01S	MV01M, MJ01M, AM01SF
2.1.2	Two way radios between departments. Green areas and managing director's quarterly tank talk. Point		BK01S, DF01S		EV01S

SP2Q2.1	Communications;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	Kaizens also help with the valuing of employee ideas. Employee suggestion boxes. Direct link to managing director per boxes at shop floor level.				
2.1.3	More visits from management to the shop floor to address workers directly.				SB01S
2.1.4	Do not know.	JC01LS	RB01MF, SB01LS, DM01LF, RL01MEN, MV01MS	JC01L, PP01M, TN01S, PN01LF, GA01LS	CM01L, CH01LS, EM01L, JM01SEN
2.1.5	More involvement from people.		SM01S	ZB01S, MM01S, DT01SQ	
2.1.6	People are more informed and they share targets. They are more involved		AS01M		
2.1.7	Signs and notice boards show before and after improvements.				GM01S
2.1.8	Communications are at an acceptable level.			AM01M	
2.1.9	Remains a problem because of strive.				SN01L
2.1.10	Stops somewhere. Does not filter down.				PM01L
2.1.11	There is more transparency and dialogue. More open door approach.		PG01LF	HM01S	
2.1.12	Workers have become more responsive.				PM02S

SP2Q2.1	Communications;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1.13	Very little communication.			ME01L	
2.1.14	Improved, because if you want something you get it.			MT01M	
2.1.15	Exports involvement too soon to say.				AS01LE
2.1.16	Has improved but needs more.		SR01LF, PJ01SEN		
2.1.17	More data regarding organisational performance being presented on information boards.	NF01LI			
2.1.18	Downward has improved with upwards communication.	RM01SE			
2.1.19	Not good.		JH01LS		AK01SE
2.1.20	e - Mails a plenty. Sometimes better to go and look.				PM01SS
2.1.21	No changes.		DK01SEN		
2.1.22	Has improved.		DB01SEN		
2.1.23	Matrix cause managers to see communications as optional.	AJ01LA			

SP2Q2.2	respect for employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.2.1	Management has become more humble.	LV01L			
2.2.2	Less dictatorial style more participative and listening to employees.	BK01S	AS01M		

SP2Q2.2	respect for employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.2.3	No changes same as before.	PC01L, CJ01SEN	DM01LF, JH01LS, DK01SEN	JL01S, MM01S, TN01S, GS01SA, DB01SEN	SB01S, MV01M
2.2.4	Has improved with people becoming more up-skilled, more flexible and more involved in the achievement of objectives.		SR01LF	ZB01S, DT01SQ	
2.2.5	Managers show respect but when there is an emergency there is no respect.			JC01L	
2.2.6	More, open door, interactive communications has led to improved respect.	DF01S, RM01SE		BS01L, AW01L, PN01LF	GM01S, AS01LE
2.2.7	No respect, since everyone is for themselves.			AM01M	
2.2.8	Respect comes with recognition. Operators explain how they will improve quality. For example, there is a reward ceremony for employees.		SM01S		AM01SF
2.2.9	Remains a problem because of strive.				SN01L
2.2.10	Do not know. Should be measured.(mentioned once)	JC01LS	RB01MF, BD01SS, RL01MEN	SB01LS, GA01LS, EM01L	PM01L, CM01L
2.2.11	Agree that is has improved somewhat.			HM01S	MJ01M
2.2.12	Has improved since plant manager joined the organisation.			EV01S	

SP2Q2.2	respect for employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.2.13	Only hear about it.			ME01S	
2.2.14	Managers do not respect employees.			MT01M	
2.2.15	Opportunity exists for employees to participate.		MM01L		
2.2.16	More teaching, coaching and comprehension have resulted in earned respect.		PG01LF		
2.2.17	Always good but has not changed.				TR01S, PM01SS
2.2.18	Has improved with workers realising and appreciating the benefits gained from the changes.		JH01L		
2.2.19	Has always been good but is now more evident.	NF01LI			
2.2.20	Good		PJ01SEN		AK01SE
2.2.21	No comment		JV01SEN, MV01MS		
2.2.22	Has changed but pity the managing director since the structure makes it difficult to earn respect.	AJ01LA			
2.2.23	Do not know.				JM01SEN

SP2Q2.3	leadership behaviour;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.3.1	There is a more participative style. Before more autocratic.	LV01L, NF01LI, RN01SE		JL01S, ZB01S	

SP2Q2.3	leadership behaviour;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.3.2	Listen, do not dictate, be transparent, and follow standard operating procedures.	BK01S	AS01M	PN01LF	
2.3.3	No changes same as before. Do not know.	DF01S, PC01L, CJ01SEN	RB01MF, JH01LS, RL01MEN, DK01SEN, PJ01SEN	JC01L, MM01S, PP01M, TN01S, ME01L, MT01M, SB01LS, GA01LS, DB01SEN	SB01S, PM01L, MV01M, MJ01M, AS01LE, TR01S, EM01L
2.3.4	Have changed but still not 100%				GM01S
2.3.5	Leaders should become more transparent so that we can understand what is really going on.			AM01M	
2.3.6	Leaders lead by example.		SM01S		
2.3.7	Leaders should acknowledge the roll of workers				SN01L
2.3.8	Leaders have become more interested.			HM01S	
2.3.9	Has improved.		SR01LF	EV01S	
2.3.10	Workers are more responsive and more involved.			DT01SQ	PM02S. CH01LS
2.3.11	Leaders listen and understand more. More talking to more people.		BD01SS, DM01LF		PM02S, AM01SF
2.3.12	Leaders more professional.		MM01L		
2.3.13	More respect.			BS01L	
2.3.14	Have changed from dictatorial to listening			AW01L	

SP2Q2.3	leadership behaviour;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.3.15	The managing director has changed to more open door approach.		PG01LF		
2.3.16	Some confusion who the real leader is.			GS01SA	
2.3.17	No comment	JC01LS	JV01SEN, MV01MS		CM01L, EM01L
2.3.18	Have become more positive with open door policy. More awareness. Plant manager's initiative to participate in the research.		JH01L		
2.3.19	Export manager is a good positive leader. Allows participation and initiatives to flow.				PM01SS
2.3.20	Good				AK01SE
2.3.21	Has changed to leaders having to become ballerinas through the matrix.	AJ01LA			
2.3.22	Do not know,				JM01SEN

SP2Q2.4	attitudes of employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.4.1	There is some confusion since people are still assimilating changes.	LV01L			

SP2Q2.4	attitudes of employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.4.2	Attitudes have improved from high level of resistance to 80% to 90% participating with the lean programme.	BK01S		JL01S, JC01L, MT01M, PN01LF	
2.4.3	Not sure. No comment	JC01LS	RB01MF, RL01MEN, JV01SEN, MV01MS	AMO1M, SB01LS, GA01LS, DB01SEN	SB01S, CH01LS, EM01L, JM01SEN
2.4.4	At first against the changes, now better understanding and more positive.			ZB01S	
2.4.5	There was a serious misinterpretation of employees regarding wealth in terms of benefits. Resulted in disciplinary action taken because of behavioural issues.	DF01S			
2.4.6	More positive, more comfortable, more awareness, more involvement and appreciation from workers. (More confidence despite a depressed market (mentioned once). The tank talk has helped to improve attitudes.	NF01LI, RM01SE	AS01M, SM01S, PG01LF	AW01L	GM01S, AS01LE, AM01SF, PM01SS
2.4.7	Not much change. Have to work on improving flexibility.			MM01S	
2.4.8	Apprehensive.			PP01M	
2.4.9	What you do to others will be done to you.				SN01L

SP2Q2.4	attitudes of employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.4.10	Very negative because of the behaviour of management. 95% of workers have negative attitudes.				PM01L
2.4.11	No changes.	PC01L, CJ01SEN	JH01LS, DK01SEN	HM01S, TN01S, GS01SA	MJ01M, TR01S
2.4.12	Has improved since plant manager joined the organisation.			EV01S	
2.4.13	Has improved with more involvement and more contributions from workers. More focus on solutions, away from blame.		JH01L	DT01SQ	PM02S
2.4.14	More negative. At a low.		MM01L	ME01L	MV01M
2.4.15	Significantly improved with more understanding and accommodation.		BD01SS	BS01L	
2.4.16	Workers still resist changes and expect to be rewarded for the changes.		SR01LF		CM01L
2.4.17	Some more negative, but not all departments.		DM01LF		
2.4.18	70% Positive attitude and 30% negative attitude.				AK01SE
2.4.19	Good.		PJ01SEN		
2.4.20	Wait and see attitude. Persist with resistance and management will go away.	AJ01LA			

SP2Q2.5	Other?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.5.1	Cannot think of any. No comment.	LV01L, DF01S, PC01L, RM01SE, CJ01SEN, JC01LS, AJ01LA	RB01MF, PG01LF, BD01SS, SR01LF, JH01L, DM01LF, RL01MEN, DK01SEN, PJ01SEN, JV01SEN, MV01MS	JL01S, PP01M, AS01M, MM01S, AM01M, EV01S, TN01S, MT01M, BS01L, SB01LS, PN01LF, GA01LS, GS01SA, DT01SQ, PM01SS, DB01SEN	MV01M, MJ01M, AS01LE, AM01SF, CM01L, CH01LS, EM01L, AK01SE, JM01SEN
2.5.2	More Communications and transparency	BK01S		ZB01S	
2.5.3	Fear but less so now.			JC01L	
2.5.4	Many layout changes. For example new rotor flow, dispatch and receiving.				GM01S
2.5.5	Trust has improved. Employees have commented that they have struggled for two years to make things happen and now it is happening.		SM01S		
2.5.6	Ask for initiatives. Build on relationships.				SN01L
2.5.7	No trust in management. Fear them.				PM01L
2.5.8	Transfer of purchasing to industrial engineering.			HM01S	

SP2Q2.5	Other?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.5.9	People are motivated with more contributions.				PM02S
2.5.10	Too many levels of managers.			ME01L	
2.5.11	Visual aids has resulted in more awareness and visibility.	NF01LI			

SP3.1Q1	Can you recall how you felt when lean was introduced to your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1	Was aware of the biggest change so far when cellular manufacturing was attempted for a product assembly cell. Change was forced on us by corporate.	LV01L, AS01M			
1.2	Appointed because of the lean programme.	BK01S		HM01S,	
1.3	Saw it as a challenge, excited and positive. Saw the advantages	PC01L, JC01LS	AS01M, SM01S, RB01MF, SR01LF, PJ01SEN	JL01S, MT01M, BS01L, AW01L, DB01SEN	GM01S, PM02S, CH01LS
1.4	It was difficult but now has a better understanding.				SB01S
1.5	Fear, apprehension, suspicion and sceptical.			JC01L, PN01LF	AS01LE
1.6	Was new to the organisation when lean had already commenced.	CJ01SEN	BD01SS, DK01SEN	ZB01S, EV01S, TN01S,	PM01SS, AK01SE

SP3.1Q1	Can you recall how you felt when lean was introduced to your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
				GS01SA, DT01SQ	
1.7	No problem with it.	DF01S		MM01S, PP01M	TR01S, EM01L
1.8	People were not aware of lean being implemented.		MM01L	AM01M	
1.9	Took it as it came but now more interested				SN01L, MV01M
1.10	Feel it is not implemented.				PM01L
1.11	Did not know.		PG01LF, DM01LF	ME01L, SB01LS, GA01LS	MJ01M, AM01SF, CM01L, JM01SEN
1.12	Surprised		JH01L		
1.13	Reserved.	NF01LI			
1.14	Not aware, dark times when introduced		JH01LS		
1.15	No.		RL01MEN		
1.16	Hopeful.		JV01SEN		
1.17	Not affected.		MV01MS		
1.18	Saw it as a problem in the South African context. Non committed people see it as an opportunity to get into a comfort zone.	AJ01LA			

SP3.1Q1.1	How did others feel?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	No comment.	LV01L, CJ01SEN	BD01SS, JV01SEN	MM01S, ZB01S, TN01S, DT01SQ	GM01S, PM01SS
1.1.2	Senior management was split about lean programme for and against. Middle management was uncertain. Shop floor resisted but things have improved.	BK01S			
1.1.3	Overwhelmed at first.			JL01S	
1.1.4	Initially apprehensive. 30% disagree with the changes.				SB01S
1.1.5	Resistance, negative, fear, apprehension and threatened.	PC01L, JC01LS	AS01M, SM01S, SR01LF, MV01MS	JC01L, PP01M, BS01L, PN01LF	MV01M, EM01L
1.1.6	Workers had a concern for job security.	DF01S			
1.1.7	People were not aware of lean being implemented.		MM01L	AM01M	
1.1.8	Not sure.			SB01LS	SN01L, TR01S, CH01LS, AK01SE, JM01SEN
1.1.9	Feel it is not implemented				PM01L
1.1.10	New to the organisation when it was launched.	RM01SE	DK01SEN	HM01S	
1.1.11	Comfort zone issue.	AJ01LA		EV01S	
1.1.12	Mixed feelings most people now accept the changes.				PM02S

SP3.1Q1.1	How did others feel?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.13	Do not know.		PG01LF, DM01LF, PJ01SEN RL01MEN,	ME01L, MT01M. GA01LS, DB01SEN	MJ01M, AM01SF
1.1.14	Suspicious				AS01LE
1.1.15	Positive. One comment: Working smarter not harder.		JH01L	AW01L	
1.1.16	Excited		RB01MF		
1.1.17	People were not consulted and were therefore unhappy.			GS01SA	
1.1.18	Workers were against changes but there are now more acceptance.				CM01L
1.1.19	People reserved their feelings.	NF01LI			
1.1.20	Sales people were under pressure at the time so not really aware of the changes. Customers were using the sham buck		JH01LS		

SP3.2Q1	Do you feel that the lean programme has been fully implemented? Please elaborate how you see this in terms of organisational behaviours regarding:	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1	No.	LV01L, BK01S, DF01S, PC01L, NF01LI, RM01SE, CJ01SEN, AJ01LA	AS01M, SM01S, MM01L, RB01MF, PG01LF, SR01LF, JH01L, RL01MEN, PJ01SEN, MV01MS, MV01MS	JL01S, ZB10S, MM01S, PP01M, HM01S, EV01S, TN01S, MT01M, BS01L, AW01L, PN01LF, GS01SA, DT01SQ, DB01SEN	SN01L, PM02S, MV01M, AM01SF, PM01SS, AK01SE
1.2	Not sure or do not know.		DM01LF	SB01LS, GA01LS	SB01S, CH01LS, EM01L, JM01SEN
1.3	Yes			JC01L	
1.4	No comment	JCO1LS			
1.5	Still learning about it				AMO1M
1.6	Unable to comment. Too soon to say.			ME01L	MJ01M, AS01LE
1.7	In progress.		BD01SS		
1.8	No, not communicated properly.		JH01LS		

SP3.2Q1	Do you feel that the lean programme has been fully implemented? Please elaborate how you see this in terms of organisational behaviours regarding:	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.9	No, not sure that we have done much. Efforts seem to be more visual to make South Africa look like the USA.		DK01SEN		
1.10	No way, only the soft issues have been addressed.		JV01SEN		

SP3.2Q1.1	How people feel about the leadership of the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	Uncertainty.	LV01L, BK01S		BS01L, GS01SA	PM01L
1.1.2	Generally accepted see them as helpful, involving the people and listening.		AS01M, SM01S	JL01S, EV01S	SN01L
1.1.3	See them as knowing what they are doing. They are held in high regard.			JC01L, HM01S	SB01S
1.1.4	50%/50% happy / not happy with leaders. Meagre wages a major issue.			ZB01S	
1.1.5	Corporate very supportive. Only get involved if they feel some things are not to plan.	DF01S, NF01LI			
1.1.6	People are negative about the leadership since communications are one way.			MM01S, DT01SQ	AS01LE
1.1.7	Lack of confidence in leadership.			PP01M	
1.1.8	No comment or do not know.	PC01L, RM01SE, CJ01SEN, JC01LS, AJ01LA	PG01LF, SR01LF, DM01LF, PJ01SEN, MV01MS	SB01LS, GA01LS,	GM01S, AM01M, CM01L, CH01LS, EM01L, JM01SEN
1.1.9	More than 65% feel good about the leadership. 80% support the leadership of the organisation.		JH01L		PM02S

1.1.10	Confident.		RB01MF, JH01LS, JV01SEN	TN01S	AM01SF, PM01SS, AK01SE
1.1.11	People are against the leaders.		MM01L, RL01MEN	ME01L	
1.1.12	Acceptance.			AW01L	MV01M
1.1.13	No change.			MT01M	
1.1.14	Need more open cross-functional communications?			PN01LF	
1.1.15	Happy, clear communications, accommodating, open door policy.		BD01SS		TR01S
1.1.16	Senior management is highly educated. Better communication is a desperate need.		DK01SEN.		

SP3.2Q1.2	participation of employees regarding lean disciplines and techniques;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1	Participation was, and still is up to supervisory level.	LV01L			
1.2.2	New multifunctional teams and production monitoring upstream and downstream has been appreciated by the shop floor.	BK01S			
1.2.3	85% accepted the changes to lean.			JL01S	
1.2.4	Yes people are participating because they understand what is expected of them.			JC01L, AW01L, PN01LF	SB01S

SP3.2Q1.2	participation of employees regarding lean disciplines and techniques;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.5	Improving with 5 s and green areas and Kaizen participation.	DF01S	AS01M, SM01S, JH01L		
1.2.6	Starting to participate. 10% to 20% acceptance			MM01S, TN01S	
1.2.7	No comment	RM01SE, CJ01SEN, JC01LS, AJ01LA	SR01LF, MV01MS	PP01M, AM01M, GA01LS, DB01SEN	AS01LE, EM01L
1.2.8	Starting to participate. Need to be developed.		JV01SEN	HM01S	GM01S, MJ01M
1.2.9	Do not know.		RB01MF, DM01LF, RL01MEN	GS01SA	SN01L, PM01L, CM01L, CH01LS, PM01SS, AK01SE, JM01SEN
1.2.10	People have not had the opportunity.			ZB01S	
1.2.11	50:50 willingness			EV01S	
1.2.12	More learning results in more participation.				PM02S, TR01S
1.2.13	Toy, toy, crisis production manager and human resources manager names on banners to be dismissed from the organisation.			ME01L	
1.2.14	None to not much from workers.			BS01L	MV01M
1.2.15	No change.			MT01M	

SP3.2Q1.2	participation of employees regarding lean disciplines and techniques;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.16	Not sure of long term implications.	PC01L			
1.2.17	Workers participate only because they have to.		MM01L		
1.2.18	Active participation	NF01LI	BD01SS		AM01SF
1.2.19	There is no direct participation but it has improved with involvement such as the five s audits.			DT01SQ	
1.2.20	Participate in green areas but not sales.		JH01LS		
1.2.21	Being handled by senior management. Employees are not involved.		DK01SEN		
1.2.22	Participation on some levels but not all.		PJ01SEN		

SP3.2Q1.3	changes in roles and responsibilities from before lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1	No real changes	LV01L	RB01MF, JH01L, JH01LS, RL01MEN, PJ01SEN	HM01S,TN01S, MT01M, PN01LF	MV01M
1.3.2	No roll changes but responsibility changes with operators being held personally responsible for their performance for output and quality.	BK01S		JL01S	

SP3.2Q1.3	changes in roles and responsibilities from before lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.3	Not sure or do not know	NF0LI	BD01SS, DM01LF	GS01SA	SB01S, GM01S, PM01SS, JM01SEN
1.3.4	People have become more flexible and multi-skilled. People sorting out their areas. People more proactive and reliable.		ASM01	JC01L, MMO1S, ZB01S, AW01L	
1.3.5	Industrial engineering manager has been appointed the Kaizen champion.	DF01S		ME01L	
1.3.6	Supply chain manager roll changed with purchasing to industrial engineering.		MM01L	PP01M	
1.3.7	No comment.	RM01SE, CJ01SEN, JC01LS, AJ01LA	PG01LF, SR01LF, JV01SEN, MV01MS	AM01M, SB01LS, GA01LS, DT01SQ, DB01SEN	MJ01M, AM01SF, CM01L, TR01S, CH01LS, EM01L
1.3.8	Inspection and buying roll changes in terms of empowerment.		SM01S, HM01S		SN01L
1.3.9	Purchasing department moved.				PM01L
1.3.10	Ordinary basic workers promoted to operators in the rubber shop.			EV01S	
1.3.11	PM02S has experienced a roll change to leading the team involved in the cell.				PM02S

SP3.2Q1.3	changes in roles and responsibilities from before lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.12	No roll changes. Positions were filled.	PC01L			AS01LE
1.3.13	Roll and responsibility changes between supply chain manager and industrial engineering manager				AK01s
1.3.14	Production leaders rotate. No other changes.		DK01SEN		

SP3.2Q1.4	knowledge of lean disciplines;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.1	50% understanding of lean at this stage.	LV01L		JL01S	
1.4.2	20% understanding of lean at this stage	BK01S			
1.4.3	Unsure. More understanding required. Not well established.			JC01L, DT01SQ	SB01S, GM01S, AM01SF
1.4.4	More understanding and improvement with training and communications.	DF01S		AW01L, PN01LF	
1.4.5	Focus is on flow.		AS01M		
1.4.6	People say lean as a tool not effective enough			MM01S	
1.4.7	Will still develop			PP01M	
1.4.8	Learning about it.			AM01M,	SN01L
1.4.9	Improving		SM01S		
1.4.10	Kaizen, five S and seven wastes			ZB01S	MV01M

SP3.2Q1.4	knowledge of lean disciplines;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.11	Unable to say	NF01LI, AJ01LA	RB01MF, PG01LF, BD01SS, DM01LF, JH01LS, RL01MEN, MV01MS	TN01S, GS01SA	PM01L, MJ01M,.AS01LE, SB01LS, GA01LS, CM01L, TR01S, EM01L, AK01SE, DB01SEN, JM01SEN
1.4.12	Has not really occurred.			HM01S, BS01L	
1.4.13	Still weak.			EV01S,	PM01SS
1.4.14	Poor, the production manager unable to read drawings.			ME01L	
1.4.15	No change.		MM01L	MT01M	
1.4.16	Lots to be done still.	PC01L			
1.4.17	No comment	RM01SE, CJ01SEN, JC01LS	SR01LF, JV01SEN		
1.4.18	Centred in middle management.		JH01L		
1.4.19	None. Do not think many employees know what lean is.		DK01SEN		
1.4.20	Positive understanding with improved quality and less waste.		PJ01SEN		

SP3.2Q1.5	changes in attitudes towards lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.5.1	There is a positive, upwards trend. More forward thinking.	LV01L, NF01LI	MM01L	AW01L, PN01LF	MV01M, AM01SF
1.5.2	Dictatorial style have changed to much less now and more listening to new ideas.	BK01S			
1.5.3	Workers resisted but now accept.			JL01S, JC01L, ZB01S	
1.5.4	Not sure or do not know		BD01SS, DM01LF, JH01LS, MV01MS		SB01S, SN01L, EM01L, JM01SEN
1.5.5	More acceptance with results. Mind-set is changing	DF01S.	AS01M, SM01S, SR01LF	MM01S, EV01S, SB01LS	
1.5.6	Will still develop			PP01M	
1.5.7	Can still improve				GM01S
1.5.8	Still learning about it.			AM01M	
1.5.9	No changes in attitude because of lean.		DK01SEN	HM01S, TN01S, ME01L, BS01L	PM01L
1.5.10	Has improved.		RB01MF, JH01L	GS01SA	PM02S, AS01LE, CH01LS, PM01SS
1.5.11	No change.	CJ01SEN	RL01MEN, PJ01SEN	MT01M	

SP3.2Q1.5	changes in attitudes towards lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.5.12	Training will play an important role. Need buy in.	PC01L			
1.5.13	No comment	RM01SE, JC01LS, AJ01LA	PG01LF, JV01SEN	GA01LS, DT01SQ	CM01L, TR01S
1.5.14	Many see lean as a threat to job security. See that it will lead to job losses.				AK01SE
1.5.15	Negative, do not think it will work.			DB01SEN	

SP3.2Q1.6	Respect shown by management towards the employees of the organisation; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.6.1	Always very healthy and no real change despite the lean process.	LV01L	BD01SS		
1.6.2	The change leadership style has cultivated more respect between management and employees.	BK01S		AW01L	
1.6.3	Always good. It's ok and do not need to improve.		SM01S	JL01S	GM01S
1.6.4	No change.	CJ01SEN	JH01LS	ZB01S, PP01M, HM01S, ME01L, MT01M	SB01S, MV01M, AS01LE, TR01S
1.6.5	Has improved but in emergencies poor respect.			JC01L	
1.6.6	Ongoing process.	DF01S,	MM01L		

SP3.2Q1.6	Respect shown by management towards the employees of the organisation; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.6.7	People welcome more communications and information sharing with them. Appreciate sharing of ideas and direct line to managing director This had led to more respect for management.		AS01M		AM01SF, AK01SE
1.6.8	Difficult. Some managers do not even greet you.			MM01S	
1.6.9	Still learning about it.			AM01M	
1.6.10	If management show respect, they will receive it.				SN01L
1.6.11	Management is autocratic and show no respect.				PM01L
1.6.12	Has improved with Gemba quarterly tank talk. The plant manager is a good listener.			EV01S, BS01L, PN01LF	PM02S
1.6.13	Always visible. High degree of respect shown.	NF01LI		TN01S	CM01L
1.6.14	No comment or do not know.	PC01L, RM01SE, JC01LS, AJ01LA	RB01MF, PG01LF, SR01LF, JH01L, DM01LF, EM01L, JV01SEN, MV01MS	GA01LS, GS01SA	MJ01M, CH01LS, JM01SEN

SP3.2Q1.6	Respect shown by management towards the employees of the organisation; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.6.15	Has improved with management concern to increase output.			DT01SQ	PM01SS
1.6.16	Management gets 5 out of 10 for respect shown to employees.		RL01MEN		
1.6.17	No different from any other organisation.		DK01SEN		
1.6.18	Management does not show respect. Workers do not respect management.			DB01SEN	
1.6.19	Yes respect is shown by management.		PJ01SEN		

SP3.2Q1.7	.....any other changes in behaviour that you specifically have witnessed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.7.1	Think most have been covered.	LV01L	PJ01SEN		
1.7.2	Improved relationships with shop stewards. Green areas are doing well.	BK01S			
1.7.3	Management has become more positive and appreciative			JL01S	
1.7.4	No	DF01S, PC01L, CJ01SEN		MM01S, ZB01S, ME01L, MT01M, BS01L, DB01SEN	SB01S, PM01L, GM01S, MV01M, AS01LE, CM01L

SP3.2Q1.7	.....any other changes in behaviour that you specifically have witnessed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.7.5	People have become more flexible.			JC01L	
1.7.6	People feel embraced.		AS01M		
1.7.7	Mistrust among departments. Blame			PP01M	SN01L
1.7.8	No comment.	JC01LS, AJ01LA	PG01LF, SR01LF, JH01L, DM01LF, JH01LS, RL01MEN, JV01SEN, MV01MS	AM01M, TN01S, SB01LS, GA01LS, GS01SA, DT01SQ	PM02S, MJ01M, TR01S, CH01LS, EM01L, JM01SEN
1.7.9	There is more buy in and involvement from workers.		SM01S		
1.7.10	Management has become more involved.			HM01S	
1.7.11	Generally a more positive attitude.			EV01S, PN01LF	
1.7.12	More awareness.		MM01L		
1.7.13	Managers listen better.		RB01MF		
1.7.14	More awareness of safety, quality and taking responsibility.				AM01SF
1.7.15	Employees are willing to help out per forklift example.		BD01SS		

SP3.2Q1.7	.....any other changes in behaviour that you specifically have witnessed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.7.16	Workforce attitudes towards each other have become friendlier and more positive.	NF01LI			
1.7.17	Dispatch has changed for the better with quick answers and feedback				PM01SS
1.7.18	More positive due to open door policy of managers.				AK01SE
1.7.19	General unhappiness and frustration.		DK01SEN		

SP4Q1	Having discussed changes in organisational structure and behaviour for your organisation, how would you describe the change in organisational culture since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1	To some extent there is more awareness of the need for teamwork and the need to assume alternate rolls.	LV01L			
1.2	Participative.	BK01S			
1.3	Make an impact. Urgency and focus to get the job through the shop.			JL01S, AW01L, PN01LF	
1.4	Before one guy worked one machine now he can work more than one machine.			JC01L	SB01S
1.5	Improve the standards. Tighten disciplines and rules.			ZB01S	MJ01M, AS01LE
1.6	Strong culture of survival, adaptation and growth.	DF01S			

SP4Q1	Having discussed changes in organisational structure and behaviour for your organisation, how would you describe the change in organisational culture since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.7	More involvement and structure.	PM01SE	AS01M, SM01S		PM025
1.8	No change.	CJ01SEN , JC01LS	JH01LS, MV01MS	MM01S. PP01M, TN01S, MT01M, GA01LS	SN01L, CH01LS
1.9	No comment.		RL01MEN, PJ01SEN, JV01SEN	BS01L, SB01LS, DT01SQ, DB01SEN	GM01S, CM01L, TR01S, EM01L, JM01SEN
1.10	Uncertainty.			AM01M	
1.11	My way or the high way.			EV01S	PM01L
1.12	Willing accommodation.			HM01S	
1.13	Output is king.			ME01L	
1.14	Interdepartmental strive				MV01M
1.15	Encounter a problem then resolve it.		MM01L		
1.16	Teamwork, focus and cooperation.		RB01MF, JH01L		
1.17	Diversified, Afrikaans, employee's biggest asset.		PG01LF		
1.18	More awareness and transparency.				AM01SF

SP4Q1	Having discussed changes in organisational structure and behaviour for your organisation, how would you describe the change in organisational culture since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.19	Employees aggressive. Want to strike, aftermath of merger lingers.			GS01SA	
1.20	Becoming a lean culture.		BD01SS		
1.21	Difficulty with communications.		SR01LF		
1.22	Positive, hardworking, enjoy the organisation.	NF01LI			
1.23	No change, make the customers happy.		DM01LF		
1.24	Service first. Achieve the organisational goals.				PM01SS
1.25	Non sharing of knowledge culture				AK01SE
1.26	Helpful, hardworking but a stress loaded ticking time bomb.		DK01SEN		
1.27	Wait and see culture	AJ01LA			

SP5.1Q1	Do you think that your organisation has self-directed teams working at implementing and continuously improving what they do?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1	As discussed teams are mainly at departmental level. No self-directed teams yet.	LV01L		JL01S	
1.2	No not fully yet	BK01S			

SP5.1Q1	Do you think that your organisation has self-directed teams working at implementing and continuously improving what they do?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3	No	DF01S, PC01L, RM01SE, CJ01SEN , JC01LS, AJ01L, AAJ01LA	AS01M, SM01S, MM01L, RB01MF, BD01SS, SR01LF, JH01L, JH01LS, DK01SEN, PJ01SEN, JV01SEN, MV01MS	JC01L, MM01S, PP01M, AM01M, HM01S, EV01S, TN01S, ME01L, MT01M, BS01L, AW01L, SB01LS, PN01LF, GA01LS, GS01SA, DT01SQ	SB01S, GM01S, SN01L, PM01L, PM02S, MV01S, MJ01M, AS01LE, AM01SF, TR01S, AK01SE
1.4	Four out of 17 people have become self-directing.			ZB01S	
1.5	Do not know.		PG01LF		CM01L, CH01LS, EM01L, JM01SEN
1.6	Beginning stages.	NF01LI			
1.7	Remote Southern African facility is a good example.	DM01LF			
1.8	We do not but dispatch team so good that they are able to work without a manager.				PM01SS
1.9	Yes the core development project.		RL01MEN		
1.10	Yes			DB01SEN	

SP5.1Q1	Do you think that your organisation has self-directed teams working at implementing and continuously improving what they do?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
SP5.1Q1.1	Are you able to point out examples of this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	No.	LV01L, DF01S, RM01SE, JC01LS, AJ01LA PC01L, CJ01SEN ,	AS01M, SM01S, BD01SS, PJ01SEN, JV01SEN, MM01L, RB01MF, SR01LF, JH01LS, DK01SEN, MV01MS	JL01S, DB01SEN, JC01L, MM01S, PP01M, AM01M, HM01S, EV01S, TN01S, ME01L, MT01M, BS01L, AW01L, SB01LS, PN01LF, GA01LS, GS01SA, DT01SQ	SB01S, SN01L, GM01S, PM01L, PM02S, MV01M, MJ0M, AS01LE, AM01SF, TR01S, CH01LS, AK01SE
1.1.2	On occasion no real examples.	BK01S			
1.1.3	Four out of 17 people have become self-directing in assembly.			ZB01S	
1.1.4	Do not know.		PG01LF		CM01L, EM01L, JM01SEN

SP5.1Q1	Do you think that your organisation has self-directed teams working at implementing and continuously improving what they do?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.5	IT team. Pockets of teams emerging such as warehouse and dispatch.	NF01LI			
1.1.6	Remote Southern African facility is a good example.		DM01LF		
1.1.7	Dispatch team.				PM01SS
1.1.8	Core development project		RL01MEN		

SP5.1Q1.2	Do you think that these teams are empowered to a substantial level in terms of decisions impacting the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1	No self-directed teams.	LV01L, DF01S, PC01L, RM01SE, CJ01SEN , JC01LS, AJ01LA	AS01M, SM01S, MM01L, RB01MF, BD01SS, SR01LF, JH01L, JH01LS, DK01SEN, PJ01SEN, MV01MS	JL01S, PN01LF, GA01LS	SN01L, TR01S, MV01M,

SP5.1Q1.2	Do you think that these teams are empowered to a substantial level in terms of decisions impacting the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.2	To some extent when the occasion arises. They may make proposals if they need a new machine for example.	BK01S, NF01LI			
1.2.3	No			JC01L, ZB01S, MM01S, PP01M, AM01M, HM01S, EV01S, TN01S, ME01L, MT01M, BS01L, AW01L, SB01LS, GS01SA, DT01SQ, DB01SEN	SB01S, GM01S, PM01L, PM02S, MJ01M, AM01SF, PM01SS, AK01SE
1.2.4	We were empowered substantially to make decisions regarding exports during six months operating without a manager				AS01LE
1.2.5	Do not know.		PG01LF		CM01L, CH01LS, EM01L
1.2.6	Remote Southern African facility is a good example.		DM01LF		
1.2.7	Yes		RP01MEN		
1.2.8	No comment.		JV01SEN		JM01SEN

SP5.1Q1.2	Do you think that these teams are empowered to a substantial level in terms of decisions impacting the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
SP5.1Q1.3	To what extent would you say has self-directed teams taken over the roles and responsibilities in the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1	Not done yet.	LV01L, BK01S, DF01S, PC01L, NF01LI, RM01SE, CJ01SEN , JC01LS, AJ01LA	AS01M, SM01S, MM01L, RB01MF, BD01SS, SR01LF, JH01L, JH01LS, RL01MEN, DK01SE, PJ01SEN, MV01MS	JL01S, JC01L, ZB01S, MM01S, PP01M, AM01M, HM01S, EV01S, TN01S, ME01L, MT01M, BS01L, AW01L, SB01LS, PN01LF, GA01LS, GS01SA, DT01SQ, DB01SEN	SB01S, GM01S, SN01L, PM01L, PM02S, MV01M, MJ01M, AS01LE, AM01SF, TR01S, PM01SS, AK01SE
1.3.2	Do not know.		PG01LF		CM01L, CH01LS, EM01L, JM01SEN
1.3.3	Remote Southern African facility is a good example.		DM01LF		
1.3.4	No comment.		JV01SEN		

SP5.2Q1	Lean theory suggests that organisations should restructure along the value stream of the organisation.	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	Blank see answers below.				

SP5.2Q1.1	Do you think that your organisation has achieved this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	No. Organisation is set in its way of a matrix structure.	LV01L	MV01MS		
1.1.2	Not fully but getting there with the development of teamwork.	BK01S			
1.1.3	No	PC01L, RM01SE, CJ01SEN, AJ01LA	AS01M, SM01S, MM01L, RB01MF, PG01LF, BD01SS, SR01LF, JH01L, DM01LF, JH01LS, DK01SEN, RL01MEN PJ01SEN	JL01S, JC01L, ZB01S,MM01S, HM01S, EV01S, ME01L, MT01M, BS01L,; AW01L, SB01LS, GS01SA, DT01SQ, DB01SEN	SN01L, PM01L, PM02S, MV01M, AM01SF, CH01LS, PM01SS, AK01SE

SP5.2Q1.1	Do you think that your organisation has achieved this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.4	Yes			AM01M, PN01LF	SB01S
1.1.5	Ongoing process.	DF01S, NF01LI			
1.1.6	No since product management is an issue and it impacts inventory.			PP01M	TR01S
1.1.7	Not sure.	JC01LS		TN01S	GM01S, AJ01M
1.1.8	Better than what it used to be.				AS01LE
1.1.9	No comment.			GA01LS	CM01L+C5:H10, EM01L, JM01SEN

SP5.2Q1.2	If so, how has the organisation achieved this in terms of restructuring and working in specific ways?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1	No comment made.	LV01L, PC01L, RB01MF, NF01LI, RM01SE, JC01LS, AJ01LA	PG01LF, JH01L, JH01LS, DK01SEN, PJ01SEN, JV01SEN, MV01MS	SB01LS, GA01LS	

SP5.2Q1.2	If so, how has the organisation achieved this in terms of restructuring and working in specific ways?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.2	Not fully but getting there with the development of teamwork.	BK01S			
1.2.3	No or no comment.	DF01S, CJ01SEN	AS01M, SM01S, RL01MEN,	JL01S, JC01L, ZB01S,MM01S, PP01M, HM01S, EV01S, ME01L, MT01M, BS01L, GS01SA, DB01SEN	SN01L, PM01L, PM02S, MV01M, MJ01M, AW01L, AM01SF, CH01LS, PM01SS, AK01SE
1.2.4	More multiskilling of people.				SB01S
1.2.5	Not sure.			TN01S	GM01S
1.2.6	Flow is better and production is better.			AM01M	
1.2.7	Not achieved can improve if Integrate sales and manufacturing		MM01L		
1.2.8	Do not know.		DM01LF		AS01LE, CM01L, TR01S, EM01L, JM01SEN
1.2.9	With the matrix structure.			PN01LF	
1.2.10	Lots to be done structurally. Current structure impedes the lean process.		BD01SS		

SP5.2Q1.2	If so, how has the organisation achieved this in terms of restructuring and working in specific ways?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.11	In progress. Organisation is employing the right people.		SR01LF		
1.2.12	More CI teams and lean teams.			DT01SQ	

SP5.2Q1.3	Do you think that teamwork has played a significant role?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1	No comment made.	LV01L, NF01LI, AJ01LA	MM01L, RB01MF, PG01LF, DM01LF, DM01LF, RL01MEN, DK01SEN, PJ01SEN, MV01MS	AM01M, TN01S, BS01L, SB01LS, GA01LS, DB01SEN	MJ01M, AS01LE, TR01S, EM01L
1.3.2	Yes as was explained, for the cross-functional teams identified.	BK01S	AS01M	PP01M, GS01SA	
1.3.3	Yes, but more so for senior management and middle management. More needs to be done at shop floor level.			JL01S,	SN01L

SP5.2Q1.3	Do you think that teamwork has played a significant role?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.4	Yes with More multiskilling of people.			ZB01S	AM01SF
1.3.5	No	DF01S, RM01SE, CJ01SEN	SM01S, SR01LF, JH01LS	JC01L, MM01S, HM01S, ME01L, MT01M, AW01L	PM01L, PM02S, MV01M, DT01SQ, PM01SS, AK01SE
1.3.6	Not sure.	JC01LS			SB01S, GM01S, CM01L, CH01LS, JM01SEN
1.3.7	To some extent.		JV01SEN	EV01S	
1.3.8	Need more buy in.	PC01L			
1.3.9	Yes more cross-functionality.			PN01LF	
1.3.10	Yes but the organisation will have to dedicate more time to this.		BD01SS		
1.3.11	There is no quick answer to this question. (Salesman insisted on the impossible with columns. Serious lack of understanding and teamwork.		JH01L		

SP5.2Q1.4	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.1	No comment made.	LV01L, NFO1LI, AJ01LA	MM01L, RB01MF, PG01LF, SR01LF, RL01MEN, DK01SEN, PJ01SEN, JV01SEN, MV01MS	AM01M, EV01S, TN01S, BS01L, SB01LS, GA01LS, DT01SQ, EM01L, DB01SEN	MJ01M, AS01LE, CM01L, TR01S, JM01SEN
1.4.2	Yes as was explained for the cross-functional teams identified.	BK01S	AS01M	PP01M, GS01SA	
1.4.3	Yes, but more so for senior management and middle management. More needs to be done at shop floor level.			JL01S	
1.4.4	Not sure				SB01S
1.4.5	No	DF01S, CJ01SEN, JC01LS	SM01S, DM01LF, JH01LS	JC01L, MM01S, HMO1S, ME01L, MT01M, AW01L	SN01L, PM01L, PM02S, MV01M, PM01SS, AK01SE
1.4.6	More communications	PC01L			GMO1S, CH01LS
1.4.7	Yes more cross-functionality.			PN01LF	
1.4.8	Yes with more multiskilling of people			ZB01S	AM01SF

SP5.2Q1.4	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.9	Just that more time is needed to resolve this.		BD01SS		
1.4.10	Serious lack of teamwork between sales and manufacturing		JH01L		

SP6Q1	Has your organisation approached lean as a total strategy in terms of Hoshin Kanri and policy deployment?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1	No	LV01L, PC01L, RM01SE, CJ01SEN, JC01LS, AJ01LA	MM01L, RB01MF, BD01SS, SR01LF, JH01L, DM01LF, JH01LS, RL01MEN, DK01SEN, PJ01SEN, MV01MS	ME01L, MT01M, BS01L, AW01L, GS01SA, DB01SEN	MV01M, AS01LE, PM01SS
1.2	Yes in terms of the cascading of objectives resulting in individual objectives	BK01S	AS01M, SM01S	MM01S	

SP6Q1	Has your organisation approached lean as a total strategy in terms of Hoshin Kanri and policy deployment?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3	Yes but more from a senior to middle management point of view.			JL01S	
1.4	Not sure or no comment.			JC01L, ZB01S, PP01M, HM01S, TN01S, PN01LF	SB01S, GM01S, MJ01M, PM02S, EM01L
1.5	No. Lean is part of the total strategy	DF01S			
1.6	Do not know		PG01LF	AM01M, SB01LS, GA01LS	SN01L, PM01L, AM01SF, CM01L, TR01S, CH01LS, AK01SE, JM01SEN
1.7	Think so.			EV01S	
1.8	Yes in order to make the organisation highly competitive.			DT01SQ	
1.9	Yes	NF01LI			
1.10	Attempted to.		JV01SEN		

SP6Q1.1	Could you explain how and why this was done?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	No.	LV01L, PC01L, RM01SE, CJ01SEN, JC01LS, AJ01LA	MM01L, RB01MF, PG01LF, BD01SS, SR01LF, JHO1L, DM01LF, JH01LS, RL01MEN, PJ01SEN, MV01MS	ZB01S, PP01M, AM01M, AM01S, JC01L, TN01S, ME01L, MT01M, BS01L, AW01L, SB01LS, PN01LF, GA01LS, GS01SA, DB01SEN	SB01S, GM01S, SN01L, PM01L, PM02S, MV01M, MJ01M, AS01LE, AM01SF, CM01L, TR01S, CH01LS, PM01SS, EM01L, AK01SE
1.1.2	Company objectives aligned to individual objectives.	BK01S	AS01M, SM01S	MM01S	
1.1.3	To improve service level.			JL01S	
1.1.4	No. Lean is part of the total strategy.	DF01S			
1.1.5	Involve people in objectives, e.g. cost reductions.			EV01S	
1.1.6	Yes in order to make the organisation highly competitive.			DT01SQ	
1.1.7	All departments were involved.	NF01LI			

SP6Q1.1	Could you explain how and why this was done?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.8	No. Lean appears to be a crutch or possible reason or lack in ownership of tasks.		DK01SEN		
1.1.9	No Comment.		JV01SEN		JM01SEN

SP6Q1.2	In hindsight what and how will you do things differently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1	No comment made.	LV01L, NF01LI, JC01LS, AJ01LA	MM01L, PG01LF, BD01SS, SR01LF, JH01L, DM01LF, JH01LS, RL01MEN, PJ01SEN, JV01SEN, MV01MS	AM01M, ME01L, BS01L, SB01LS, GA01LS, DT01SQ, DB01SEN	PM01L, PM02S, MV01S, MJ01M, AS01LE, CM01L, PM01SS, EM01L
1.2.2	More Communications and more convincing of problematic employees and more time spent to obtain buy in.	BK01S		JC01L, MM01S	GM01S

SP6Q1.2	In hindsight what and how will you do things differently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.3	No change to structure more, shop floor teams with more focus on waste			JL01S	
1.2.4	Not sure.			PP01M, TN01S, PN01LF	SB01S, TR01S, CH01LS, AK01SE, JM01SEN
1.2.5	Prepare a checklist for what needs to be done.				ZB01S
1.2.6	Nothing.	DF01S			
1.2.7	Start with level scheduling at the outset.		AS01M		
1.2.8	Empower employees more.		SM01S		
1.2.9	Flatten the structure to improve communications.			AW01L	SN01L
1.2.10	Integrate departments, more empowerment, more teamwork, restructure with total involvement.			HM01S	
1.2.11	More involvement.			EV01S	
1.2.12	Maximise sales, streamline manufacturing reduce heads but more heads in finance.		RB01MF		
1.2.13	Do not sell to bad paying customers.				AM01SF
1.2.14	Sort out the structure according to flow before implementations	RM01SE		GS01SA	

SP6Q1.2	In hindsight what and how will you do things differently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.15	Lean should be a strategic decision. Determine the objective of full implementation. Flatten the structure to achieve effective flow.	CJ01SEN			
1.2.16	Chose a strategy lean, MRP, just in time and stick with it.		DK01SEN.		

SP6Q1.3	Can you identify the lean disciplines and techniques that have been implemented by way of teamwork in any form in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1	No comment made. Have to think about it.	LV01L, PC01L, AJ01LA	MM01L, MV01MS	AM01M, BS01L, AW01L, SB01LS	GM01S, PM02S, PM01SS
1.3.2	Five S, (S1,S2 with S4), SOP'S, Visual management, tact versus tact, Kaizen, point Kaizens and problem-solving, operators responsible for own inspection, value stream mapping more teamwork.	BK01S, DF01S	AS01M, SM01S	JC01L, PP01M, MM01S, EV01S, MT01M	
1.3.3	Teamwork mainly with senior and middle management but we used one-piece flow. Push rather than pull at the moment.			JL01S	
1.3.4	Not sure.		PJ01SEN	TN01S	SB01S, SN01L, AK01SE

SP6Q1.3	Can you identify the lean disciplines and techniques that have been implemented by way of teamwork in any form in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.5	Would say that a supervisor cross-functional team has been established.			ZB01S	
1.3.6	Do not know.	JC01LS	RB01MF, PG01LF, DM01LF, JH01LS	ME01L, PN01LF, GA01LS	PM01L, MJ01M, AM01SF, CM01L, CH01LS, CH01LS, EM01L, JM01SEN
1.3.7	Communication and training				MV01M
1.3.8	Kaizen, problem-solving and five s		BD01SS, SR01LF	GS01SA	AS01LE
1.3.9	No limited in teamwork.			DT01SQ	
1.3.10	No comment.	NF01LI, RM01SE	JH01L, RL01MEN, JV01SEN		
1.3.11	Teamwork not done.		DK01SEN.		

SP6Q2	If teamwork was extensively utilised with your lean implementation programme, please explain what these teams are or were and.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1	There was and is a lack of teamwork.	LV01L	DK01SEN	PN01LF	

SP6Q2	If teamwork was extensively utilised with your lean implementation programme, please explain what these teams are or were and.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.2	Senior management team, Kaizen teams with corporate, shop floor teams with green areas. Story board for receiving department developed.	BK01S, DF01S	AS01M, SM01S	PP01M	SB01S
2.3	Teamwork mainly with senior and middle management as well as supervisors and setters.			JL01S	
2.4	Not used. Was not done.	PC01L, NF01LI, CJ01SEN, AJ01LA	MM01L, SR01LF, JH01L, DM01LF, JH01LS, RL01MEN, PJ01SEN, JV01SEN, MV01MS	ZB01S, MM01S, JC01L, AW01L, DT01SQ, DB01SEN	PM02S, MV01M, AS01LE, AM01SF, PM01SS
2.5	Not sure			TN01S	GM01S, SN01L, TR01S
2.6	No comment.		RB01MF,	AM01M. HM01S, GA01LS	EM01L
2.7	Do not know.	JC01LS		SB01LS	PM01L, MJ01M, CM01L, CH01LS, AK01SE, JM01SEN

SP6Q2	If teamwork was extensively utilised with your lean implementation programme, please explain what these teams are or were and.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.8	Rotor, product type, assembly and test bay has work teams.			ME01L, BS01L	
2.9	Five s, Kaizen			MT01M	
2.10	Teamwork mainly departmental.		PG01LF, BD011S		
2.11	Kaizen cross-functional NPD team			GS01SA	

SP6Q2.1	.....what their respective roles and responsibilities are or were?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1.1	There was and is a lack of teamwork.	LV01L	DK01SEN	MM01S, EV01S, PN01LF, DT01SQ	AM01SF
2.1.2	Up to operator level everyone has responsibilities to achieve given objectives.	BK01S	AS01M, SM01S		
2.1.3	Implement and lead.			JL01S	
2.1.4	Not sure			JC01L, ZB01S, TN01S	SB01S, GM01S, SN01L
2.1.5	As discussed the department managers and supervisors lead the teams.	DF01S			

SP6Q2.1	.....what their respective roles and responsibilities are or were?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1.6	I acted as chairperson for the receiving Kaizen that was facilitated by corporate team.			PP01M	
2.1.7	No comment	PC01L, NF01LI, RM01SE, CJ01SEN, AJ01LA	MM01L, RB01MF, PG01LF, SR01LF, JH01L, DM01LF, JH01LS, RN01MEN, PJ01SEN, JV01SEN, MV01MS	AM01M, HM01S, AW01L, SB01LS, GA01LS, DB01SEN	PM02S, MV01M, MT01M, AS01LE, PM01SS
2.1.8	Do not know.	JC01LS			PM01L, MJ01M, CM01L, CH01LS, EM01L. AK01SE, JM01SEN
2.1.9	Different task done by all e.g. milling, drilling, machining and assembly of pumps.			ME01L	
2.1.10	Refer to JL01S who has done well with teams in the rotor shop and the rubber plant.			BS01L	

SP6Q2.1	.....what their respective roles and responsibilities are or were?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1.11	NPD Kaizen team, Engineering manager acted as chairperson and scribe.			GS01SA	
2.1.12	Apart from assembly teamwork was not extensively used.		BD01SS		

SP6Q2.2	Did these teams participate in lean implementation regarding disciplines and techniques?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.2.1	There was and is a lack of teamwork.	LV01L	DK01SEN	MM01S, PN01LF, DT01SQ	
2.2.2	Yes with Kaizens and with developing manufacturing cells, improved housekeeping, and improved flow.	BK01S, DF01S	AS01M, SM01S, ME01L	BS01L	
2.2.3	Yes but, work mainly with senior and middle management as well as supervisors and setters.			JL01S	
2.2.4	Not sure	NF01LI		JC01L, ZB01S, TN01S	SB01S, GM01S
2.2.5	Yes details as per receiving story board.			PP01M	

SP6Q2.2	Did these teams participate in lean implementation regarding disciplines and techniques?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.2.6	No comment.	RB01MF, PG01LF, RM01SE, CJ01SEN, AJ01LA	MM01L, SR01LF, JH01L, DM01LF, JH01LS, PJ01SEN, JV01SEN, MV01MS	HM01S, AM01M, AS01LE, AW01L, SB01LS, GA01LS, DB01SEN	AM01M, PM02S, MV01M, PM01SS, EM01L
2.2.7	Do not know.	JC01LS			PM01L, MJ01M, CM01L, TR01S, CH01LS, AK01SE, JM01SEN
2.2.8	In rotor shop and rubber shop			EV01S	
2.2.9	No.	PC01L	RL01MEN	MT01M	
2.2.10	NPD team to improve flow and product design.			GS01SA	
2.2.11	Not extensively		BD01SS		

SP6Q2.3	Specifically which lean techniques have featured prominently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.3.1	No comment made.	LV01L, NF01LI, RM01SE, CJ01SEN, AJ01LA	MM01L, JH01L, DM01LF, JH01LS, RL01MEN, DK01SEN, PJ01SEN, JV01SEN, MV01MS	AM01M, HM01S, MM01S, PM02S, AW01L, PN01LF, AM01SF, GA01LS, DT01SQ, DB01SEN	MV01M, AS01LE, PM01SS
2.3.2	Five S, (S1,S2 with S4), SOP'S, Visual management, tact versus tact, Kaizen, point Kaizens and problem-solving, operators responsible for own inspection, value stream mapping more teamwork.	BK01S, DF01S	AS01M, SM01S	JC01L, EV01S, ME01L	
2.3.3	One-piece flow, kaizen, five s, push versus pull.			JL01S, ZB01S, PP01M, BS01L	
2.3.4	Not sure.			TN01S	SB01, GM01S, SN01L
2.3.5	Do not know.	PC01L, JC01LS	RB01MF, PG01LF	SB01LS	PM01L, MJ01M, CM01L, TR01S, CH01LS, EM01L, JM01SEN

SP6Q2.3	Specifically which lean techniques have featured prominently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.3.6	Kaizen, five s, value stream mapping		BD01SS	MT01M, GS01SA	
2.3.7	Know about Kaizen teamwork.				AK01SE

SP6Q2.4	Could you expand on how and why these techniques have featured prominently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.4.1	No comment made.	LV01L, RM01SE, CJ01SEN, AJ01LA	SM01S, MM01L, BD01SS, SR01LF, JH01L, DM01LF, JH01LS, DK01SEN, PJ01SEN, JV01SEN, MV01MS	MM01S, AM01M, HM01S, PM02S, BS01L, AW01L, GA01LS, DT01SQ, DB01SEN	MV01M, AS01LE, AM01SF, TR01S, PM01SS
2.4.2	To improve working areas, flow, on-time delivery reduce breakdowns and scrap.	BK01S, DF01S	AS01M, SM01S	PP01M, EV01S, ME01L, GS01SA	
2.4.3	To improve service delivery to stores who is my customer.			JL01S	

SP6Q2.4	Could you expand on how and why these techniques have featured prominently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.4.4	No.	PC01L, NF01LI	RB01MF, RL01MEN	TN01S, MT01M	SB01S, GM01S, SN01L, CH01LS
2.4.5	Forced to do it.			JC01L	
2.4.6	First phase.			ZB01S	
2.4.7	Do not know.	JC01LS	PG01LF	SB01LS	PM01L, MJ01M, CM01L, EM01L, JM01SEN
2.4.8	To continuously improve an identified area.				AK01SE

SP6Q3	Are the teams operating in manufacturing cells self-directing in terms of achieving flow and pull?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1	No self- directing teams at the moment	LV01L, DF01S, PC01L, NF01LI, RM01SE, RM01SE, CJ01SEN, JC01LS, AJ01LA	AS01M, SM01S, MM01L, RB01MF, BD01SS, SR01LF, JH01L, DM01LF, JH01LS, RL01MEN,	JL01S, JC01L, ZB01S, MM01S, PP01M, HM01S, EV01S, TN01S, ME01L, MT01M, BS01L, AW01L, PN01LF, GA01LS, GS01SA, DT01SQ	SB01S, GM01S, SN01L, PM02S, MV01M, AS01LE, AM01SF, TR01S, CH01LS, PM01SS

SP6Q3	Are the teams operating in manufacturing cells self-directing in terms of achieving flow and pull?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			DK01SEN, PJ01SEN, JV01SEN, MV01MS		
3.2	Not fully so, but green areas are helping this to develop.	BK01S			
3.3	Yes they are.			AM01M	
3.4	Do not know.		PG01LF	SB01LS	PM01L, MJ01M, CM01L, EM01L, AK01SE, JM01SEN

SP6Q4	Are you able to provide examples of lean techniques being applied to cellular manufacturing such as:	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	Blank see answers below.				

SP6Q4.1	Taguchi;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.1.1	No	LV01L, BK01S, DF01S, PC01L, RM01SE, CJ01SEN	AS01M, SM01S, MM01L, RB01MF, RL01MEN, DK01SEN+	JL01S, JC01L, ZB01S, PP01M, AM01M, HM01S, EV01S, TN01S, ME01L, MT01M, BS01L, AW01L, PN01LF, DT01SQ, CH01LS	SB01S, .GM01S, SN01L, PM01L, PM02S, MV01M, MJ01M, AS01LE
4.1.2	Yes rubber meeting with engineering regarding new machine was effective.			MM01S	
4.1.3	Do not know	JC01LS	BD01SS, SR01LF, DM01LF, JH01LS, PJ01SEN, MV01MS	SB01LS, PG01LF, GA01LS, GS01SA, TR01S, DB01SEN	JM01SEN
4.1.4	Limited examples.		JH01L		

SP6Q4.2	cycle time reduction;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.2.1	No	LV01L, DF01S, PC01L, RM01SE, AJ01LA	MM01L, RB01MF, RL01MEN	JC01L, ZB01S, AM01M, TN01S, MT01M, BS01L, AW01L	SB01S, SN01L, MV01M, MJ01M, AS01LE, CH01LS
4.2.2	Refer to Kaizens for rubber, chrome, assembly and product cells.	BK01S		MM01S, PP01M	
4.2.3	Adapters used to require two operators, now only one operator.			JL01S, SB01LS	
4.2.4	Industrial engineering did some time studies.			HM01S	GM01S
4.2.5	Aware of a team that came up with idea to reduce lead time of an item from two weeks down to four days. Under the leadership of the industrial engineering manager.		AS01M		
4.2.6	To some extent		SM01S, DK01SEN		
4.2.7	Was done but not documented properly on CNC.machine.			EV01S	
4.2.8	Done for cells		BD01SS	ME01L	PM02S,
4.2.9	Reduced the press time in rubber plant by increasing the temperatures.			AW01L	

SP6Q4.2	cycle time reduction;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.2.10	Do not know.	NF01LI, JC01LS	SR01LF, DM01LF, JH01LS, MV01MS	SB01LS, PN01LF, PG01LF, GA01LS, GS01SA, DB01SEN	AM01SF, CM01L, TR01S, PM01SS, EM01L, AK01SE, JM01SEN
4.2.11	Productivity increase from 60% to 85%		JH01L		
4.2.12	NPD cell was trialled.	CJ01SEN	PJ01SEN		
4.2.13	No comment.		JV01SEN		

SP6Q4.3	One-piece flow;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.3.1	No	LV01L, DF01S, PC01L, RM01SE, AJ01LA	MM01L, RB01MF, JH01L, RL01MEN	JC01L,ZB01S, PP01M, AM01M, JC01L, PM01L, HM01S, TN01S, MT01M, BS01L,	SB01S, GM01S, SN01L, PM02S, MV01M, MJ01M, AS01LE, CH01LS
4.3.2	Achieving one-piece flow in a product assembly line.	BK01S	BD01SS	DT01SQ	
4.3.3	Achieving it on one machine but breakdowns interrupt the flow.			JL01S	

SP6Q4.3	One-piece flow;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.3.4	Achieving it on two machines		AS01M		
4.3.5	In progress.			MM01S	
4.3.6	Was done but not documented properly on CNC.machine.			EV01S	
4.3.7	Achieving it on extrusion			AW01L	
4.3.8	Do not know.	NF01LI, JC01LS	PG01LF, SR01LF, DM01LF, JH01LS, DK01SEN, PJ01SEN, MV01MS	SB01LS, PN01LF, GA01LS, GS01SA, DB01SEN	AM01SF, CM01L, TR01S, PM01SS, EM01L, AK01SE, JM01SEN
4.3.9	NPD cell was trialled.	CJ01SEN			
4.3.10	No comment.		JV01SEN		

SP6Q4.4	Kanban;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.4.1	No	LV01L, BK01S, DF01S, PC01L,	AS01M, MM01L, RB01MF, JH01L,	JL01S, JC01L, AM01M, MM01S, HM01S, EV01S,	SB01S, GM01S, SN01L, PM02S, MV01M, MJ01M, AS01LE, CH01LS

SP6Q4.4	Kanban;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
		RM01SE, AJ01LA	DM01LF, RL01MEN, DK01SEN, PJ01SEN	TN01S,ME01L, MT01M, BS01L, AW01L	
4.4.2	Partially in assembly		BD01SS	ZB01S	
4.4.3	Was attempted but found to be chaotic.			PP01M	
4.4.4	Just starting		SMO1S		
4.4.5	Do not know.	NF01LI, JC01LS	PG01LF, SR01LF, JH01LS, MV01MS	SB01LS, PN01LF, GA01LS, GS01SA, DB01SEN	AM01SF, CM01L, TR01S, PM01SS, EM01L, AK01SE, JM01SEN
4.4.6	In process in assembly and the rubber shop.			DT01SQ	
4.4.7	NPD cell was trialled.	CJ01SEN			
4.4.8	No comment.		JV01SEN		

SP6Q4.5	SMED	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.5.1	No	LV01L, DF01S, PC01L, RM01SE, CJ01SEN, AJ01LA	SM01S, MM01L, RB01MF, BD01SS, JH01L, RL01MEN	JL01S, JC01L, MM01S, AM01M, EV01S, TN01S, ME01L, MT01M, PP01M, BS01L, AW01L, DT01SQ	SB01S, GM01S, PM01L, MV01M, MJ0M, AS01LE, CH01LS
4.5.2	Set-up sheets have been implemented for one person.	BK01S	AS01M	HM01S	
4.5.3	Achieved for assembly.			ZB01S	
4.5.4	To some extent.				PM02S
4.5.5	Do not know.	NF01LI, JC01LS	PG01LF, SR01LF, DM01LF. JH01LS, DK01SEN, PJ01SEN, MV01MS	SB01LS, PN01LF, GA01LS, GS01SA, DB01SEN	AM01SF, CM01L, TR01S, PM01SS, EM01L, AK01SE
4.5.6	No comment.		JV01SEN		

SP6Q4.6	Poka-yoke and Jidoka; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.6.1	No	LV01L, DF01S, PC01L, RM01SE, CJ01SEN, AJ01LA	AS01M, MM01L, RB01MF, JH01L, RL01MEN, DK01SEN	JL01S, ZB01S, MM01S, PP01M, AM01M, HM01S, TN01S, ME01L, MT01M, BS01L, AW01L, DT01SQ, CH01LS	SB01S, GM01S, SN01L, PM01L, MV01M, MJ01M, AS01LE
4.6.2	Limited focus at present.	BK01S	SM01S		
4.6.3	Seen on one pump assy cell			JC01L	
4.6.4	Working on it.			EV01L	PM02S
4.6.5	Do not know.	NF01LI, JC01LS	SR01LF, DM01LF, JH01LS, PJ01SEN, MV01MS	SB01LS, PN01LF, PG01LF, GA01LS, GS01SA, DB01SEN	CM01L, TR01S, EM01L, AK01SE, JM01SEN
4.6.6	No comment.		JV01SEN		

SP6Q4.7	Heijunka?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.7.1	No	LV01L, DF01S, PC01L, RM01SE, CJ01SEN, AJ01LA	SM01S, MM01L, RB01MF, BD01SS, JH01L, RL01MEN, DK01SEN	JL01S, JC01L, ZB01S, MM01S, PP01M, AM01M, HM01S, EV01L, TN01S, ME01L, MT01M, BS01L, AW01L, DT01SQ	SB01S, GM01S, SN01L, PM01L, PM02S, MV01M, MJ01M, AS01LE, CH01LS
4.7.2	Starting	BK01S	AS01M		
4.7.3	Do not know.	NF01LI, JC01LS	PG01LF, SR01LF, DM01LF, JH01LS, PJ01SEN, MV01MS	SB01LS, PN01LF, GA01LS, GS01SA, DB01SEN	AM01SF, CM01L, TR01S, PM01SS, EM01L, AK01SE, JM01SEN
4.7.4	No comment.		JV01SEN		

**APPENDIX J - COMPLETED QUESTIONNAIRE FOR THE CASE STUDY RESEARCH FOR CONDUCTING INTERVIEWS WITH FOCUS
GROUPS OR TEAMS PER APPENDIX G WITH W01 ORGANISATION**

OPENING REMARKS

Thank you so much for agreeing to participate in this research study. The questions that we will be discussing involve the research into your lean implementation programme and the study is focusing on organisational structure and behaviour aspects relative to lean disciplines, techniques and systems. Please feel free to answer the questions in terms of your particular viewpoint or how you feel about the current state of the programme.

Note that no names will be mentioned after the interview is concluded. You need not fear that confidentiality will be breached in any way. So please answer without prejudice or concern.

Some of the questions consist of a set of questions in order to determine influences, links and relationships. In terms of team response, please answer each of these individual questions through consensus. Please feel free to make recommendations on how you as a team see particular issues and how you would go about resolving same.

The coding of the question or question set are as follows:

MP-Main research proposition; SP- Sub research proposition; T-Team questionnaire, meaning this questionnaire;; Q-Question or question set linking data to a particular research proposition; 1/2-Question or question set number.

QUESTIONS LINKING DATA TO RESEARCH PROPOSITIONS

Date		06	2014
Organisation number	W	0	1

Proposition and question link	Question-Please note some questions are linked together in terms of the attribute being researched,	Please answer per each question and by cell below:
MP1TQ1	Can you please explain what the roles and responsibilities of your group or team are in terms of the lean thinking programme, strategy or project?	Please refer the organogram of the organisation with functions as indicated. Top management team consists of directors, unit managers and operations managers. The roles of the team is in terms of the relevant functions. The team meets once per week to review the operational performance and to discuss the future direction of the organisation.
	Would you say that the work you have done as a team, has impacted the organisation significantly and	Since a dramatic restructuring of the organisation commencing from circa 1997 to 2001, the organisation has made significant and remarkable progress in profitability and growth. The organisation has adopted the Twenty Keys process to drive the company to become a world class organisation in aluminium extrusion products manufacturing.
	can you be specific about this by quoting examples or by providing storyboard history in terms of a before and after lean projects?	The organisation works on the basis of profit centres. These centres have been developed into effective flow lines consisting of: Scrap and bailing that supply the re-melting operation. The re-melt operation supply the extrusion press flow lines that supply either the powder coating pant or anodising plant

		with extruded products. In turn powder coating and anodising supply the organisation's stockists consisting of the Gauteng operation as well as two distribution organisations that have been acquired in order to provide effective distribution capacity. The die manufacturing is a stand-alone department of the extrusion division that acts as a profit centre and that obtains orders from customers for dies that is utilised for the manufacture of customer extrusions. A die repair shop services the extrusion factory with dies that are brought back to standard after use.
	Could you explain how the organisation has changed due to your efforts and teamwork in terms of organisational structure; and	Following a major restructuring in 1997, the organisation restructured to the organogram depicted in the Section covering organisation W01.
	can you please be as specific as possible by focusing on, for example:	
	the functional changes;	The organisation has been structured as per the current organogram. The only change is the appointment of a chief operations director and this position has been created to secure the focus over the manufacturing operation of the organisation.
	the change in the number of organisational levels;	There has been some reduction in the number of organisational levels from the previous organisation in the late 1990's.
	horizontal and vertical integration and communications;	The organisation have free flowing communications between the different levels and units both vertically (upward and downward) and cross-functionally. The organisation has an open door approach to all

		communications. The organisation has developed an effective team structure that has regular feedback and input sessions.
	the locus of decision-making; and	The locus of decision is fairly low in the organisation. The organisation have developed its first-line managers to make effective day to day decisions that normally would have required middle or senior management interventions. Empowerment involves multiskilling and up skilling of employees and the organisational development department is focused on continuously improving the skill level of employees.
	Whether team structures are significant in terms of cellular manufacturing.	All the manufacturing flow lines have mini business teams running each flow line. Each flow line is under the control of a first-line manager.
	Please include any other observations not covered in the examples.	
MP1TQ2	Could you explain how the organisation has changed due to your efforts and teamwork in terms of organisational behaviour?	Since two years ago, the organisation has not changed structurally. There has been some positional changes. Behaviourally, people are accepting the changes in a positive way, and this is due to the way the organisation communicates to its employees. Most employees interviewed referred to the way as open door with no hidden agendas.
	Please be as specific as possible, regarding how you as a team have noticed organisational changes in terms of for example:	
	employees' awareness of lean;	Lean awareness: Twenty Keys is the organisation's lean management approach and is well communicated in the daily mini business team meetings held every day by work area. First line managers have undergone

		significant training in supervisory skills and the Twenty Keys methodology. Key one, cleaning and organising receives regular focus and regular audits are held by the organisations organisational development department.		
	how employees feel about the organisational leadership;	Organisational leadership: Research has indicated that employees have a high level confidence and trust in the leadership of the organisation. Leaders are well respected and employees feel respected by the leadership. Respect is characterised in the way people are treated in the organisation. The good manners of leaders are evident and employees express their appreciation for the way in which management communicates with them. Managers have a humble approach and care is taken to deal with conflict issues in a sensitive and adult manner.		
	the commitment of employees; the attitudes towards lean;	Employee commitment: The research survey indicate that a major portion of the organisation’s employees is affectively committed to the organisation and this may be attributed to the mini business team activities and the feedback sessions such as the joint leadership forum and other arranged employees and management get togetherness.		
	any other changes observed.	Other changes:		
MP2TQ1	As a team, do you feel that all the employees are involved in lean?	All the employees are involved in the Twenty Keys approach to lean manufacturing in the organisation. The process is enforced in the daily mini business activity meetings and regular Key one audits.		
	Would you be able to explain how they are involved with lean	Working alone	Cross-functional-team	Self-directed-team or work team

	<p>techniques and disciplines working as individuals, or for example, cross-functional teams or self-directing teams and</p>	<p>The modus operandi is that we conduct ourselves in teams.</p>	<p>There are various cross-functional teams that meet regularly, depending on the situation. A significant cross-functional team meeting occurs twice weekly when the top team meets with the operations managers to discuss issues, opportunities and future plans. Another significant cross-functional team is the drawing office meeting with the die manufacturing and senior operations manager to discuss the customer orders.</p>	<p>Employees work in mini business teams that are directed by the first-line managers, Some teams operate as self-directed teams but empowerment are limited to schedule changes only.</p>
	<p>how have these particular changes influenced the organisational structure?</p>	<p>The organisation has experienced a remarkable turnaround since 1997. The current organisational structure in the way it operates supports the flow of product through the various manufacturing profit centres. Teamwork is an</p>		

		<p>integral part of the process, as is the Twenty Keys approach to the way things are done. Unit managers oversee the various flow lines of the organisation and each flow line has a first-line manager and team operating the flow line. The scrap purchasing and bailing operation is for example an acquisition that replaced scrap buy-in of bails from a previous supplier. The re-melt operation has for example been improved to consistently provide aluminium billets to the profile operation. The extrusion sales and distribution are part of the manufacturing operation of the organisation and as such represent an effective integration of sales with manufacturing. Customers are allowed to link directly with flow line and unit managers interact regularly with customers regarding progress and status. Order processing is quick and effective and orders are fully processed with three days of receipt of order. The organisational units has flow lines that run on a basis of no cross flows and set-up times have been reduced to less than three minutes in the profile section and under twenty minutes in powder coating operations.</p>	
	<p>Have you as a team, been given specific authorisation to implement your own ideas, improvements, and/ or lean projects and</p>	<p>The top team has total authority over the organisation that is part of a major group that is listed on the Johannesburg stock exchange.</p>	
		<p>How did authorisation occur?</p>	<p>Why did authorisation occur?</p>

	could you explain by example how and why this has occurred?	Turnaround management gained confidence from Holding company.	Holding company is an investment company and not an operational one.	
	Has teamwork changed the organisational structure and If so,	Teamwork is an integral part of the way the organisation conducts its business.		
	are you able to make a sketch of how the structure has changed?	Changes to organisational structure due to teamwork: It became a flattened widened structure. No changes following restructuring in early 2000 except for the appointment of a chief operations director two years ago, who oversees the manufacturing arm of the business.		
	Are you able to link these changes to specific team empowerment and lean disciplines and techniques?	Team empowerment	Lean disciplines	Lean techniques
		After restructuring the organisation established an organisational development department in 2002 that drives the Twenty Keys implementation together with management and employee development. Managers are encouraged to act in superior roles as and when the situation presents itself.	The organisation's organisational development department drive the Twenty Keys approach through training and by sending out champions to the respective areas. The department conduct audits to assess the status.	The organisation after restructuring in 1997 has focussed heavily on the cleaning and organising technique or Key one. Small group activities per Key three are held as and when the opportunity presents itself. Key two, goal alignment is part of the organisation ensuring that each

				team has targets to work towards.
	Are you able to elaborate on how and why these changes are linked to lean disciplines and techniques?	How linked to lean disciplines and techniques	Why linked to lean disciplines and techniques	
		The champions in the organisational development department drive the Twenty Keys and first-line managers does on the job training of applications.	Key one, cleaning and organising, has changed the organisation through the mini business teams, to become extremely efficient with reduced finding time of things vital to promote the product flow. Employees are motivated by the cleaner environment they work in. Key two, goal alignment has become part of the business in the way goals are cascaded and aligned throughout the organisation. The mini business meeting by area and unit are the full representation of Key three that includes for the organisations focus on teamwork and small group activities. The focus on quick changeovers and reducing run times (Key four and five) has	

			<p>led to major improvements enabling the organisation to deliver any customer order within three days of receipt of order. Continuous improvements are focused on per key six and there are examples of improvements that significantly reduced lead-times such as the changes of heaters in the extrusion plant and the introduction of the Kelly system to improve production monitoring in profiles. Key nine has been recently focused on in order to involve line workers more directly in maintenance and care for equipment. Key ten has been implemented by means of an effective time keeping and disciplinary standard operating procedure. The attendance bonus system has been introduced to encourage healthy regular attendance by employees. Key 11, the quality assurance system is</p>
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			<p>being focused on by cross-functional teams involving the accounts department with the teams in manufacturing. Focus on rejects has reduced rejects from 2% to 0.5% over the past three years. Key 12 is demonstrated with the care in which one supply lines, for example, bailing provide inputs to the re-melt line and the billets supply to the extrusion lines. W01 has made significant strides towards the developing of suppliers in a fully integrated manner. External suppliers are encouraged to follow the W01 example and a key example is that of the efficient scrap supply system that have been developed by the organisation. Waste elimination Key 13 are being focused on by mini business teams in terms of continuous improvements, following the dramatic restructuring in 1997</p>
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			<p>where large portions of waste was taken out. Worker empowerment is driven by the organisational development department, but also in the manner in which mini business activities are conducted. Employees are encouraged to lead team sessions and team members update their own visual performance graphs and indicators. Key 15 that deal with skills are fully represented by the organisational development department. Individual mini business teams are focused on a skills matrix which motivates employees to acquire more skills. Production scheduling per Key 16 is effectively done with the make to order policy of the manufacturing organisation. Key 17 efficiency control is focused on in the mini business sessions where targets per shift is monitored daily. Productivity has improved with</p>
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			many operations being done by one employees that previously had been done by two employees. Key 19 efforts resulted in a national award for energy efficiency improvements.
SP1TQ1	As a team are you able to demonstrate Kaizen, flow and pull lean techniques implementation?	<p>All production lines have been established as continuous flow lines utilising quick changeover techniques and improving layout. In some cases value stream mapping is applied to improve the flow lines for powder coating. Key twenty has been utilised to improve in manufacturing technology. Manufacturing management has visited overseas to assess latest extrusion technologies and the most up to date methodologies are continuously pursued. Die design is being improved by importing dies from overseas and comparing local methodology with frontline overseas organisations. The flow lines are controlled by means of daily production schedules set by the decentralised planning units. Kanban is utilised between billets and press operations. A type of Kanban using skips is utilised in the powder coating and anodising lines controlling in puts locations and output finished product locations.</p>	
	Has this resulted in cellular manufacturing?	<p>The organisation is structured into profit centres that have established flow lines that can be viewed as independent manufacturing cells.</p>	

	<p>With these flow and pull lean implementations, how and why has the organisational structure changed (please provide sketches of changes)?</p>	<p>How has the organisation changed? Refer to the detailed organogram according to which unit managers oversees the different flow lines that can be seen as independent manufacturing cells.</p>	<p>Why has the organisation changed? The organisation essentially changed in 1997 to the current organisational structure. The restructuring was required in order to establish a world class manufacturing aluminium extrusion organisation.</p>
		<p>Sketches of changed organisational structure: Refer to the current organisational structure in the Section dealing with W01.</p>	
<p>SP1TQ2</p>	<p>To what extent are teams working independently in terms of empowerment?</p>	<p>The extrusion plant in the Vereeniging operation operate as a fully self-directed team. Some teams operating in the organisation have matured to effective self- directing operations as far as day to day management of the flow lines are concerned.</p>	
	<p>Which organisational functions are now covered by teams working in the manufacturing cells?</p>	<p>None</p>	
	<p>How are the manufacturing cells serviced by organisational functions?</p>	<p>Planning determines the workload.</p>	

SP2TQ1	Based on your participation in teamwork, are you able to comment on whether the reasons for organisational changes have occurred due to:	
	cross-functional and	Cross- functional-teamwork: The organisational structure encourages cross-functional teamwork as demonstrated in the twice weekly top and middle management team meeting and cross-functional teams meeting to discuss key indicators, profitability and customer order processing.
	self-directed teamwork implementing lean disciplines and techniques	Self-directed-teamwork: Teams are developing to be self-directing, but in the main all teams have first-line managers that facilitate team processes.
	To what extent has empowerment of teams occurred and	Empowerment: Employees have been up-skilled and multi-skilled. In certain situations, first-line managers have been empowered to make decisions that normally would have been made by the operations or unit managers. Artisans make line decisions involving machine stoppages and restarts when required. Decision making are shared in follow-up sessions with the respective managers. Seldom does discouragement occur to stop initiatives that promote or disrupt the flow process.
	how has this changed the leadership of the organisation?	Leadership changes: As discussed, mainly positional changes and some changes regarding branch managers.
	Has the teamwork replaced functions performed by individuals in the organisation and	Functions being performed by teams: Inspection is done by teams manning the flow lines but there are still in line inspectors in profile manufacturing and that operate as part of the team. These inspectors perform stretching operations on the product being manufactured. Packers now do visual inspections that previously were performed by QCs.

	has this helped the lean implementation?	Not applicable.					
SP2TQ2	To what extent has organisational performance improved specifically in terms of PBIT, inventory turns, reduced rejects, sales, cost reductions or other, since lean implementation?	PBIT	Inventory turns	rejects	sales	costs	other
		Average RM 14 per month from a loss-making situation in 1997.	Manufacturing make to order Stockists keep 40 days inventories.	0.5%	Average: RM100 per month		Customer order lead time. 3 days.
SP3.1TQ1	As a team, please comment on the organisational behaviour experienced when you commenced with the lean transformation process. Can you comment specifically on leadership and employee behaviours with this announcement that lean are going to be introduced to your organisation? Examples of organisational behaviour are commitment, attitudes and perceptions of lean as a means to transform the organisation. Please refer to other behaviours observed or experienced when the lean transformation process commenced.						
	Behaviours	Employee behaviours			Leadership behaviours		
	Commitment behaviours	There is a high level of affective commitment in the organisation as can be assessed from the individual interviews held.			There is a high level of affective commitment in the organisation as can be assessed from the individual interviews held.		
	Attitudinal behaviours:	Attitude of employees are positive due to: the respectful way they are treated			Leaders always present a positive attitude and this was confirmed by		

		<p>by management; the sharing in profits in the form of production, attendance and profit incentive bonuses; the awareness of where the organisation is going from daily feedback mini business sessions and the monthly joint leadership meeting to which employees are invited; the recognition of employee achievements when production records are broken; the recognition of employee ideas and suggestions; the awareness of details such as profits and measurement pertaining to set targets; the added responsibility that comes with for example Key one cleaning and organising and Key nine maintenance responsibilities of workers; the participation in the daily mini business team meetings where ideas are listened to and recognised in a positive manner; the visits by top managers to mini business meetings to listen to the feedback from employees; the effective</p>	<p>most of the employees during the individual interviews. Leaders have a positive attitude due to the way the organisation had been led by its managing directors after the remarkable change in 1997. Throughout the organisation, employees talk with great regard regarding the previous and current managing directors. These two leaders have led by example. They have earned respect due to their performance depicted in the turnaround of the organisation, the growth experienced and the results that are openly and effectively communicated with all in the organisation. These leaders have led by example in the decent and respected way they treat employees and managers alike.</p>
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		and quick dealing with employee grievances when these occur.	
	Perceptions of lean:		
	Other behaviours		
SP3.2TQ1	Please answer specifically, given the current state of your lean implementation programme, whether you as a team feel that organisational behaviours have improved or changed in any way in the organisation regarding:		
	attitudes;	<p>The attitudes towards the Twenty Keys are generally positive by employees as has been assessed in the individual interviews. Attitudes are positive due to the participation and involvement experienced by employees in the mini business team meetings held every morning. Having a positive attitude is enhanced due to employees linking results to targets and seeing this as related to the incentive bonuses. Many employees stated that the earning of incentive bonuses is the major reason for maintaining a positive attitude. Targets set in team meetings and the achievement of same, has created and awareness and appreciation for the way the organisation conducts its business and has contributed to a positive attitude. First-line managers are key to communicating and applying the Keys in the day to day running of the business, however, the focus on the Keys were found to be mainly on cleaning and organising, team activities, targets set, quality, time control and maintenance. First-line managers have been effectively trained in the Twenty Keys but individual interviews indicated that they also focus only on a few Keys in their daily sessions. There is low awareness regarding flow and pull in the organisation, but this may be due to the effective flow lines that have been established throughout the organisation. In some ways effective flow</p>	

		<p>is therefore seen as a given. Make to order has been developed very effectively and the use of level scheduling and Kanban is also not really regarded as an issue.</p>
	<p>commitment;</p>	<p>Virtually in every interview conducted, the opinion was that there existed a high level of affective commitment in the organisation toward the lean process in the form of the Twenty Keys and mainly in terms of the mini business team meetings encouraging employees to provide ideas for improvement. Participation in the targets set has also led to employees taking initiatives to improve output and quality. In one case an employee had contributed an idea that warranted patenting and his idea had become standard practise for the organisation. Some concerns were raised by a shop steward, who indicted that although most managers displayed affective commitment, one first-line manager was sleeping on the night shift and had therefore earned a low level of respect from the team on the line.</p>
	<p>respect for employees;</p>	<p>Respect for employees were found to be at a high level. With three exceptions of sixty seven interviews, employees expressed their appreciation for the way management conducted themselves. Employees felt respected because: of the manner in which management conducted themselves described as humble, open door, and listening to employees grievances and ideas; of following through on issues and grievances until full and final resolving is achieved; of the recognition received in front of team members for their participation and involvement; of the constant feedback by the managing director for the recognition of the roll the employees of the organisation had played in the turn-around and</p>

		<p>performance of the organisation; of the bringing back of retrenched employees once the organisation had recovered from economic hardship phases (after restructuring and retrenchments in 1997 and 2008); of the attendance of mini business meeting by the top management of the organisation. An interesting observation is that some employees stated that respect was at a high level due to the way the disciplinary procedure of the organisation was being applied.</p>
	knowledge of lean;	<p>Knowledge of the Twenty Keys were found to be limited to the Keys being focused on during the team sessions. Knowledge was good up to first-line management level, however, workers and staff's knowledge was mainly in terms of cleaning and organising and filling in of the maintenance check sheets. First-line managers expressed their view that literacy was an issue and hence the focus by the organisational development department on the development that had been invested in the First-line managers of the organisation.</p>
	participation; or	<p>Participation was assessed in terms of the mini business meetings, however, this participation was mainly limited to employees involved in cleaning and organising and the filling in of maintenance check lists. Participation was high for all management in the organisation, however their role was key regarding the applications and support for the process. It was evident that the organisation relies heavily on the development and the roll its First-line managers were playing in order to enhance the lean process.</p>
	other behaviours?	
SP4TQ1	Culture is sometimes defined as the way we do things around here.	

	Do you as a team support this viewpoint?	Yes we do.
	has your organisational culture changed since lean implementation?	Yes.
	Please elaborate on how it has changed.	Our culture changed from self- interest to one of care for our customers and employees. We promote the saying: “We are family”.
SP5.1/.2/6TQ1	How would you as a team design your organisational structure to obtain maximum benefits from lean and to make your organisation the best in field relative to your competitors?	Considerations and views: The current structure works well and changes will be made as required.
	Please provide a sketch for this particular organisational structure.	Sketch of best organisational structure in your opinion:
	Please comment on the implementation and utilisation of the lean techniques and	Comments regarding sketch above:
	organisational functions and roles and responsibilities.	Clearly indicate the functions roles and responsibilities:

APPENDIX K - RESPONSES RECEIVED FROM INDIVIDUALS' PARTICIPATION IN THE RESEARCH-ORGANISATION W01

(Appendix E changed to line question format)

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1.1	Major changes fifteen years ago. More recent changes, warehouse manager and operations manager in warehouse appointed.			WJM01L, WJN01LWD	
3.1.2	Vast improvement since 2004 to 2006 Less management levels. Warehouse manager left without having to be replaced, No departmental restructuring. Improved communications, cleaner neater organisation. Getting changes done effectively.		WAC01LL		WAM03LDCOR
3.1.3	New managing director helped the organisation: previous top managers did not consult employees at all; new leader brought significant changes; some retrenchments; all in the organisation		WHM01L, WAS02LF,	WTM01L, WPM03L, WPM04L	WPDB01LDCOR

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	important; far better communications and trust; know what needs to be done; know where the organisation is going.				
3.1.4	A new department formed to implement twenty keys plus mini business activities (MBA) and training.		WAK01LIT		
3.1.5	No restructuring last three years, more teamwork plus goals with measurements for all. More transparency. All employees know profits, bonuses and other pertinent information. More streamlined. Workers work more efficiently.		WBS01L, WYE01SF WES01SFCW		
3.1.6	Previous managing director brought major changes. Much flatter structure. New department established to implement 20 keys.		WAL01L, WGP01LFEXPP		
3.1.7	Previous and current managing directors made major changes. Flow has improved drastically, workforce understands the		WBM01L, WJH01LWD		WHD01LMNT

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	aim of the organisation, Channels of communications has opened up upwards and downwards. Cleaner organisation.				
3.1.8	Vast improvement, since twenty keys. A functional structure mini business teams and some cross-functional teams working together. For example, sales with die manufacture with die shop and drawing office daily contact with each other.			WBK01L,	
3.1.9	Do not know	WKW01L		WBK01S, WMG01LGS, WLT01SPRA,	WRL01LSC, WEN01LMNT, WDR01MNPROG, WOV01LMNT
3.1.10	Production was restructured, do not have details. Growth in output 70 ton per day to 100 ton per day.		WWF01LSY		
3.1.11	Previous and current managing directors changed the organisation.		WPK01MSTK,		

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	Work smarter not harder, focus on continuous improvement.				
3.1.12	Quality engineer appointed three years ago in profiles section. Quality has improved from 5% defects down to 0, 5% defects. Last three years renewed focus on cleaning and organising and quality improvement.		WJM01M		
3.1.13	Last five years, focus on continuous improvement in stockists section. Operations manager appointed. Focus on working smarter not harder. Big changes by previous and current managing directors.		WPK01MSTK		
3.1.14	Fifteen years ago, major changes leading to a vastly improved organisation, There was some integration (to many directors and managers). Management layers taken out. Organisational development	WPP01LF	WRM01L	WDC01L, WPM01L, WRS02L	

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	unit established that drive the 20 keys and development of people. Mini business teams (MBA) established for all areas.				
3.1.15	No comment. Too new to the organisation		WAR01SSC		WSB01M
3.1.16	Last fifteen years major changes with previous managing director. 1998 commenced with restructuring to flatter organisation with less departments. Example of one operations manager replacing two. Performing better with less people. More empowerment.		WET01LSFTY	WBS02L	
3.1.17	Last fifteen years major changes for the better; More growth, more understanding, more teamwork, more awareness of targets in terms of output and quality; more incentives; more training; improved technology; more visual management; reduced waste; improved time keeping			WBM02L WNM01L,	WNH01LQC

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	from employees and more focus on customer service.				
3.1.18	With major reorganisation there was no significant structural change. Twenty keys introduced circa 2004. Some management levels taken out. Much improved factory organisation. Improved communications Improved efficiency, improved plant maintenance and reduced inventory.	WHS01LSLS,			
3.1.19	Last three years only chief operations director appointed. Awareness that with major restructuring in 2000 many layers of management were taken out and this led to a much improved organisation with much improved communications and improved customer service.	WAV01M			WNP01LDDES
3.1.20	Huge improvement since major reorganisation fifteen years ago. Major			WPM01L, WP02L	WAM01LBUYA

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	changes by the new managing director, the current managing director and the unit manager organisational development. The operations director appointed two years ago. More open communications were introduced and teamwork was established. Employees experienced better working conditions. First line managers were developed instead of supervisors.				
3.1.21	Last 10 to 11 years no significant structural changes. The 20 keys was introduced in 2004.			WFM01L, WJN02LSCR	WAS01LMNT
3.1.22	Last 12 years there was organisational changes and number of levels increased since the changes. There was a key person who was retrenched before the new managing director started with the organisation. This person was brought				WRB01LDR

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	back by the previous managing director. He was a real people person. The organisation commenced with 20 keys in 2005.				
3.1.23	With previous organisational structure there were six levels of management that was reduced to four levels some fifteen years ago. The previous management kept a closed agenda and there were no open flow of communications. This was changed when the new managing director took over. The structure was changed to a flatter more open and effective structure. The organisation was turned around from RM70 in the red to the current performance levels.	WCVDW01L			WWB01LSLS
3.1.24	Since the major changes fifteen years ago, more committed flatter structure.		WSR01LMNT		

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1.25	Major changes fifteen years ago: previous managing director appointed; organisation made much leaner; drawing office changed to report to sales but work cross-functionally with manufacturing; excellent teamwork; excellent leaders previous and current managing director.		WAE01LDWG		
3.1.26	Major changes fifteen years ago but, no detail. Aware that die shop and maintenance had two managers and now only one. Organisation works perfectly. People know where they are going. Part of the change was the development of first line managers replacing supervisors.			WAM02L	
3.1.27	Since 9 years ago organisation improved but difficult to maintain. Two years ago chief operations director appointed.				WHB01LMNT
3.1.28	Since seven years ago, new managing director replaced the previous person and		WKP01LSCR		

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	a chief operations director was appointed. All managers are keen to implement the 20 keys. The organisational development department was established.				
3.1.29	Acting operations manager for distribution organisation taken over by W01.		WMW01SSHL		
3.1.30	No structural changes last fifteen years, All given an opportunity to study further			WM01LWD	
3.1.31	Scrap receiving established 10 years ago. Production has increased significantly. Key one cleaning and organising changed the organisation. Focus has been on key one, standard operating practices and maintaining equipment			WCM01LSCR	
3.1.32	Major structural changes for the better 14 years ago but no detail				WLN01LQC,

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1.33	Recession 2008 led to retrenchments with some people re-appointed with lower grades. People were multi-tasked without pay. Less people so there is job rotation.				WSN01LQC, WGN01LQC
3.1.34	Last eight years, In powder coating, first line managers were increased from one to four due to organisational growth. Powder coating operations manager replaced three years ago.				WTD01LLABTECH
3.1.35	Since eight years ago see lots of improvements in communications, output and team objectives and action plans. The chief operations director was appointed two years ago.				WEK01LMNT
3.1.36	The organisation was restructured in 1997; the original structure was flattened and widened; detailed critical analysis was done to ensure that each manager had a full day's work; retrenchments was	WHR01LTM			

MP1Q3.1	What are your particular views regarding organisational restructuring or the changes that the organisation has undergone since the implementation of lean thinking?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	part of the process; every top manager had customer involvement; customers were allowed open communication with top management and any other manager in operations or staff whatever the situation was; planning and sales were put in the same office to ensure a direct link of customers with operations; personal relations with customers were thus secured; levels reduced from 8 to 4 and now 5.				

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.2.1	When lean was introduced people wanted to grow, they were concerned for loss of jobs. Things are now perfect and better than expected.			WJM01L	

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.2.2	Positively received at all organisational levels. Organisation was in the red and was forced to accept changes, but done in such a way that the atmosphere changed to positive. Employees felt that they were keeping their jobs and changing their lives. Feedback always given by management. Management always positive about the future. Incentive bonuses keep people positive. Employees aware of the improvements and benefits gained.	WKW01LSY	WAC01L WJH01LWD, WAE01LDWG WKP01LSCR		WAM01LBUYA
3.2.3	Employees did not like the changes		WHM01L		
3.2.4	Sceptical.		WAK01LIT		
3.2.5	Well received by all. Top team consulted well. People were positive with no reservations. All working towards achieving a better organisation.		WBS01L, WAS02LF		WEN01LMNT
3.2.6	New to W01 in Gauteng. Just heard about it. Found people very positive.		WAL01L		

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.2.7	Older people not positive, reacting to the changes, but now more accepting. All now accepting the changes.		WYE01SF		
3.2.8	Employees have become more dedicated because they see the benefits. Organisation was in the red now in the black.		WBM01L		
3.2.9	Employees were passive. Now more positive with small group activities.			WBK01L	
3.2.10	No comment	WAV01M	WJM01M, WAR01SSC	WBK01S, WLT01SPRA	WSB01M
3.2.11	Employees were positive about the changes due to the way leadership dealt with the change. They were prepared to listen to anybody. Leaders have remained positive throughout.		WWF01LSY		WOV01LMNT
3.2.12	Last five years find people positive and motivated by more training with management doing their utmost to make it easy for employees to understand. Exited by mini business team process; seeing the		WPK01MSTK	WMG01LGS	

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	benefits; more involvement by employees; more awareness of results; more personal growth and advancement.				
3.2.13	There were some major retrenchments in 1998 and employees were concerned, but the changes were well done with the previous managing director explaining to all the reason for the changes. Employees were constantly informed of status and organisational progress. Managing director communicated in Zulu and this cultivated respect and understanding. Period was short, three weeks and then people became more positive.	WPP01LF	WSR01LMNT WRM01L	WBS02L, WDC01L, WTM01L WPM04L,	WWB01LSLS,
3.2.14	In the beginning of the changes from the previous managing director's appointment (2000 to 2001), people feared for their jobs. There were major retrenchments from top to bottom of organisation. Some people that were retrenched were brought back by the new managing director. The people		WET01LSFTY	WBM02L WGP01LFEXPP, WRS02L	WNH01LQC

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	were thoroughly consulted and kept up to date with what was happening to the organisation. People were trained (multi-skilled), mini business teams were established, people became more motivated as the new organisation produced the results and more bonuses was paid out. An attendance bonus was even paid and this motivated the people even more.				
3.2.15	Would not know how people reacted at the beginning of the change, but the organisation have become more pro customer over the last fourteen years.	WHS01LSLS			
3.2.16	Fifteen years ago, the organisation was in trouble and the newly appointed managing director called everybody together and informed the people of the detail of the changes and the reasons. Employees welcomed his approach. The employees were asked for their opinions, regarding			WNM01L, WMN01L	

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	retrenches that new their jobs, and carefully listened to. Upon the employees input, some of the previous employees that had been retrenched were re-appointed. This approach motivated the people and the organisational started to recover.				
3.2.17	Fifteen years ago major changes made employees fear for their jobs. Restructuring from top to bottom took place. The previous management before the new managing director had retrenched good people. These previously retrenched employees were re- appointed by the new managing director and this approach was welcomed by all. The new managing director called everybody together and explained what had to be done and this was appreciated. Mini business teams were introduced with set targets for every team. Incentive bonuses were introduced and blacks were included in the management of the			WPM01L	

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	organisation. These changes motivated the people to perform and the organisational performance improved.				
3.2.18	Last 10 to 11 years it appears that employees are satisfied and happy with the organisational changes. It has become easier to work in the organisation with the improvements made. Employees more involved in decision making and internal promotions have moved employees into higher positions. 2012 chief operations director appointed. Service has improved with improved methods.			WFM01L, WJN01LWD	WAS01LMNT, WNP01LDDES
3.2.19	Fifteen years ago new managing director appointed. No real structural changes but positional changes. Main focus was on continuous improvement. Open channels of communication established. The organisational development department was established with the current unit manager in 2004. The current team	WRK01L			

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	<p>structure was developed with goal alignment with management, unit and area teams. Prior to 1997 under the old regime, there were poor relationships and communications between management and employees. After 1997 restructuring and reorganisation occurred under the new managing director. Positional changes occurred and lean thinking was introduced with the 20 keys process. A culture of trust was established with the new managing director involving all the employees of the organisation in the decisions regarding the future of the organisation. All were given an equal chance. The product range was rationalised with focus on extrusion manufacturing. Employees became positive about the way the company was being managed. In 2002 the company recovered so well that the first profit</p>				

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	bonuses were paid to the employees. This contributed to the positive behaviour.				
3.2.20	There was a low level of discipline 12 years ago. With the new managing director: the changes were stress full, but not as stress full as now; at the time, circa (2001to 2003), top team visited the far east and came back with the 20 keys as a change tool; people took a wait and see approach; people feared the 20 keys change process; the feeling is to continuously watch one's back; since lean, there has been improvements, especially key one that makes it easier to find tools and materials required; there is also more focus on savings and machine reliability.				WRB01LDR,
3.2.21	In 2001 people felt positive about the changes. They were given targets in teams and incentive bonuses that kept them going and helped them to remain positive. Management always positive about the			WPM01L, WPM03L	WAM01LBUYA

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	future and they provide feedback how things are going. This adds to a positive climate.				
3.2.22	Since 2006, employees are actively involved. They are accepting the changes and conscious of working as a team. Consultations with shop stewards have helped.				WRL01LSC
3.2.23	Since 2000, the changes were welcomed: more open door; transparent; better cooperation and support. Know what is happening and where the organisation is going.	WCVDW01L			WLN01LQC, WGN01LQC
3.2.24	Fifteen years ago major change to current shift system starting at six am in the morning from previous seven am. Changed to a four day work week.			WPM02L	
3.2.25	Fifteen years ago with major changes employees were negative and felt exploited due to retrenchments followed by multiskilling without compensation.			WAM02L	

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	However, the manner in which the 20 keys were introduced and the paying of incentive bonuses linked to organisational performance changed the employees view. The mini business team meetings were motivational and the management often visit the meetings recognising the employee contributions.				
3.2.26	Three years ago saw keys as extra work when taken over by W01. Currently positive because see the benefits of it.		WES01SFCW		
3.2.27	People are positive and production driven.				WHB01LMNT
3.2.28	New to organisation that have been taken over by W01. Too new to comment but excited about the management opportunity.		WMW01SSHL		
3.2.29	Negative due to the attitude of the manager, but the managing director is a fine person and a good leader. In warehouse and distribution pretend everything is normal.			WHM01LWD	

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.2.30	Last 10 years mini business teams and small group activities established with focus on 20 keys. Better organisation with increased production.			WCM01LSCR	
3.2.31	Discipline with 20 keys have changed the attitude of employees.			WJN02LSCR	
3.2.32	Recession, 2008 returned people had to accept lower grades but given opportunity to apply for higher grades. People still unhappy about the situation.				WSN01LQC
3.2.33	Three years ago employees resisted female operations manager in powder coating. Now acceptable due to open door approach, better results and growth in powder coating.				WTD01LLABTECH
3.2.34	Since eight years ago, employees were questioning changes. The keys were in.				WEK01LMNT
3.2.35	No changes.				WDR01MNPROG
3.2.36	Some employees have changed for the better and some not. First line managers				WHD01LMNT

MP1Q3.2	What are your particular views how people have changed behaviourally to the organisational changes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	and artisans are positive but workers are not.				
3.2.37	IN 1997, difficult because most people resisted change; took about six months before peoples started to notice the results; brought people back highly skilled in press and extrusion work; some correctors brought back; top team listened to all the workers; consultative approach; worker inputs were utilised in decision making	WHR01LTM			

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.3.1	Workers have changed from working as individuals to working in mini business teams together with management. Initially negative with fears, now positive.			WJM01L WAM02L,	
3.3.2	Top, middle and operational management all positive and working together, workers are friendlier and more forthcoming.		WAC01L		

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.3.3	Employees did not like the changes.		WEHMO1L		
3.3.4	Mixed feelings at first but adapted. Currently more positive towards changes. People can see the changes and the benefits. Also increased bonuses. Employees' attitudes has improved with cleaning and organising of the workplace per key one, training and improved discipline.		WAK01LIT WES01SFCW		WTD01LLABTEC,H, WHD01LMNT
3.3.5	Initially (2000) employees were uncertain sceptical and concerned (organisation in red), but improved with awareness of results and benefits such as incentive bonuses. Openness and honesty of leader changed the mind-set to a more driven approach. Employees now extremely positive and kept informed of ups and downs of the organisation. People feel the togetherness and the teamwork.		WBS01L, WSR01LMNT, WAE01LDWG	WFM01L, WMN01L, WGP01LFEXPP, WRS02L	WLN01LQC
3.3.6	Problem initially but now all display a positive attitude in the organisation. All feel		WAL01L		

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	that they contribute to the success of the W01 family.				
3.3.7	New to the organisation, but found everybody positive due to involvement and keeping the organisation clean and tidy. Would say incentive bonuses help		WYE01SF, WMW01SSHL		WDR01MNPROG
3.3.8	More positive as seen by workers volunteering to work overtime when required. Before management not communicating enough, not appreciating worker efforts. Major communications gap before has been eliminated.		WBM01L		
3.3.9	Total organisational change with: employees becoming positive and participating actively; employees supporting one another; small group activities and mini business teamwork; production, profit sharing and attendance incentive bonuses and employees knowing what is going on through effective feedback		WAS02LF	WBK01L	WOV01LMNT

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	through mini business meetings and the joint leadership meeting.				
3.3.10	Positive in terms of results achieved.			WBK01S	
3.3.11	Changes were gradually introduced over eleven years. Nothing was forced, Employees and management remained positive during this period.		WWF01LSY		
3.3.12	Management had and still has a positive attitude, however, workers were apprehensive due to job losses five years ago, as a result of a bad economic situation. However, with the changes, improvement came, that made it possible to recall the retrenched workers and pay incentive bonuses. This had a positive effect on the attitudes.		WPK01MSTK,	WMG01LGS	
3.3.13	Attitudes more positive in the last three years due to improved growth of the organisation leading to more profit sharing in the form of bonuses.		WJM01M		

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.3.14	Since fifteen years ago major changes commenced with negative attitudes due to retrenchments and uncertainty. Gradually after the introduction of the twenty keys, the managing director managed to improve the business and change the mind-set of people through direct and constant consultation, feedback and involvement of the employees in the decision making process. Attitudes became positive. Team structure was introduced as mini business teams. Visual management was extensively utilised to explain to employees what was happening with the organisation. Employees were constantly informed of where the business was going. Management listened to proposals from employees. Improved results resulted in improved profits. Incentive bonuses consisting of production, profit and	WPP01LF	WET01LSFTY	WBS02L, WNM01L WTM01L, WPM04L	WDC01L, WPDB01LDCOR WNH01LQC,

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	attendance were paid. Successes were celebrated				
3.3.15	Eleven years ago, attitudes changed from negative to positive with the organisation turned around. The organisation commenced paying out profit sharing bonuses and this motivated employees in a big way. The attendance bonuses helped to reduce absenteeism providing more consistency. The management maintained a consultative approach through the changes, involving and listening to employees and this improved the relationships between workers, the union and management greatly. Work areas improved with the introduction of protective clothing and protective equipment as well as automating some operations. The mini business team meetings contribute to the positive attitudes.		WJH01LWD	WPM01L WJN01LWD,	WEN01LMNT
3.3.16	No comment		WAR01SSC		

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.3.17	<p>Since the new managing director initiated major organisational changes (2000 to 2001), employees have acquired a positive attitude due to the sense of ownership brought about by the way in which the changes and improved results were communicated by the top management. The managing director listened to the suggestions of the workers and followed through with it. Employees were kept informed where the organisation was going. Management became transparent. Profits and gains were shared in the form of production, profit and attendance incentive bonuses. Setting targets for mini business teams have created an awareness of the organisational performance, benefits and where the organisation is going. Management recognise employees for their contribution. Standard operating procedures are clear on what and how to do</p>		WKP01LSCR	WBM02L, WPM02L, WCM01LSCR, WMN01L, WPM03L, WJN02LSCR.	

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	things. Disciplines resulted in better time keeping, cleaning and organising,				
3.3.18	Last four years, attitudes have improved due to organisational growth and the organisation being able to pay out larger bonuses. The attitudes are also positive since the management care for people as being very important for the organisation. Employees are encouraged to work smarter not harder as has been evident from a new hydraulic press used for cleaning out the dies that had required substantial manual effort previously.				WSB01M
3.3.19	Last fourteen years lots of improvement. People work in teams and help each other. "Can do" attitude versus, "not my job", before. The organisation has experienced remarkable growth and workers have shared in the benefits.	WHS01LSL S			
3.3.20	Last three years attitudes are positive because of the incentive bonuses and the	WAV01M			

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	organisational culture that is entrepreneurial in nature. There is less red tape and things are done in a less formal and less bureaucratic way.				
3.3.21	Experience over 11 years indicted that employees thought that the changes would be difficult to implement. But attitudes changed positively; as employees saw the improvements in the workplace; became aware of the benefits and the incentive bonuses; with teamwork and visual management; with management providing constant feedback regarding the state of the business; with management responding to team feedback; with teams competing regarding the achievement of targets and management dealing effectively with employee grievances.			WFM01L	
3.3.22	Last 10 years aware that the top to middle management has been positive about the success of the organisation. Innovations	WKW01LSY			

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	has contributed to the success of the business.				
3.3.23	Fifteen years ago with the re-organisation by the new managing director, employees were treated more respectfully resulting in more positive attitudes. There was more understanding between management and employees regarding the business, the vision and the mission. Open communications top to bottom and bottom to top and a reduced blame culture, contributed to the positive attitudes.	WRK01L			
3.3.24	Attitudes are relative to the following aspects: Top management has a positive attitude but, has big stick approach; operations manager more a people's person; discipline is of the order of the day and after three warnings one is dismissed; Quality control inspectors are mostly disciplined for returns from customers lack				WRB01LDR

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	of skills have resulted in shop floor issues leading to many press line stoppages.				
3.3.25	Attitudes are not always the same due to management sometimes exercising favouritism, but this has been resolved by means of a meeting with the manager. Currently employees have a positive attitude due to the team meetings.				WRL01LSC
3.3.26	Since fifteen years ago attitudes improved due to: employees realising the need to work together as a team; more recognition by management; more empowerment; the removal of red tape; dismissing previous directors and management; enabling line managers to make decisions without constraint; the paying out of incentive bonuses when the organisational performance improved.	WCVDW01L			
3.3.27	Initially fifteen years ago, all concerned for jobs. New managing director handled the change well explaining the future clearly (in				WWB01LSLS

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	Zulu). Management attitudes changed from “high and mighty” to working with employees. Employees became positive and worked with management to improve the organisation.				
3.3.28	Last nine years, generally a good attitude.				WHB01LMNT
3.3.29	Last 10 years more positive due to employee involvement and the appointment of more black leaders.				WAS01LMNT
3.3.30	In warehouse and distribution employees are negative due to favouritism, and deliveries not always fully met.			WHM01LWD	
3.3.31	Since 2001 improved due to: more training keys and quality; many impact projects to turn the organisation around; improved flow; more direct working with the shop floor by management,		WRM01L		
3.3.32	Positive attitude from 60% of the employees in die manufacturing due to easier working with improved flow and CNC machining.				WNP01LDDES

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.3.33	After recession 2008 there was a negative attitude due to changed grades. People were trained in the mini business meeting to make them understand the situation.				WSN01LQC
3.3.34	Last two years find workers still resisting, but their attitudes change to positive when they learn. The first line managers are doing their best at the mini business meetings and the production assistant is playing a positive role in this regard.		WLT01SPRA		
3.3.35	After the recession in 2008, the attitudes have improved with twenty keys training in the mini business team meetings. Team members enjoy the process of achieving the set team targets. Incentive bonuses help to keep employees positive. Employees see the results and organisation of workplace to a neater cleaner area motivates employees.				WGN01LQC, WEK01LMNT
3.3.36	In die shop people have adapted to the changes but they are not happy due to				WAM03LDCOR`

MP1Q3.3	Would you be able to be more specific about organisational changes in terms of the attitudes of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	some quarrelling. Employees welcome the incentive bonuses, but would appreciate more verbal recognition				
3.3.37	After restructuring in 1997, people were happy to have a job and be with a company that was starting to perform; 600 to 400 retrenched; spoke to everybody in Zulu and English; we still talk before things are implemented; teams were good for the attitudes; restructuring first profit in 1998; the first bonus, each person received was a coke from the managing director handed to each person that entered for work.	WHR01LTM			

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.4.1	Workers provide more ideas, than initially. More creative employees than before. They feel responsible for the organisation and see the organisation as their own. See the		WKP01LSCR WAS02LF,	WJM01L, WGP01LFEXPP WRS02L, WPM04L	WLN01LQC,

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	benefits of giving of one self. Workers are motivated by the bonus for service delivery. Many of the workers have become affectively committed. See the benefits of going the extra mile. A few workers still normatively committed. Workers see the organisation's future as their family's future. Avoid what the mines are doing.				
3.4.2	Most employees are normatively committed. Die manager is affectively committed having computerised everything in the die shop. Ten percent of employees are affectively committed.		WAC01L		
3.4.3	People did not like the changes.		WHM01L		
3.4.4	50% of workers affective. Has improved with monthly joint leadership and management meeting (JLM) and employees aware of organisational results and growth. Find first line managers affective since they are always making plans to improve things. Find workers 50%		WAK01LIT		WHB01LMNT WEK01LMNT,

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	affective since they help with maintenance out of their own initiatives.				
3.4.5	Before the changes people were normatively committed, now 60% of employees affectively committed.		WBS01L		
3.4.6	See only 50 % affective commitment. Workers are normatively committed. Need to do more. Feel that we need more energy from the organisational development team.		WAL01L		
3.4.7	70% to 80% of employees are affectively committed since they are concerned for the organisation (nowhere to go), balance are normatively committed. The incentive bonuses greatly support the commitment. Management has an open door approach and maintain good relationships with employees. It has become easier to come to work. Joint leadership meeting assists to maintain affective commitment.		WYE01SF WJH01LWD,	WBK01L, WDC01L, WPM02L, WTM01L, WCM01LSCR,	WAM01LBUYA
3.4.8	80% to 90% of employees affectively committed since: they know where to		WBM01L	WJN01LWD WPM03L,	WNH01LQC

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	company is going; successes of the organisation motivates the employees; feedback always positive from the top; employees aware of the challenge of China; team focus on targets and compete against each other; the incentive bonuses drive affective commitment; team members supports each other and stand in when a team member is absent from the area.				
3.4.9	Top management is affectively committed but, most employees are normatively committed including the first line managers. Team members regarding the mini business teams are not that affective.			WBK01S	WGN01LQC
3.4.10	60% to 70% of employees are affectively committed due to managing director's leadership style and the incentive bonus system. Willingness to work overtime demonstrates affective commitment.		WWF01LSY,	WBS02L,	
3.4.11	Workers are becoming more affectively committed due to incentive bonuses from		WPK01MSTK,		

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	profit sharing, Workers have become interested in the results that indicate how the organisation is doing. They participate actively in the daily mini business sessions to support plans for improvement. Fabrication training has helped to cultivate improved understanding. Affective commitment comes from fabrication training plus incentives plus active team participation.				
3.4.12	Mainly management affectively committed. Workers are 30% to 40% affectively committed. Managers listen, but do not agree all the time.	WCVDW01L	WJM01M WAE01LDWG	WJN02SCR	
3.4.13	Top and middle management are affectively committed. Cannot comment on worker's commitment.	WPP01LF, WKW01LSY	WMW01SSHL		WWB01LSLS
3.4.14	Employees are 50% affectively committed. Unable to comment why.		WAR01SSC		
3.4.15	Top to first line management are affectively committed because of their positive			WBM02L	

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	contributions and achievements of targets. Workers in despatch are mainly normatively committed as can be assessed from their participation in the mini business team meetings. Only two out of seven participate affectively.				
3.4.16	Last four years people have been affectively committed to a high degree due to bonuses, training and multi skilling. See 70% affective commitment from workers and 100% from management				WSB01M
3.4.17	Affective commitment comes and goes depending on the situation. Impact projects cultivate creativity and the affective commitment is then more revealed. Top management are affectively committed, with middle management 70% and first line 50%. The workers are less than 30% affectively committed.	WHS01LSL S			
3.4.18	No change in commitment last three years.50% affective.	WAV01M			

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.4.19	Top to first line management are all affectively committed as can be assessed from the performance of the organisation. Workers are 50% to 80% affectively committed due to providing many ideas in the mini business meetings, being pulled into decision making, being encouraged to participate, and helping each other in teamwork.			WNM01L, WAM02L	WAS01LMNT, WEN01LMNT WHD01LMNT,
3.4.20	All the employees are affectively committed due to the changes of teamwork and incentive bonuses and the improved safety and PPE.			WPM01L	
3.4.21	All the managers are affectively committed. Workers are 70% affectively committed because of their willingness to become multi-skilled and participate in the mini business team activities.			WFM01L	
3.4.22	80% affective worker force measured in terms of the employees volunteering to work overtime when asked. Incentives	WRK01L			

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	bonuses help with the maintaining the interest of employees. The organisation has developed a family culture and this contributes to the affective commitment of employees. 98% utilisation of presses being achieved through effective teamwork and leads to success in results. Recognition of employee ideas and suggestions contribute to the high level of affective commitment.				
3.4.23	Top management are affectively committed as can be assessed from the achievements of the organisation, however unit managers are getting results through fear and applying the disciplinary procedure; fortunately the operations manager and first line managers cultivate affective commitment through encouragement, recognition of ideas. Would say that in the die repair section 3 out of 20 individuals are affectively committed.				WRB01LDR

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.4.24	Employees in the scrap and bailing department are affectively committed since family members work in the company and they are conscious of the responsibility to care for the family.				WRL01LSC
3.4.25	In maintenance employees are mainly normatively committed due to organisation they come from. 30% of maintenance employees affective in terms of ideas and initiatives taken		WSR01LMNT		
3.4.26	88% of workers are affectively committed as assessed in their willingness to work overtime and their active participation in the mini business teams.		WET01LSFTY		
3.4.27	Affectively committed at 80%, due to participating in mini business team and feeling part of a team.		WES01SFCW		
3.4.28	Top management are affectively committed. No comment regarding employee commitment.			WHM01LWD	

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.4.29	Management 75% affectively committed and employees 60% because of a clear vision and structure.		WRM01L		
3.4.30	In profiles all the managers and workers are 100% affectively committed due to information flowing quickly up and down the organisation and the effectiveness of the first line managers.			WMN01L	
3.4.31	Employees 60% affectively committed due to keenness to learn. Linked to age. Younger people are keener to learn.			WMG01LGS	
3.4.32	In die manufacturing, management is affectively committed with workers 45% as measured in terms of their creative contributions to die design. Combatting China is a major motivator.			WNP01LDDES	
3.4.33	Top to middle management are 50% affective since they do not always listen. First line manager is 90% affective since they lead by example, listen well are supportive and follow through to resolve				WSN01LQC

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	issues. Workers are 50% affective characterised by many complaints and issues regarding job grades. It would be better to speak to the top management to come to the mini business meetings				
3.4.34	Would say that 60% the top to first line management has lots of creative ideas, however, workers are 30% affectively committed in terms of their contributions to new ideas that will help the business.		WLT01SPRA		
3.4.35	Last fifteen years, top and middle management are affectively committed since they listen and follow through on the suggestions from workers. First line managers no comment. Most of the workers are affectively committed (80%) and actively participate in the mini business meetings.				WPDB01LDCOR
3.4.36	Top and middle management are affectively committed because of results and following through. First line managers				WTD01LLABTECH

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	are not since they do not follow through. Workers are normatively committed and react to instructions.				
3.4.37	Workers in the die shop are 40% affectively committed in terms of the many ideas that are shared. Find that such workers enjoy the thinking process of working smarter not harder.				WAM03LDCOR
3.4.38	Since three years ago see 85 % affective commitment due to the worker involvement in cleaning and organising the workplace. Find the morale high and energetic.				WDR01MNPROG
3.4.39	Most of the employees are affectively committed due to the awareness of employees to achieve a common goal.				WOV01LMNT
3.4.40	Cannot expect creative thinking from all employees; top to downwards creative thought have to be nurtured and is nurtured; teams are creative not necessarily the person; employees do walk the extra mile to help the team; incentive bonuses	WHR01LTM			

MP1Q3.4	Would you be able to be more specific about organisational changes in terms of the commitment of employees?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	stimulate affective commitment; 25% of the gains are shared; what you get back from employees far more worth that the 25%.				

MP1Q3.5	Would you be able to be more specific about organisational behaviour changes in terms of how employees feel about the vision, mission, organisational goals and objectives?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.5.1	Management and employees focused on the vision of achieving one day deliveries to customers. Workers are motivated by the bonuses. The vision drives the organisation.		WBS01L, WAK01LIT	WJM01L	
3.5.2	High awareness, 60% to 90% of employees aware and aligned to the vision of one day delivery.	WAV01M	WAC01L WAE01LDWG WBM01L, WAS02LF, WRM01L, WLT01SPRA,	WBM02L, WPM04L WCM01LSCR, WCVDW01L	WNP01LDDES, WAM03LDCOR, WNH01LQC, WEK01LMNT, WRB01LDR, WAM01LBUYA, WEN01LMNT, WDR01MNPROG, WHD01LMNT
3.5.3	Do not understand		WHM01L		
3.5.4	Total alignment to the vision of one day delivery, due to team structure, the leadership and the success of the organisation.	WPP01LF, WRK01L, WCVDW01L	WAL01L, WYE01SF, WWF01LSY WPK01MSTK,	WBK01L WBS01L, WDC01L WNM01L, WPM01L, WFM01L WTM01L,	WHB01LMNT, WAS01LMNT, WLN01LQC WSN01LQC,

MP1Q3.5	Would you be able to be more specific about organisational behaviour changes in terms of how employees feel about the vision, mission, organisational goals and objectives?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WJM01M, WJH01LWD WSR01LMNT, WET01LSFTY WES01SFCW WKP01LSCR WMW01SSHL	WJN01LWD WAM02L, WHM01LWD WMN01L, WMG01LGS, WGP01LFEXPP, WPM03L WJN02LSCR, WRS02L	WPDB01LDCOR, WTD01LLABTECH WGN01LQC, WOV01LMNT
3.5.5	Fully embedded but employees do not live the vision unless forced.			WBK01S	
3.5.6	Alignment only 50%.		WAR01SSC		
3.5.7	Last four years everybody knows the vision. See 70% alignment				WSB01M
3.5.8	Management lives the vision, but workers less so. See about 60% overall alignment in the organisation.	WHS01LSLS			
3.5.9	Positive up to middle management level.	WKW01LSY			
3.5.10	High level of alignment.				WRL01LSC

MP1Q3.5	Would you be able to be more specific about organisational behaviour changes in terms of how employees feel about the vision, mission, organisational goals and objectives?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.5.11	Uncertain due to imports changing the vision.				WWB01LSLS
3.5.12	Vision is easy to understand-would say; even employees who have issues are still aligned to the vision; never 100%; say 95%	WHR01LTM			

MP2Q1.1	Would you be able to elaborate how the employees of the organisation have been involved in the lean implementation process?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	Yes in the 20 keys programme since 2006.		WAC01L	WJM01L	
1.1.2	Unable to comment.		WHM01L WMW01SSHL		
1.1.3	Predetermined training session and attending daily small business activity meetings. Focus on cleaning and organising, key one. Also quality, key		WAK01LIT, WBS01L WJM01M,		

MP2Q1.1	Would you be able to elaborate how the employees of the organisation have been involved in the lean implementation process?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	eleven and eliminating waste, key 13. Visibility at machines and workplace.				
1.1.4	Mainly in terms of the mini business activity team meeting held daily. Focus on cleaning and organising, maintenance and quality. Training is done by the first line manager.		WAL01L, WLT01SPRA	WBK01L	WRB01LDR, WRL01LSC, WLN01LQC WOV01LMNT,
1.1.5	Key one, cleaning and organising is the major focus and all work areas are involved. Once a month audit keeps every one focused. Debtors meeting, once per month regarding product quality, with manufacturing managers and distribution regarding credit notes, due to quality, very effective. Meeting coordinated by organisational development champion for quality. First line managers very much involved.		WYE01SF		
1.1.6	Cleaning and organising has become a way of life. With mini business meeting		WBM01L		

MP2Q1.1	Would you be able to elaborate how the employees of the organisation have been involved in the lean implementation process?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	find a way to improve. Currently improving on lost time between invoicing and loading the trucks.				
1.1.7	Project based, team focused and quality focused.			WBK01S	
1.1.8	Mini business meeting held daily assists greatly with the keys implementation. Employees participate in problem-solving. The first line managers or operations managers train the team members.		WWF01LSY	WAM02L	WGN01LQC, WAM03LDCOR
1.1.9	Predetermined training session from the organisation's organisational development team and attending daily small business activity meetings. Heavy focus on cleaning and organising key one. Consultants were utilised to assist with training sessions. First line managers were well trained (NQF).		WPK01MSTK WJH01LWD, WSR01LMNT WAE01LDWG WES01SFCW WKP01LSCR, WAS02LF, WRM01L	WDC01L, WBM02L WMG01LGS,	WAS01LMNT, WEN01LMNT, WNP01LDDES, WHD01LMNT

MP2Q1.1	Would you be able to elaborate how the employees of the organisation have been involved in the lean implementation process?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.10	Consultants and organisational development department formed performed all the training and development in the twenty keys. First line managers received supervisor training from consultants. Initially (early 2000's) the previous managing director trained employees.	WPP01LF WAV01M, WCVDW01L	WET01LSFTY	WNM01L, WJN01LWD, WCM01LSCR, WPM04L WRS02L,	
1.1.11	Maintained by the management, but training done by the organisational development team.		WAR01SSC		WHB01LMNT
1.1.12	Impact projects training from organisational development department plus twenty keys training from consultants and the newly formed training department.			WBS02L, WPM02L WMN01L,	
1.1.13	The maintenance manager coaches the employees in maintenance. Training is done by the organisational development department.				WSB01M, WEK01LMNT,

MP2Q1.1	Would you be able to elaborate how the employees of the organisation have been involved in the lean implementation process?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.14	Initially trained by outside consultants now the organisational development department arranges and does training in twenty keys. Seminars was also part of the initial training package. First line managers were trained so that they could train the employees.	WHS01LSLS, WRK01L		WTM01L, WGP01LFEXPP	WNH01LQC
1.1.15	Outside consultants and the organisational development department trained the first line managers who trained the workers.			WPM01L, WFM01L	WWB01LSLS
1.1.16	Never involved. Systems staff went for training by the organisational development department.	WKW01LSY			
1.1.17	The previous managing director introduced the 20 keys. The previous unit manager trained the workers in the die shop. The keys are displayed in the mini business team areas.			WPM03L,	WAM01LBUYA, WPDB01LDCOR

MP2Q1.1	Would you be able to elaborate how the employees of the organisation have been involved in the lean implementation process?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.18	Fifteen years ago received training in the organisation's training school from a consultant.			WHM01LWD	
1.1.19	Trained by the unit or operations manager.			WJN02LSCR	WTD01LLABTECH, WDR01MNPROG
1.1.20	Trained by the first line manager.				WSN01LQC
1.1.21	Consultants trained after the restructuring; current and previous managing directors initially consulted and are still consulting; actual keys implementation commenced in 2002; currently organisational development department involved in the training but consultants are still utilised.	WHR01LTM			

MP2Q1.2	Could you be specific regarding the lean techniques that have been utilised with employee involvement?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1	Mostly in cleaning and organising key one, small group activities and teamwork		WAK01LIT	WJM01L WJN02LSCR,	

MP2Q1.2	Could you be specific regarding the lean techniques that have been utilised with employee involvement?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	key three. Also strategic planning with setting objectives for all, key two.				
1.2.2	Key one cleaning and organising emphasised, Key two objectives, key three teamwork, key five, quick change over, , key 6 methods improvement, key nine maintenance, key ten commitment (go the extra mile). Key 11 quality assurance system. Also eliminating waste, empowering workers and multi-skilling.		WAC01L, WRM01L	WNM01L, WPM01L, WTM01L, WJN01LWD WAM02L, WHM01LWD WRS02L, WPM04L	WLN01LQC, WNP01LDDES, WTD01LLABTECH, WNH01LQC, WEK01LMNT,
1.2.3	Unable to.	WKW01LSY	WHM01L		
1.2.4	Predetermined sessions were, and are held. Daily mini business team meeting by area or department teams are held. All issues discussed, even personal issues.		WBS01L		
1.2.5	Mainly cleaning and organising, teamwork, targets, maintenance and quality. Also developing standard operating procedures. Focus on quality, cost, delivery and morale.		WAL01L, WAR01SSC, WLT01SPRA	WDC01L WMG01LGS,	WGN01LQC

MP2Q1.2	Could you be specific regarding the lean techniques that have been utilised with employee involvement?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.6	Mainly cleaning and organising and quality focused on in the various areas. Credit notes are a measure of customer complaints. Standard operating procedures are also a major focus area.		WYE01SF		
1.2.7	Cleaning and organising key one, objectives key two, teamwork key three, improving handling key six and time control key 10.		WBM01L		
1.2.8	Cleaning and organising key one, goal alignment key two, teamwork key three, maintenance key nine, time control and commitment key 10, Quality key 11, eliminating waste key 13, empowering workers key 14 and production scheduling key 16.	WAV01M	WJM01M	WBK01L, WBK01S WBS01L, WFM01L, WCM01LSCR	WAM01LBUYA
1.2.9	The important technique was cleaning and organising key one. Also key three managing by objectives through team activities.		WWF01LSY		WAM03LDCOR

MP2Q1.2	Could you be specific regarding the lean techniques that have been utilised with employee involvement?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.10	Key one cleaning and organising and key two, teamwork was basic to the process.	WPP01LF	WPK01MSTK		WWB01LSLS WPDB01LDCOR, WDR01MNPROG
1.2.11	In warehouse and distribution the focus was and still is on key one, cleaning and organising, key nine maintenance and key 10 time control and commitment.		WJH01LWD		
1.2.12	Mostly the focus is on key one but also teamwork, eliminating waste, skills training and improving handling methods in despatch.			WBM02L	
1.2.13	Maintenance is focused on key nine and cleaning and organising.		WSR01LMNT		WSB01M, WHB01LMNT WAS01LMNT, WEN01LMNT, WHD01LMNT, WOV01LMNT
1.2.14	In sales the keys were initially cleaning and organising, goal alignment, teamwork and commitment, followed by	WHS01LSLS			

MP2Q1.2	Could you be specific regarding the lean techniques that have been utilised with employee involvement?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	inventory reduction, quality and multi skilling.				
1.2.15	Initial training focused on nine keys covering: cleaning and organising; developing standard operating procedures; goal alignment; teamwork; seven wastes; continues improvement; quality assurance; maintenance; methods improvement and cycle time reduction.	WRK01L			
1.2.16	In die repair department, the focus is on: cleaning and organising; maintaining equipment and time keeping and commitment.				WRB01LDR
1.2.17	Mainly on cleaning and organising and maintenance.				WRL01LSC
1.2.18	Main focus was on: cleaning and organising; maintaining equipment; teamwork and small group activities; visual management; quality; Kaizen and problem-solving	WCVDW01L	WET01LSFTY		

MP2Q1.2	Could you be specific regarding the lean techniques that have been utilised with employee involvement?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.19	Initially all the keys were trained with heavy focus on cleaning and organising.	WAE01LDWG			
1.2.20	Problem-solving and continuous improvement.		WES01SFCW		
1.2.21	In scrap and bailing department the main keys are: cleaning and organising; objectives and teamwork; maintaining equipment; time control and commitment and developing scrap suppliers.		WKP01LSCR		
1.2.22	In new organisation taken over, mainly focused on cleaning and organising and objectives.		WMW01SSHL		
1.2.23	In finance: key one cleaning and organising; key three, teamwork; key 11 quality; key 15 skills and standard operating procedures.		WAS02LF		
1.2.24	When 20 keys commenced consultants raining and implementation work focused on impact projects covering teamwork, quick changeovers, cleaning and organising and waste reduction.			WMN01L	

MP2Q1.2	Could you be specific regarding the lean techniques that have been utilised with employee involvement?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.25	Problem-solving, running a small business team, visibility and organising and cleaning.		WGP01LFEXPP		
1.2.26	In anodising the keys were: cleaning and organising; standard operating procedures; teamwork; reducing inventory and cycle time; quick change over; methods; coupled manufacturing; maintenance; commitment; quality; eliminating waste; multi- tasking and empowering workers.			WPM03L	
1.2.27	Cleaning and organising, objectives and teamwork, maintenance, timekeeping and discipline and quality.				WSN01LQC
1.2.28	Key one was basic with key 2 and three; pot can stand on three legs	WHR01LTM			

MP2Q1.2	Could you tell me more about the teamwork in the organisation and how it works?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1	Yes in the warehouse we have for example, a despatch team, a local team, a coastal team, a driver team and a picker team.			WJM01L	
1.2.2	Press team, die manufacturing team are examples. Cross-functional team with engineering, die manufacturing and press shop. Chaired by die manufacturing manager. Cross-functional team between engineering and sales in order to analyse customer requirements.		WAC01L, WHM01L	WBK01L,	
1.2.3	Teams by area meet every morning. Once a month Joint leadership meeting held. Mini business activities team constantly working at continuous improvement. This team conducts monthly key one audits. Teamwork linked to incentive bonuses.		WBS01L, WAK01LIT, WYE01SF	WBK01S	
1.2.4	There is a team calendar and agenda. Top management team meet once per	WHS01LSLS WAV01M,	WAL01L WBM01L,	WBS02L WPM01L, WFM01L,	WSB01M WRB01LDR,

MP2Q1.2	Could you tell me more about the teamwork in the organisation and how it works?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	week, middle and top management team meet twice per week, mini business small group activities meet once per day by unit and area and the joint leadership meetings once per month. The organisational development department is a team of experts that focuses on driving the keys throughout the organisation. Calendar works well; key three; circa 1998 team structure commenced;	WRK01L, WCVDW01L, WHR01LTM	WWF01LSY WJM01M, WSR01LMNT WAE01LDWG WKP01LSCR, WAS02LF, WRM01L, WLT01SPRA	WPM02L, WTM01L, WJN01LWD, WAM02L, WHM01LWD, WCM01LSCR, WMN01L, WRS02L, WPM04L	WAM01LBUYA, WWB01LSLS, WHB01LMNT, WEN01LMNT, WNP01LDDES, WSN01LQC, WPDB01LDCOR, WNH01LQC, WEK01LMNT, WHD01LMNT WOV01LMNT.
1.2.5	Top management team meet once per week, middle and top management team meet twice per week, mini business small group activities once per day by area and the joint leadership meetings once per month, Unit managers with all section management meet three times per week for warehouse and distribution, and daily for the factory,	WJH01LWD	WPK01MSTK	WNM01L	

MP2Q1.2	Could you tell me more about the teamwork in the organisation and how it works?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.6	Financial team meets once during the week.	WPP01LF		WGP01LFEXPP	
1.2.7	Do not know		WAR01SSC		
1.2.8	Mini business team meets daily and first line managers and operations managers meet daily as well.		WET01LSFTY	WDC01L, WBM02L, WPM03L, WJN02LSCR	WAS01LMNT, WLN01LQC, WTD01LLABTECH, WGN01LQC, WAM03LDCOR, WDR01MNPROG
1.2.9	Top management team meet once per week, middle and top management team meet twice per week, mini business small group activities meet once per day by area and the joint leadership meetings once per month. Systems team meets once per week as and when innovation requires a meeting. Meetings are project management driven.	WKW01LSY			
1.2.10	Know about the mini business team meetings, held per calendar dates.		WES01SFCW		WRL01LSC

MP2Q1.2	Could you tell me more about the teamwork in the organisation and how it works?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.11	New organisation taken over by W01, management team and branch teams meet once per week.		WMW01SSHL		
1.2.12	The mini business team meetings and once per week admin team meets with stockists.			WMG01LGS	

MP2Q1.3	Would you say that teams operating within the organisation have been empowered in any way regarding deciding on, for example, what and when to purchase things such as materials and tools or what to manufacture and how and when to manufacture?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1	Workers are empowered to provide ideas. Would say that employees are empowered up to manager level. First line managers empowered to an advanced degree to make most of the operational decisions.		WAC01L, WH01L	WJM01L, WPM04L	WAM03LDCOR, WDR01MNPROG, WOV01LMNT

MP2Q1.3	Would you say that teams operating within the organisation have been empowered in any way regarding deciding on, for example, what and when to purchase things such as materials and tools or what to manufacture and how and when to manufacture?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.2	Decision making by employees allowed that had previously required management interventions. An employee in a team may lead a team or small group activity. Employees more empowered with up-skilling and multi-skilling through intensive training. There is a skills matrix that measures development of employees. Guidelines exist for team processes. Employees are encouraged to take the initiative and work without supervision. Emphasis on promotion from within.	WHS01LSLS, WAV01M, WRK01L, WCVDW01L	WBS01L, WAE01LDWG, WET01LSFTY, WKP01LSCR, WMW01SSHL, WRM01L, WLT01SPRA.	WBM02L, WNM01L WPM01L, WFM01L WPM02L, WTM01LWJN01L WD, WAM02L WHM01LWD, WCM01LSCR, WMN01L WMG01LGS, WPM03L WJN02LSCR, WRS02L	WSB01M, WWB01LSLS, WHB01LMNT, WAS01LMNT, WEN01LMNT, WLN01LQC, WNP01LDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH, WGN01LQC, WNH01LQC, WEK01LMNT, WHD01LMNT
1.3.3	Employees in IT team allowed to make programme and system changes.		WAK01LIT		
1.3.4	Empowered up to supervisor level.		WAL01L		

MP2Q1.3	Would you say that teams operating within the organisation have been empowered in any way regarding deciding on, for example, what and when to purchase things such as materials and tools or what to manufacture and how and when to manufacture?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.5	Training up and multi skill people and they get promoted based on skills attained. Ideas of a person is given a trial and SOP's are then updated. This motivates and encourages the employees.	WPP01LF	WYE01SF, WGP01LFEXPP		
1.3.6	In despatch we pick two employees to give them more information and give them opportunities to act as team leaders. They also receive training and come in line for promotion in terms of their development. Trust them to lead and for the team to become self-directing.		WBM01L		
1.3.7	In die manufacturing have up- skilled grinder to do CNC milling. Team member given opportunity to act as team leaders.			WBK01L	

MP2Q1.3	Would you say that teams operating within the organisation have been empowered in any way regarding deciding on, for example, what and when to purchase things such as materials and tools or what to manufacture and how and when to manufacture?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.8	Employees being developed according to skills matrix analysis. Trained for empowerment utilising consultants training.			WBK01S	
1.3.9	Up-skilled and multi skilling training of people to support promotions. Employees in systems given the opportunity to lead projects.		WWF01LSY, WJM01M,		
1.3.10	Employees are up-skilled and multi-skilled through formal and on the job training. Employees are given the opportunity to lead team sessions for a period of a week. Managers are given the opportunity to run the units when their superior is absent for a period of time.		WPK01MSTK, WJH01LWD	WBS02L	
1.3.11	Do not know		WAR01SSC		
1.3.12	Not done.		WSR01LMNT	WDC01L	

MP2Q1.3	Would you say that teams operating within the organisation have been empowered in any way regarding deciding on, for example, what and when to purchase things such as materials and tools or what to manufacture and how and when to manufacture?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.13	System employees are given the freedom to be creative and innovative. Openness maintained to new ideas and based on how customers would purchase aluminium system products.	WKW01LSY			
1.3.14	In the die repair section, decisions are allowed on how to improve the die.				WRB01LDR
1.3.15	Empowered by the contributions made by workers in the mini business team sessions				WAM01LBUYA WRL01LSC,
1.3.16	Employees are empowered through idea sharing in the mini business team sessions. Pickers empowered by changing selections but always with consent.		WES01SFCW		
1.3.17	In accounting there was supervision training.		WAS02LF		

MP2Q1.3	Would you say that teams operating within the organisation have been empowered in any way regarding deciding on, for example, what and when to purchase things such as materials and tools or what to manufacture and how and when to manufacture?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.18	First line managers well developed as a powerful resource; workers are encouraged to make decisions normally taken by senior managers; allow for mistakes; multi skilling and up skilling all part of the empowerment process.	WHR01LTM			

MP2Q1.3.1	Could you also elaborate on team roles, responsibilities and authority levels?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1.1	Workers are multi-skilled. Pickers can change with locals as an example.			WJM01L	
1.3.1.2	By task and function of the employee but some employees multi-skilled	WCVDW01L	WAC01L, WHM01L, WMW01SSHL	WDC01L, WPM02L, WCM01LSCR,	WAM01LBUYA, WWB01LSLS, WAS01LMNT, WDR01MNPROG

MP2Q1.3.1	Could you also elaborate on team roles, responsibilities and authority levels?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1.3	Multi-skilled employees assume different roles as required by the situations and based on the manning requirements. Employees may lead team sessions for a period. Team members update graphs and book. First line managers or operations managers facilitate.	WAV01M, WRK01L	WBS01L, WJM01M, WET01LSFTY, WKP01LSCR, WRM01L, WLT01SPRA,	WBK01L, WNM01L, WPM01L WTM01L, WJN01LWD WAM02L, WMN01L WMG01LGS, WPM03L WJN02LSCR, WRS02L, WPM04L	WRB01LDR WLN01LQC, WNP01LDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH, WGN01LQC, WAM03LDCOR, WNH01LQC, WEK01LMNT, WHD01LMNT
1.3.1.4	By function, but some team members lead mini business team session.		WAK01LIT	WHM01LWD	
1.3.1.5	By task and by function.		WAL01L, WSR01LMNT, WGP01LFEXPP		WRL01LSC
1.3.1.6	Meetings are conducted to guidelines that ensure change of rolls in terms of cross chores given. Team members are given an opportunity to lead the team. Managers are given the	WPP01LF WHS01LSLS,	WYE01SF	WBS02L, WBM02L	WSB01M, WHB01LMNT,

MP2Q1.3.1	Could you also elaborate on team roles, responsibilities and authority levels?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	opportunity to act in superior's position when absent. Mill wright often make management decisions and then follow through with consulting the manager who positively supports such decisions. Role changes during strikes run machines and do inspection.				
1.3.1.7	The despatch team is self- directing through natural leadership and multi-tasking. ("The cranes are running")		WBM01L, WJH01LWD,		
1.3.1.8	No comment.		WAR01SSC	WBK01S	
1.3.1.9	The manager leads the team, but innovative thought processes are encouraged.		WWF01LSY		WOV01LMNT
1.3.1.10	In team meetings employees represent their functions, but can also represent tasks in another area due to multiskilling or in terms of experience in leading the team when the line manager is absent.		WPK01MSTK,		

MP2Q1.3.1	Could you also elaborate on team roles, responsibilities and authority levels?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1.11	Team meetings have a set agenda: yesterday's production; today's targets; problems suggestions; the keys; and safety. Team members participate in the graphs and take part in leading the team sessions.			WFM01L	
1.3.1.12	Systems teams are project driven and meeting are based on project management principles. Creative though processes are utilised. A team leader is appointed and can be any person at any level within systems department. Even the operations manager can be a team member that has been given a task by the respective team leader. Team sizes vary from three to four individuals.	WKW01LSY			
1.3.1.13	Drawing office work cross-functionally with manufacturing and sales to clarify customer orders. Help with administration.		WAE01LDWG		

MP2Q1.3.1	Could you also elaborate on team roles, responsibilities and authority levels?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1.14	Pickers can change their controller but only with consensus reached in the team meeting.		WES01SFCW		
1.3.1.15	Artisans are highly valued and are often seen as being on the same level as managers. In maintenance, team roles are by task when meetings are conducted.				WEN01LMNT
1.3.1.16	In accounting leader supports more than instructs. Work strictly to standard operating procedure.		WAS02LF		
1.3.1.17	A workers sometimes allowed to lead the team; first line manager always facilitate; goals should be cascaded and aligned; roll of first line manager very important; the managing director is also a supervisor; team members update graphs.	WHR01LTM			

SP1Q1	Could you elaborate on the process, how the organisation derived its manufacturing cells in terms of the utilisation of lean disciplines and techniques?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1	No comment or no knowledge.	WPP01LF, WHS01LSLS	WAK01LIT, WBS01L, WYE01SF, WBM01L, WWF01LSY, WAR01SSC, WSR01LMNT, WET01LSFTY, WES01SFCW, WMW01SSHL, WAS02LF, WGP01LFEXPP, WLT01SPRA	WJM01L, WBS02L WBM02L, WNM01L WPM01L, WFM01L WPM02L, WTM01L WJN01LWD, WHM01LWD, WCM01LSCR WVG01LGS, WPM03L, WJN02LSCR, WRS02L	WSB01M, WRB01LDR, WAM01LBUYA, WRL01LSC, WHB01LMNT WAS01LMNT, WLN01LQC, WNP01LDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH WGN01LQC, WAM03LDCOR, WNH01LQC WEK01LMNT, WDR01MNPROG, WHD01LMNT, WOV01LMNT
1.2	Standard flow process flow for extrusion presses has always been there, but since		WAC01L, WRM01L		

SP1Q1	Could you elaborate on the process, how the organisation derived its manufacturing cells in terms of the utilisation of lean disciplines and techniques?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	lean very much improved. Logical sequencing of transforming activities.				
1.3	Die manufacturing has 12 machines arranged as a U, feeding an assembly cell.		WHM01	WAM02L	
1.4	Used process flow diagrams.		WAL01L		
1.5	Used flow analysis so no cross flows and the routing of the die manufacture.			WBK01L	
1.6	Customer driven.			WBK01S	
1.7	Used process flow diagrams plus arranged activities in sequence plus reduce setup times plus reduced run times plus no cross flows.		WJM01M		
1.8	Cells work to a standard operating procedure (SOP)		WPK01MSTK,		
1.9	Think process flow was analysed and mapped, no cross flows and the rates between processes balanced.		WJH01LWD		
1.10	Think it was based on building size, not sure.			WDC01L	
1.11	Flow lines are not organised into U's.	WAV01M			

SP1Q1	Could you elaborate on the process, how the organisation derived its manufacturing cells in terms of the utilisation of lean disciplines and techniques?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.12	Based on chief executive's experience, but taking account of pit design, Kelly system software, latest extrusion technology and designing extrusion dies in China.	WKW01LSY			
1.13	Based on historical flow lines for aluminium extrusions with latest technology continuous improvement focus to improve the flow. Based on a continuous process flow principles.				
1.14	In re-melt we analysed the flow and reviewed power consumption. The batch re-melt was also reviewed to more frequent melts during a three shift continuous cycle.	WCVDW01L			WEN01LMNT
1.15	Continues improvement from historical layout.			WMN01L	WWB01LSLS
1.16	Developed in terms of the process flow routings with the focus on small cells.		WAE01LDWG		

SP1Q1	Could you elaborate on the process, how the organisation derived its manufacturing cells in terms of the utilisation of lean disciplines and techniques?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.17	Scrap and bailing has developed an effective process flow: from suppliers; weigh; cut; bail; quality evaluated; palletised and shrink wrapped; to re-melt section.		WKP01LSCR		
1.18	Anodising was a batch production process, but the organisational development team designed it into a continuous flow process.			WPM04L	
1.19	Standard flow processes used internationally; improved through techniques of quick changeovers and cycle time reduction; sequencing of value adding processes; waste taken out through critical analysis; quick changeovers well advanced with 40 die changes per day compared to Europe only 2 to 3 die changes per day.	WHR01LTM			

SP1Q1.1	Could you also explain why this particular process was followed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	No comment, do not know.	WPP01LF WHS01LSLS, WAV01M	WBS01L, WAK01LIT, WBS01L WPK01MSTK, WBM01L, WWF01LSY WAR01SSC, WSR01LMNT WET01LSFTY WES01SFCW WMW01SSHL WAS02LF, WGP01LFEXPP WLT01SPRA	WJM01L, WBK01S, WBS02L WDC01L, WBM02L, WNM01L, WPM02L, WPM01L, WPM01L WFM01L, WTM01L, WJN01LWD WHM01LWD, WCM01LSCR WGM01LGS, WPM03L WJN02LSCR, WRS02L	WSB01M, WRB01LDR WAM01LBUYA, WRL01LSC, WHB01LMNT WAS01LMNT, WLN01LQC WNP01LDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH, WGN01LQC, WAM03LDCOR WNH01LQC, WEK01LMNT WDR01MNPROG, WHD01LMNT WOV01LMNT
1.1.2	Press manufacturing cells improved with technology to speed up machines and reduce cycle times. Heaters and pumps upgraded.		WAC01L		WWB01LSLS

SP1Q1.1	Could you also explain why this particular process was followed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.3	To improve flow and achieve quicker delivery of the die or profile for extrusion process. Approach is to achieve mass production type flow.		WHM01, WJM01M, WJH01LWD	WAM02L	
1.1.4	Layout done per process flow to achieve improved flow and quality.		WAL01L,	WBK01L	
1.1.5	Influence of the CEO.	WKW01LSY			
1.1.6	Logical arrangement of transforming activities for aluminium extrusion process. Small cells more controllable and flexible.	WRK01L	WAE01LDWG	WMN01L	
1.1.7	Continuous flow process with volume melting. Logical flow no cross flows experienced. Four furnace lines established.	WCVDW01L			WEN01LMNT
1.1.8	Scrap and bailing flow line is a best practice.		WKP01LSCR		
1.1.9	Based on history since the 1960's		WRM01L		
1.1.10	Based on flow analysis, the previous managing director helped to clarify the process.			WPM04L	

SP1Q1.1	Could you also explain why this particular process was followed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.11	To develop continuous and effective flow throughout the organisation. To achieve world class standards.	WHR01LTM			

SP1Q2	Could you explain how you achieved flow and pull in your organisation in terms of the specific lean techniques utilised to achieve this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1	Developed smaller trolleys with racking system to make handling easier and quicker. More flexibility was achieved. Previously used heavy cumbersome trolleys.			WJM01L	
2.2	More push than pull, but we are focused on 400 "A" item dies out of 6000.		WAC01L, WHM01		
2.3	Experience from history. Flow lines with job cards. Flow lines established many years ago but improved. Cross-functional interaction between departments who supply and who use.		WBS01L WRM01L	WBK01S, WBS02L, WTM01LWJN01LW D,	
2.4	No knowledge.	WPP01LF WHS01LSLS,	WAK01LIT WBS01L,	WDC01L, WNM01L,	WSB01M, WAM01LBUYA,

SP1Q2	Could you explain how you achieved flow and pull in your organisation in terms of the specific lean techniques utilised to achieve this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WWF01LSY WPK01MSTK, WAR01SSCWW SR01LMNT, WET01LSFTY WAS02LF, WGP01LFEXPP WLT01SPRA	WPM01L, WFM01L, WPM02L, WJN01LWD WCM01LSCR, WMG01LGS, WPM03L, WJN02LSCR, WRS02L	WRL01LSC, WAS01LMNT, WEN01LMNT, WLN01LQC, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH, WGN01LQC, WAM03LDCOR, WNH01LQC, WEK01LMNT, WDR01MNPROG WHD01LMNT, WOV01LMNT
2.5	Achieved flow as per process flow diagram in order to resolve space issues.		WAL01L		
2.6	Despatch focused on flow methods improvement. Customer are surprised. Plan the next day carefully for deliveries		WBM01L		

SP1Q2	Could you explain how you achieved flow and pull in your organisation in terms of the specific lean techniques utilised to achieve this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	to be on-time. Personally move upstream to expedite the orders.				
2.7	Reduced set-up and run times, worked on the best flow layout. Achieved flow not pull. Quick changeovers introduced for presses improved flow.		WJM01M	WBK01L, WMN01L	
2.8	Increased capacity with night shift and balanced inputs outputs among different units.		WJH01LWD		
2.9	Flow is like a continuous chain from upstream through to despatch that does not stop. Pull through job cards make to customer order.			WBM02L	
2.10	Three years ago found the current state of flow lines.	WAV01M			
2.11	Based on pull by customers and the organisation making to order.	WKW01L			
2.12	The customer service unit pull from powder coating or anodising; anodising and powder coating pull from profiles	WRK01L			

SP1Q2	Could you explain how you achieved flow and pull in your organisation in terms of the specific lean techniques utilised to achieve this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	extrusion; Profiles extrusion pulls from re-melt; re-melt pull from scrap and bailing unit. All units are set-up as flow lines. The total lead-time for an order is less than four days				
2.13	Logical process flow for extrusion processes. Kanban billet area to presses, then stretching sawing, cutting, aging and then to packers.				WRB01LDR, WHB01LMNT
2.14	Logical flow after melt operation.	WCVDW01L			
2.15	Continuous improvement.				WWB01LSLS
2.16	Coupled manufacturing with small group activities and quick change over emphasis.		WAE01LDWG		
2.17	Use of “U” to achieve flow but die manufacture is make to order controlled.			WAM02L	WNP01LDDDES
2.18	There is a standard operating practice developed that resolves the flow from warehouse to customer		WES01SFCW		

SP1Q2	Could you explain how you achieved flow and pull in your organisation in terms of the specific lean techniques utilised to achieve this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.19	Quick change over considered for scrap and bailing operation plus how to achieve a more continuous flow. Automation of the system utilised.		WKP01LSCR		
2.20	In new distribution organisation focused on flow and effectively managing stock levels.		WMW01SSHL		
2.21	In warehouse and distribution, demarcations were developed. Electronic invoicing control the flow and visual controls show pile ups in demarcated areas.			WHM01LWD	
2.22	In anodising a small group activity was formed and the flow line was developed.			WPM04L	
2.23	Value adding facilities arranged in sequence to achieve continuous flow; compare with global best practices; customer triggers pull; quick change-over and methods improvement; cycle	WHR01LTM			

SP1Q2	Could you explain how you achieved flow and pull in your organisation in terms of the specific lean techniques utilised to achieve this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	time reduction; use of value stream mapping				

SP1Q3	Did you utilise teamwork to implement flow and pull in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1	Team local worked with procurement to achieve flow and pull from suppliers.			WJM01L	
3.2	Yes but to achieve flow.		WAC01L, WHM01, WBS01L, WJM01M	WBK01S, WAM02L, WCM01LSCR	
3.3	No knowledge.	WPP01LF WHS01LSLS, WAV01M	WAK01LIT WBS01L, WWF01LSY WAR01SSCWW SR01LMNT WAS02LF WGP01LFEXPP , WLT01SPRA	WBM02L, WJN01LWD, WVG01LGS, WJN02LSCR, WRS02L	WSB01M WRB01LDR, WAM01LBUYA, WWB01LSLS, WRL01LSC, WAS01LMNT, WEN01LMNT, WLN01LQC, WNP01LDDES,

SP1Q3	Did you utilise teamwork to implement flow and pull in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
					WSN01LQC, WPDB01LDCOR, WTD01LLABTECH, WGN01LQC WAM03LDCOR, WNH01LQC WEK01LMNT, WDR01MNPROG WHD01LMNT, WOV01LMNT
3.4	Yes.	WKW01LSY, WRK01L, WHR01LTM	WAL01L WBM01L, WPK01MSTK, WJH01LWD WAE01LDWG WET01LSFTY WES01SFCW WKP01LSCR WMW01SSHL WRM01L	WBK01L, WBS02L, WDC01L, WNM01L WPM01L, WFM01L WPM02L, WTM01L WHM01LWD, WMN01L WPM03L, WPM04L	WHB01LMNT,

SP1Q3	Did you utilise teamwork to implement flow and pull in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.5	Yes in re-melt the team played a major part in the frequency and speed of loading the furnaces.	WCVDW01L			

SP1Q3.1	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1.1	The work involves focus on two deliveries per day from suppliers in terms of requirements.			WJM01L	
3.1.2	More push than pull at this time for dies and profiles.		WAC01L, WHM01L, WBS01L	WAM02L	
3.1.3	No knowledge.	WPP01LF, WHS01LSLS, WAV01M	WAK01LIT, WBS01L WWF01LSY, WAR01SSC, WSR01LMNT WAS02LF WGP01LFEXPP, WLT01SPRA	WBM02L, WJN01LWD, WVG01LGS WJN02LSCR, WRS02L	WSB01M, WRB01LDR, WAM01LBUYA, WRL01LSC, WWB01LSLS, WAS01LMNT, WEN01LMNT, WLN01LQC, WNP01LDDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH WGN01LQC, WAM03LDCOR WNH01LQC, WEK01LMNT,

SP1Q3.1	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
					WDR01MNPROG, WHD01LMNT WOV01LMNT
3.1.4	Team members run the powder coating cell. Motivated as a team by the production bonuses.		WAL01L	WDC01L	
3.1.5	Despatch teamwork with profiles team. Presses teamwork with die shop team.		WBM01L		WHB01LMNT
3.1.6	Die manufacturing team shared ideas at the small group activities sessions.			WBK01L	
3.1.7	Anodising is a natural flow line and the employees work as a team.			WBK01S	
3.1.8	The mini business team run the cell or flow line according to job cards and a production schedule from planning.	WKW01LSY WRK01L, WCVDW01L	WJM01M WPK01MSTK, WAE01LDWG WET01LSFTY WRM01L	WBS02L WNM01L, WPM01L, WFM01L WPM02L, WTM01L, WHM01LWD WMN01L,	
3.1.9	Team members in mini business activities asked to contribute how to improve flow. One to the other focus. Achieve a rhythm.		WJH01LWD	WCM01LSCR WPM03L,	

SP1Q3.1	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1.10	Team reacts to the order and picks the item.		WES01SFCW		
3.1.11	Scrap and bailing work to a one week ahead schedule.		WKP01LSCR		
3.1.12	In new organisation, the focus is on flow from receiving through stock control and effective purchasing.		WMW01SSHL		
3.1.13	In the continuous flow process in anodising, the current team roles were identified by the small group activity team who had designed to flow line.			WPM04L	
3.1.14	Mini business team drive flow lines; cross-functional effectiveness occur due to openness; twice a week meeting top team with operations managers provides effective cross-functionality.	WHR01LTM			

SP1Q4	Would you say your organisation has managed to implement manufacturing cells utilising the techniques associated with flow and pull?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.1	It has been achieved but do not have detailed information.	WAV01M		WJM01L	
4.2	Yes we have although controls involve pushing the work through.		WAC01L, WHM01L WBS01L, WJM01M, WJH01LWD	WBK01L WBK01S, WBS02L WAM02L, WHM01LWD	
4.3	Do not know.	WPP01LF WHS01LSLS,	WAK01LIT, WYE01SF WBM01L, WWF01LSY WPK01MSTK, WAR01SSC, WSR01LMNT WET01LSFTY WES01SFCW WMW01SSHL WAS02LF, WGP01LFEXPP WLT01SPRA	WBM02L WNM01L, WPM01L WFM01L, WPM02L WTM01L, WVG01LGS WPM03L, WJN02LSCR, WRS02L	WSB01M, WAM01LBUYA WRL01LSC, WAS01LMNT WEN01LMNT, WLN01LQC WPDB01LDCOR, WTD01LLABTECH, WGN01LQC, WAM03LDCOR WEK01LMNT, WDR01MNPROG

SP1Q4	Would you say your organisation has managed to implement manufacturing cells utilising the techniques associated with flow and pull?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
					WHD01LMNT, WOV01LMNT
4.4	Not fully yet.		WAL01L		
4.5	Yes but not sure of the details.	WRK01L WCVDW01L,		WDC01L, WJN01LWD	WRB01LDR WWB01LSLS,
4.6	Extrusion process flow lines established plus make to order system implemented.	WKW01LSY			WNH01LQC
4.7	Yes	WHR01LRM	WKP01LSCR WRM01L	WCM01LSCR, WMN01L, WSN01LQC WPM04L,	WHB01LMNT, WNP01LDDDES

SP1Q4.1	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.1.1	No comment, no knowledge.	WPP01LF WHS01LSLS, WAV01M	WBS01L, WAK01LIT, WAL01L, WYE01SF, WBM01L, WWF01LSY,	WJM01L, WBK01S WBM02L, WNM01L, WPM01L, WFM01L, WPM02L WTM01L,	WAM01LBUYA, WRL01LSC, WWB01LSLS, WAS01LMNT, WEN01LMNT, WLN01LQC

SP1Q4.1	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WPK01MSTK, WAR01SSC, WSR01LMNT, WET01LSFTY, WES01SFCW, WMW01SSHL, WAS02LF, WGP01LFEXPP, WLT01SPRA	WMG01LGS WPM03L, WJN02LSCR, WRS02L	WPDB01LDCOR, WTD01LLABTECH WGN01LQC, WAM03LDCOR WEK01LMNT, WDR01MNPROG WHD01LMNT, WOV01LMNT
4.1.2	Pull is being focused on by top management. The extruder presses are effective flow lines. Die manufacturing is one U cell.		WAC01L, WHM01L		WNP01LDDES
4.1.3	Achieved flow through arranging the machine in terms of the routing and doing the layout so that no cross flows occur. Based on history.		WJM01M, WAE01LDWG WRM01L	WBK01L	WNH01LQC
4.1.4	Achieved flow. Control the work through with a job card system.		WJH01LWD	WBS02L, WAM02L, WHM01LWD	
4.1.5	The powder coating flow line consists of: receiving from profiles; placed in			WDC01L	

SP1Q4.1	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	designated racks; preheat; spray powder, despatch.				
4.1.6	Flow lines throughout the organisation. Make to order principles maintained in production. Additional capacity established to meet the demand.	WKW01LSY			
4.1.7	Flow lines throughout the organisation. Make to order principles maintained in production. Additional capacity established to meet the demand. Units are set-up as profit centres for example: anodising purchase from profiles; profiles purchase from re-melt; re-melt purchase from scrap and bailing.	WRK01L			
4.1.8	Logical process flow thinking. Able to see continuous flow.				WRB01LDR, WSN01LQC,
4.1.9	As explained the re- melt operation allows for logical flow process in terms of loading and unloading and manufacturing into billets after the melt operation. We assured that the flow has no cross flows and we improved output	WCVDW01L			

SP1Q4.1	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	with more frequent melts and improved loading methods.				
4.1.10	Flow lines have been established material is moved with cranes and forklifts.			WJN01LWD	WHB01LMNT
4.1.11	Flow with push emphasis 25 tons per day vital for scrap and bailing.		WKP01LSCR	WCM01LSCR	
4.1.12	Extrusion flow line in profiles effective flow achieved through quick changeovers and reducing run times			WMN01L	
4.1.13	The anodising continuous flow line is a good example of continuous flow being achieved.			WPM04L	
4.1.14	As discussed before: the facilities are arranged in sequence; W01 follow international best practices; quick change over and cycle time reduction utilised to improve the flow; value stream mapping is used for current and future flow lines.	WHR01LTM			

SP1Q5	Are your manufacturing cells manned by work teams and.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
5.1	Yes they are. The mini business teams that are led by the first line managers.	WAV01M, WKW01LSY, WRK01L, WCVDW01L, WHR01LTM	WAC01L, WBS01L, WAK01LIT WAL01L, WYE01SF, WBM01L, WJM01M WPK01MSTK, WJH01LWD, WSR01LMNT WAE01LDWG WET01LSFTY WKP01LSCR WRM01L, WLT01SPRA	WJM01L WBK01L, WBK01S WBS02L, WDC01L, WNM01L, WPM01L WFM01L, WPM02L, WTM01L, WJN01LWD, WAM02L, WHM01LWD, WCM01LSCR, WMN01L, WPM03L WJN02LSCR, WRS02L WPM04L	WRB01LDR, WAM01LBUYA, WWB01LSLS, WRL01LSC, WAS01LMNT, WEN01LMNT, WLN01LQC, WNP01LDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH, WGN01LQC, WAM03LDCOR, WNH01LQC WEK01LMNT, WDR01MNPROG, WHD01LMNT WOV01LMNT
5.2	Manned by individuals that work in small group activities		WHM01L		
5.3	Do not know.	WPP01LF, WHS01LSLS,	WWF01LSY WAR01SSC,	WBM02L WMG01LGS,	WSB01M

SP1Q5	Are your manufacturing cells manned by work teams and.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WES01SFCW WMW01SSHL WAS02LF WGP01LFEXPP		

SP1Q5.1	.....can you explain how this works in terms of the control systems and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
5.1.1	Job cards are utilised to control each works order. A production schedule is used with the job cards. For each die to be corrected there is a die report.	WKW01LSY, WRK01L	WJH01LWD, WSR01LMNT, WAE01LDWG, WET01LSFTY, WRM01L WLT01SPRA,	WJM01L WNM01L, WPM01L WFM01L, WPM02L WTM01L, WJN01LWD, WAM02L, WHM01LWD, WCM01LSCR WMN01L, WPM03L, WJN02LSCR WRS02L	WAM01LBUYA, WRL01LSC, WHB01LMNT WAS01LMNT, WLN01LQC WNP01LDDES, WSN01LQC WPDB01LDCOR, WTD01LLABTECH WGN01LQC, WAM03LDCOR WNH01LQC, WDR01MNPROG

SP1Q5.1	.....can you explain how this works in terms of the control systems and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
					WHD01LMNT, WOV01LMNT
5.1.2	Day shift and night shift assures continuous flow but with push controls. First line managers are the team leaders.		WAC01L		WEN01LMNT
5.1.3	For die manufacturing, a forward schedule is prepared and the cell work to this. The team consists of highly skilled employees.		WHM01L,	WBK01L	
5.1.4	Do not know.	WPP01LF WHS01LSLS,	WBS01L, WAK01LIT WYE01SF, WBM01L WWF01LSY, WAR01SSC, WES01SFCW, WMW01SSHL, WAS02LF, WGP01LFEXPP	WBM02L, WMG01LGS	WSB01M
5.1.5	Pull control, but not fully in powder coating cell.		WAL01L	WDC01L	

SP1Q5.1	.....can you explain how this works in terms of the control systems and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
5.1.6	Standard operating procedure in anodising states how the work should be done. Work to a schedule therefore push control.			WBK01S WBS02L,	
5.1.7	Profile teamwork to a production schedule from planning.		WJM01M		WRB01LDR
5.1.8	Job cards go to first line manager who schedules and prioritises the work.		WPK01MSTK,		
5.1.9	Planning receives order that is turned into a job card and schedule that is handed to the first line manager.	WAV01M			WWB01LSLS
5.1.10	In re-melt we work to a standard operating procedure. Melts are in terms of job cards and a production schedule.	WCVDW01L			
5.1.11	Production sheets one week ahead in scrap and bailing. Sort, bail, check quality and palletise and shrink wrap the product.		WKP01LSCR		
5.1.12	The mini business team controls the flow line.				WEK01LMNT

SP1Q5.1	.....can you explain how this works in terms of the control systems and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
5.1.13	In anodising we create a work to schedule for the shift.			WPM04L	
5.1.14	Make to order schedule; flexible to adjust to customer requirements; correct priorities to the advantage of the customer.	WHR01LTM			

SP1Q5.2	.....how the employees in the manufacturing cells function regarding, for example, their roles and responsibilities or other attributes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
5.2.1	The line manager is charge of the cell. The teams report to the line manager.			WJM01L	
5.2.2	Some of the employees in the teams are multi skilled. Assume roles as required by the process. Employees able to change to another flow line when required. Able to assist one another to resolve a pile up.	WAV01M WRK01L, WHR01LTM	WAC01L, WBK01L, WSR01LMNT, WAE01LDWG, WET01LSFTY, WKPO1LSCR, WRM01L WLT01SPRA,	WBK01S, WNM01L, WPM01L, WFM01L, WPM02L WJN01LWD, WAM02L, WCM01LSCR, WMN01L,	WHB01LMNT, WAS01LMNT, WEN01LMNT, WLN01LQC, WEK01LMNT WDR01MNPROG

SP1Q5.2	.....how the employees in the manufacturing cells function regarding, for example, their roles and responsibilities or other attributes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
				WJN02LSCR WRS02L,	
5.2.3	The employees participate in small group activities and try and solve problems without line manager involvement. Team sessions are led by the line manager.		WHM01L		
5.2.4	Do not know.	WPP01LF WHS01LSLS,	WBS01L, WAK01LIT, WYE01SF, WBM01L, WWF01LSY, WAR01SSC, WES01SFCW WMW01SSHL WAS02LF, WGP01LFEXPP	WBM02L WMG01LGS,	WSB01M, WWB01LSLS,
5.2.5	By allocated task. Some workers are multi-skilled.	WKW01LSY, WCVDW01L	WAL01L WKP01LSCR	WDC01L, WTM01L WHM01LWD, WPM03L, WPM04L	WRB01LDR, WAM01LBUYA, WNP01LDDES,

SP1Q5.2	.....how the employees in the manufacturing cells function regarding, for example, their roles and responsibilities or other attributes?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
					WRL01LSC, WSN01LQC WPDB01LDCOR, WTD01LLABTECH, WGN01LQC, WAM03LDCOR, WNH01LQC, WHD01LMNT WOV01LMNT,
5.2.6	Profile team, man operations by task, but if the need arises they change tasks in terms of multi-skilled levels.		WJM01M, WPK01MSTK,	WBS02L	
5.2.7	The first line manager control the team in the warehouse and distribution consisting of loaders, drivers and despatchers.			WBK01L,	

SP1Q6	Since the implementation of manufacturing cells would you say that Kaizen as a lean technique is effectively being utilised?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
6.1	Yes	WPP01LF WAV01M, WKW01LSY WRK01L, WCVDW01L, WHR01LTM	WAC01L, WHM01L, WBS01L, WJH01LWD WBM01L, WJM01M, WPK01MSTK WAE01LDWG WET01LSFTY WKP01LSCR WMW01SSHL WRM01L	WJM01L, WBK01L, WBK01S, WBS02L, WDC01L, WBM02L, WNM01L, WPM01L WFM01L, WPM02L WJN01LWD, WAM02L WTM01L, WHM01LWD, WCM01LSCR, WMN01L WPM03L, WJN02LSCR, WRS02L WPM04L	WRB01LDR, WAM01LBUYA, WRL01LSC, WWB01LSLS WHB01LMNT, WAS01LMNT, WEN01LMNT, WLN01LQC, WNP01LDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH WNH01LQC, WEK01LMNT WDR01MNPROG, WOV01LMNT
6.2	Do not know.	WHS01LSLS	WAK01LIT, WWF01LSY, WAR01SSC WES01SFCW	WMG01LGS	WSB01M WGN01LQC,

SP1Q6	Since the implementation of manufacturing cells would you say that Kaizen as a lean technique is effectively being utilised?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WAS02LF WGP01LFEXPP,		
6.3	Yes, but can be improved.		WAL01L WYE01SF		
6.4	Not really.		WSR01LMNT		WAM03LDCOR, WHD01LMNT
6.5	Last two years no		WLT01SPRA		

SP1Q6.1	Could you expand on how it is being utilised and are you able to provide an example/s?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
6.1.1	Continuous improvement of defective production with quality control department arrange to re-run returned stock from customer and avoid a re-occurrence.			WJM01L	
6.1.2	Continuous improvement of extruder presses with updated technology. Quality has improved dramatically.		WAC01L	WTM01L	

SP1Q6.1	Could you expand on how it is being utilised and are you able to provide an example/s?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
6.1.3	In die manufacturing, continuous improvement focus at least once per day. Sparking has recently been improved by ideas from workers. Also CNC back milling.		WHM01L,	WBK01L	WNP01LDDDES
6.1.4	Do not know.	WHS01LSLS	WBS01L WAK01LIT, WYE01SF, WBM01L, WWF01LSY WAR01SSC, WES01SFCW WMW01SSHL WAS02LF WGP01LFEXPP , WLT01SPRA	WMG01LGS	WSB01M, WHB01LMNT WGN01LQC,
6.1.5	Visibility in terms of what is running now. Metal tanks have a call light. Alarms on ovens		WAL01L	WDC01L	
6.1.6	No comment.			WBK01S	WAM03LDCOR, WHD01LMNT

SP1Q6.1	Could you expand on how it is being utilised and are you able to provide an example/s?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
6.1.7	Profile team improved quality by refocusing on process and training to close the knowledge gap, Scrap reduced from 1,5% to 0,5%		WJM01M		
6.1.8	New extrusion method brought over from the United states of America.		WPK01MSTK,		
6.1.9	Quick changeovers in profiles and presses speeded up. New heaters used to heat the presses. Latest technology incorporated for press operations. People added to improve transfer extrusions. Team members multi-skilled.	WPP01LF, WRK01L, WHR01LTM	WRM01L	WBS02L, WNM01L, WPM02LWJN01L WD, WMN01L, WRS02L	WWB01LSLS WAS01LMNT, WNH01LQC
6.1.10	We improved the flow line in warehouse and distribution and introduced a second shift loading truck through the night.		WJH01LWD		
6.1.11	Deliveries have improved from previous 8 days down to three days.			WBM02L	
6.1.12	Setting standards with standard operating practices utilising international standards for extrusions.	WAV01M			

SP1Q6.1	Could you expand on how it is being utilised and are you able to provide an example/s?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
6.1.13	More effective loading of jigs.			WPM01L, WFM01L, WPM04L	WOV01LMNT
6.1.14	The Kelly system on the presses implemented. Die changeovers less than three minutes achieved.	WKW01LSY			
6.1.15	Through improved die designs.				WRB01LDR, WPDB01LDCOR,
6.1.16	Demarcation and cleaning so things are easily found, saving time.				WAM01LBUYA, WRL01LSC
6.1.17	In re- melt we improved the loading method, introduced new technology with better blowers and incentivised workers for achieving better production targets.	WCVDW01L			
6.1.18	No example.		WSR01LMNT		
6.1.19	Drawing office meet twice per week cross-functionally with manufacturing and this has led to improved die designs.		WAE01LDWG		
6.1.20	Multi-skilling.			WAM02L	
6.1.21	Tables in the Gauteng warehouse to promote flow.		WET01LSFTY		

SP1Q6.1	Could you expand on how it is being utilised and are you able to provide an example/s?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
6.1.22	Improved the scrap sorting from manual to machine.		WKP01LSCR		
6.1.23	Soft starter cooling tower in re-melt section.				WEN01LMNT
6.1.24	Profiles output has improved from 15 ton per day to 35Ton per day through various improvement projects.			WHM01LWD	
6.1.25	Conveyer for scrap sorting.			WCM01LSCR	
6.1.26	Automated colouring in powder coating.				WLN01LQC
6.1.27	Redesigned anodising jigs to increase through put.			WPM03L	
6.1.28	Scrap bailer adjusted to reduce cycle time.			WJN02LSCR	
6.1.29	New table with rollers has resulted in reduce rejects.				WSN01LQC
6.1.30	As demonstrated by the new operations manager with new gun technology.				WTD01LLABTECH
6.1.31	Roller table used at the final saw in profiles.				WEK01LMNT
6.1.32	New software for CNC programming.				WDR01MNPROG

SP1Q7	Since the implementation of manufacturing cells would you say that the organisation has changed its organisational structure in any way to service these manufacturing cells and help them function better?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.1	Changed to teams from individuals.			WJM01L	
7.2	Top structure changed. Since 2006 managing director changed. Two levels of management taken out. Communications improved and information can more easily be accessed.		WAC01L		
7.3	Yes there are more direct communications. Focus is on giving workers responsibilities so that they take ownership of what needs to be achieved.		WHM01L WBM01L,		
7.4	No structural changes. Teamwork by area and some cross-functional teams.	WPP01LF	WBS01L WAL01L, WPK01MSTK, WJH01LWD, WAR01SSC, WSR01LMNT WLT01SPRA	WBK01L WDC01L, WPM01L WFM01L,	WHB01LMNT, WAS01LMNT WEN01LMNT, WNP01LDDDES WAM03LDCOR,

SP1Q7	Since the implementation of manufacturing cells would you say that the organisation has changed its organisational structure in any way to service these manufacturing cells and help them function better?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.5	The previous and current managing director came into the organisation via a consulting company. Thanks to them the business changes were well introduced. An organisational development team focusses on the twenty keys implementation throughout the organisation. The unit manager organisational development also came from the consulting company and she was key to the implementation of the 20 keys.		WAK01LIT	WPM04L	WLN01LQC
7.6	Do not know.	WHS01LSLS	WYE01SF, WWF01LSY, WES01SFCW, WMW01SSHL, WAS02LF, WGP01LFEXPP	WBM02L WPM02L, WVG01LGS	WSB01M, WAM01LBUYA WRL01LSC, WPDB01LDCOR WDR01MNPROG,

SP1Q7	Since the implementation of manufacturing cells would you say that the organisation has changed its organisational structure in any way to service these manufacturing cells and help them function better?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.7	Yes, but cannot elaborate how.			WBK01S WAM02L,	
7.8	Profiles cell appointed a quality engineer.		WJM01M		
7.9	The appointment of the chief operations director some two to three years ago.	WAV01M		WBS02L	WGN01LQC, WNH01LQC, WEK01LMNT
7.10	New operations director plus the appointment of first line managers.			WNM01L, WJN02LSCR	WSN01LQC, WTD01LLABTECH
7.11	Top team discourages organisational silos. Board beliefs in flexibility.	WKW01LSY			
7.12	Fifteen years ago new managing director appointed, who initiated the current structure. Levels have been taken out and factory manager superintendent, foreman and supervisors replaced with first line managers, per flow line or cell. Customers link directly with the unit and therefore the flow line itself. One person	WRK01L	WRM01L	WTM01L WMN01L, WRS02L	

SP1Q7	Since the implementation of manufacturing cells would you say that the organisation has changed its organisational structure in any way to service these manufacturing cells and help them function better?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	covers more functions that before. Emphasis on first line managers' development.				
7.13	A die person is allocated to each mini business team on a press flow line. The establishment of mini business teams is a structural change.				WRB01LDR
7.14	Flatter structure, less levels of management. Less management.	WCVDW01L		WPM03L	
7.15	Packers decentralised to each cell in order to promote continuous flow.			WJN01LWD	
7.16	Mini business teams developed.				WWB01LSLS
7.17	Team structures developed by previous managing director.		WAE01LDWG WET01LSFTY		
7.18	Structural changes last 7 years: the organisational development manager; the chief operations director and the		WKP01LSCR		

SP1Q7	Since the implementation of manufacturing cells would you say that the organisation has changed its organisational structure in any way to service these manufacturing cells and help them function better?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	development and empowerment of first line managers to run the business				
7.19	No structural change since major restructuring 15 years ago.			WHM01LWD	
7.20	Billets buy-in replaced with internal manufacturing 10 years ago.			WCM01LSCR	
7.21	The operations manager powder coating was changed two years ago and more first line managers were appointed in powder coating with more lines being established.				WHD01LMNT
7.22	Last eight years current managing director took over from the previous managing director. A senior operations manager appointed for profiles and anodising in place of current managing director.				WOV01LMNT

SP1Q7	Since the implementation of manufacturing cells would you say that the organisation has changed its organisational structure in any way to service these manufacturing cells and help them function better?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.23	Was changed in 1997 to the current structure. Would say the current structure is a flow structure due to the organisation of first line managers each responsible for a manufacturing cell reporting to the operations managers reporting to unit managers.	WHR0LTM			

SP1Q7.1	Would you say that these changes have helped to improve your customer service?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.1.1	Yes customer complaints have reduced dramatically. Service delivery has improved from 80% to 90% being delivered with in one day of receiving the customer order.		WES01SFCW	WJM01L	
7.1.2	Lead times down from previously 14 to 20 days to three or four days. Improved quality.	WHS01LSLS WAV01M, WKW01LSY,	WAC01L, WWF01LSY WPK01MSTK,	WPM01L, WPM02L WTM01L, WAM02L,	WRB01LDR, WWB01LSLS, WHB01LMNT,

SP1Q7. 1	Would you say that these changes have helped to improve your customer service?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
		WRK01L, WHR01LTM	WAE01LDWG WET01LSFTY WGP01LFEXPP , WLT01SPRA	WMN01L WRS02L, WPM04L	WAS01LMNT WPDB01LDCOR, WAM03LDCOR
7.1.3	Not delivery but definitely quality of die manufacturing.		WHM01L		
7.1.4	Yes deliveries two weeks before, now within 4 days		WBS01L WBM01L,	WBS02L, WBM02L WNM01L,,	
7.1.5	To some extent, information now much quicker than before.		WAK01LIT		
7.1.6	Yes manual lines can provide one day deliveries in powder coating. New gun clean automatically.		WAL01L		
7.1.7	Yes more happy customers.	WPP01LF	WYE01SF,		
7.1.8	Yes but not sure to what extent.			WBK01L, WBK01S	WSB01M, WAM01LBUYA, WRL01LSC, WGN01LQC, WNH01LQC, WEK01LMNT, WHD01LMNT,

SP1Q7.1	Would you say that these changes have helped to improve your customer service?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.1.9	Yes scrap reduced in profiles from 1, 5% to 0, 5% and delivery improved from 20 to three days.		WJM01M		
7.1.10	Warehouse and distribution has improved from missing deliveries during the day to no missed deliveries since the night shift loading system		WJH01LWD		
7.1.11	Do not know.		WAR01SSC WMW01SSHL		WPDB01LDCOR WDR01MNPROG, WOV01LMNT
7.1.12	Powder coating has improved output from 8000 square meters to 11000 meters per day.			WDC01L	
7.1.13	Anodising improved from 3000 square meters to 5000 square meters.			WFM01L, WPM03L	
7.1.14	Yes, re melt production increased extensively.	WCVDW01L			
7.1.15	Last five years profiles improved by 95%			WJN01LWD	
7.1.16	Yes, priority management of dies.		WSR01LMNT		
7.1.17	Yes re-melt our customer and we have increased our productivity by 25%.		WKP01LSCR		

SP1Q7. 1	Would you say that these changes have helped to improve your customer service?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.1.18	Using racking for billets improved categorisation and reduced searching time.				WEN01LMNT
7.1.19	In warehouse and distribution, trucks are loaded on the night shift so no delays occur during the day.			WHM01LWD	
7.1.20	Enough billet stock available to keep extrusions flowing continuously.			WCM01LSCR	
7.1.21	Customers can liaise directly with the factory. Promises are kept.		WAS02LF		
7.1.22	No changes has always been good.		WRM01L		
7.1.23	Better organised stock control by relating description to code.			WMG01LGS	
7.1.24	One day delivery achieved in powder coating.				WLN01LQC
7.1.25	Dies manufacturing lead time reduced from four weeks to one week.				WNP01LLDES
7.1.26	Obtaining cleaner scrap supply.			WJN02LSCR	
7.1.27	No changes.				WSN01LQC
7.1.28	Action plans identify employee's responsibilities for a specific task.				WTD01LLABTECH

SP1Q7. 2	Do you think there is an alternative and better way to achieve even higher levels of customer service?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.2.1	Have a meeting with first line managers to improve customer service.			WJM01L	
7.2.2	Fully implement 20 keys.		WAC01L		
7.2.3	Yes in die manufacturing we are now going for three D designs.		WHM01L		
7.2.4	Electronic decision making.		WBS01L		
7.2.5	Do not know.		WAK01LIT, WYE01SF, WAR01SSC WET01LSFTY		WAM01LBUYA, WRS01LSC, WAS01LMNT, WPDB01LDCOR, WEK01LMNT WDR01MNPORG, WOV01LMNT
7.2.6	Yes run complete orders without defects.		WAL01L		
7.2.7	Improve teamwork.		WBM01L		
7.2.8	Not really, we are on the right track.			WBK01L	
7.2.9	Fine tune the systems.			WBK01S	
7.2.10	Yes but difficult to explain how.	WHS01LSLS	WWF01LSY, WPK01MSTK,	WPM01L WTM01L,	WHB01LMNT, WEN01LMNT, WNP01LDDDES

SP1Q7.2	Do you think there is an alternative and better way to achieve even higher levels of customer service?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.2.11	Yes in profiles incorporate metallurgical aspects into the schedule. Run long lead time aging once per week.		WJM01M		
7.2.12	Sure there should be, but will have to think about it.	WPP01LF WAV01M,	WJH01LWD		
7.2.13	Acquire new technology. For example more Kelly systems.		WRM01L	WBS02L, WPM02L	WNH01LQC
7.2.14	Powder coating requires a bigger building to replace China imports.			WDC01L	
7.2.15	Yes in despatch we should monitor transport better.			WBM02L	
7.2.16	Workers are filling in maintenance check sheets that will assist with improved machine maintenance.				WSB01M
7.2.17	Yes through continuous improvement.	WCVDW01L	WAS02LF WGP01LFEXPP ,	WNM01L,	
7.2.18	Yes install more anodising baths.			WFM01L	
7.2.19	Yes, establish more flow lines (more extrusion presses) that means increasing capacity.	WKW01LSY, WRK01L,		WAM02L	WWB01LSLS

SP1Q7. 2	Do you think there is an alternative and better way to achieve even higher levels of customer service?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.2.20	Empower the right people to make decisions without having to consult managers, who do not really know any better.				WRB01LDR
7.2.21	Discipline flow line workers to immediately move materials to demarcated areas.			WJN01LWD	
7.2.22	More quick changeovers and less defects.		WSR01LMNT		
7.2.23	Become leaner.		WAE01LDWG		
7.2.24	Improve stock availability.		WES01SFCW		
7.2.25	Completely automate scrap sorting. Bailing and packing.		WKP01LSCR		
7.2.26	Yes consistent one day delivery to new organisation taken over by W01 from W01 Gauteng stores.		WMW01SSHL		
7.2.27	Achieve the vision of one day delivery.		WHM01LWD		
7.2.28	Increase the size of the sorting conveyer.			WCM01LSCR	
7.2.29	Presses can be speeded up more with better heaters.			WMN01L	

SP1Q7.2	Do you think there is an alternative and better way to achieve even higher levels of customer service?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
7.2.30	More and better customer knowledge. More direct interviews with customers.		WLT01SPRA	WMG01LGS	
7.2.31	Do not think so.			WPM03L	WLN01LQC, WTD01LLABTECH
7.2.32	Develop scrap suppliers to do what W01 is doing.			WJN02LSCR	
7.2.33	Resolve non-conformance reports from customers.				WSN01LQC
7.2.34	Set higher targets.			WRS02L	
7.2.35	Establish a small group activity to deal with production issue. Establish a permanent cross-functional team between profiles and the die shop.				WGN01LQC
7.2.36	Allocate a space for returned dies.				WAM03LDCOR
7.2.37	Eliminate customer backlog completely			WPM04L	
7.2.38	More training of workers.				WHD01LMNT
7.2.39	Yes with continues improvement. An example is increased capacity in Vereeniging and Cape Town that is part of our current lean thought processes. To create free capacity is also a strategy.	WHR01L			

SP1Q8	How would you describe your current organisational structure functionally since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.1	Much improved since inception of 20 keys.			WJM01L	
8.2	Improved communications, feedback, teamwork, training, morale and technology. Better understanding of the way forward.		WAC01L WKP01LSCR, WAS02LF		WEN01LMNT WDR01MNPROG, WHD01LMNT
8.3	Neater, more streamlined, more empowerment. Major quality improvements in die manufacturing. Less down time and improved plant maintenance.		WHM01L		WWB01LSLS WNH01LQC,
8.4	Functionally structured		WBS01L		
8.5	Orders come in through sales, goes to planning that loads the various production centres, presses, dies and powder coating.		WAK01LIT		
8.6	Quick decision making		WAL01L		
8.7	No structural changes.		WYE01SF		
8.8	Better communications. More sensitive leadership who listen, work well with shop stewards to resolve issues, trust among employees.		WBM01L		

SP1Q8	How would you describe your current organisational structure functionally since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.9	No departmental changes but layers of management taken out.			WBK01L	
8.10	Too new to comment		WMW01SSHL WLT01SPRA,	WBK01S	
8.11	Not totally there.		WWF01LSY		
8.12	Improved information and material flow, open line communications, and effective feedback. Joint decision making through consultations. Working easier. Achieving targets and satisfying the customer. Everything required is provided.	WCVDW01L	WJM01M WRM01L	WBS02L, WPM02L WTM01L, WJN01LWD WPM03L,	WLN01LQC, WNP01LDES, WSN01LQC
8.13	Different departments work as if integrated.		WPK01MSTK,		
8.14	Working better with better systems.	WPP01LF			
8.15	Much improved relationships and even ethnicity issues resolved in warehouse and distribution.		WJH01LWD		
8.16	Do not know.		WAR01SSC	WDC01L, WAM02L	WSB01M
8.17	Less losses, more ownership, proof of delivery improved, joint leadership forum.				

SP1Q8	How would you describe your current organisational structure functionally since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.18	Working well, no silos free flowing interactive open communications. Effective cross-functional interaction possible without issues. Orders processed first in first out. Works like a chain.	WHS01LSLS	WGP01LFEXPP		WAS01LMNT, WTD01LLABTECH, WEK01LMNT,
8.19	Working well and very applicable to the business of manufacturing aluminium extrusions and achieving the targets set.	WAV01M			
8.20	Working well with team meetings and information on-time all the time. Goals cascaded throughout the organisation by team. Incoming order flow handled quickly and effectively.			WNM01L,	
8.21	Good with the involvement of all employees. Good teamwork, open communications and cooperation amongst the employees. Knowledge sharing amongst team members. All know where the organisation is going.		WSR01LMNT	WPM01L, WMN01L, WPM04L	WPDB01LDCOR
8.22	Good with visual management, effective feedback and communications.			WFM01L	

SP1Q8	How would you describe your current organisational structure functionally since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.23	Top team discourages organisational silos and encourages cross-functional working together.	WKW01LSY			
8.24	Working well with much improved communications and focus on internal customers and suppliers.	WRK01L		WJN02LSCR	
8.25	Could work better through empowerment of right people, for example making decision to correct the press alignment can be made by the die repair person with the first line manager and the same applies to temperature changes.				WRB01LDR
8.26	Working well with a flatter structure and good communications. Direct interactions with higher levels are possible. Unit managers visit the mini business team.		WET01LSFTY	WCM01LSCR, WRS02L	WAM01LBUYA
8.27	Working well with the mini business team meetings.				WRL01LSC
8.28	Working well with team structure.		WAE01LDWG		
8.29	Evolving continuously improving.		WES01SFCW		

SP1Q8	How would you describe your current organisational structure functionally since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.30	Working well with no hidden agendas and a clear path ahead.				WHB01LMNT
8.31	Working well in warehouse and distribution since the implementation of the nightshift truck loading.			WHM01LWD	
8.32	Improved flow of materials and customer service. More employee involvement and improved morale.			WMG01LGS	
8.33	Not optimised, can improve.				WGN01LQC
8.34	In die shop find it working well. Generally good relationships, however there are occasional cases of blame shifting.				WAM03LDCOR
8.35	Problematic with anodising receiving defective material from profiles.				WOV01LMNT
8.36	Work well: integrated; open communication; close to the customer.	WHR01LTM			

SP1Q8.1	Could you explain how this organisational structure has changed since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.1.1	More teams with more responsibilities than only cleaning and organising.			WJM01L	
8.1.2	Better flow of communications with improved training and technology.		WAC01L		
8.1.3	Flatter, less people, less managers more effective, better organised.	WCVDW01L, WHR01LTM	WHM01L	WMN01L, WPM03L, WRS02L	WAM01LBUYA
8.1.4	No structural changes but lots of teamwork.		WBS01L WYE01SF, WES01SFCW	WPM01L, WFM01L, WPM02L, WHM01LWD WVG01LGS	
8.1.5	Current and previous managing director came into the business. Organisational development manager now driving the changes with keys implementation and training for employees. First line managers were developed to run mini business teams and flow lines.		WAK01LIT WET01LSFTY	WBM02L, WPM04L	
8.1.6	More informed.		WAL01L		

SP1Q8.1	Could you explain how this organisational structure has changed since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.1.7	Too many offices before to get things done. Now more stream lined.		WBM01L		
8.1.8	Layers have been reduced and the managing directors have changed.			WBK01L	
8.1.9	Unable to comment on the detail.		WJM01M, WAR01SSC, WMW01SSHL, WGP01LFEXPP, WLT01SPRA	WBK01S, WCM01LSCR	WRS01LSC, WWB01LSLS WLN01LQC, WPDB01LDCOR, WNP01LDDES, WAM03LDCOR, WDR01MNPROG
8.1.10	Ex managing director and current managing director changed the business. Information well shared. Top team meets twice per week. Effective top down and down up communications.		WWF01LSY, WAS02LF		
8.1.11	Team structure works effectively.		WPK01MSTK,		
8.1.12	No significant structural changes.	WPP01LF WAV01M,	WJH01LWD	WJN01LWD	WEN01LMNT
8.1.13	Added a quality engineer and the chief operating officer.			WBS02L	

SP1Q8.1	Could you explain how this organisational structure has changed since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.1.14	No comment	WHS01LSLS		WDC01L	WSB01M
8.1.15	New operations director appointed and the development of first line managers.			WAM02L, WJN02LSCR	WHB01LMNT, WSN01LQC WTD01LLABTECH, WGN01LQC WNH01LQC WEK01LMNT
8.1.16	No silos, effective cross-functional interactions.	WKW01LSY			
8.1.17	Fifteen years ago new managing director appointed who initiated the current structure. One level has been taken out and factory manager superintendent, foreman and supervisors replaced with unit manager, operations manager and first line manager per flow line or cell. Customers link directly with the unit and therefore the flow line itself. To accommodate growth, a chief operations director appointed. The establishment of an organisational	WK01L		WTM01L	

SP1Q8.1	Could you explain how this organisational structure has changed since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	development department or unit is also a significant change for the better.				
8.1.18	Die corrector has been allocated to the press flow line.				WRB01LDR
8.1.19	Has occurred but do not know the details.		WSR01LMNT		
8.1.20	Refined teamwork through the mini business teams established.		WAE01LDWG		WHD01LMNT
8.1.21	Last seven years: managing director replaced the previous person; organisational development manager appointed; two years ago chief operations director appointed. Scrap and bailing manager appointed.		WKP01LSCR		
8.1.22	Last 10 years no significant structural changes but continuous improvement.				WAS01LMNT
8.1.23	Better utilisation of employees.		WRM01L		
8.1.24	Last eight years current managing director took over from the previous managing director. A senior operations manager appointed for profiles and anodising in place of current managing director.				WOV01LMNT

SP1Q 8.2	Is this the best organisational structure for lean operations?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.2.1	Yes	WPP01LF, WHS01LSLS WAV01M, WKW01LSY, WRK01L WCVDW01L, WHR01LTM	WAC01L WYE01SF, WBM01L WWF01LSY, WJM01M WPK01MSTK, WAE01LDWG WET01LSFTY WES01SFCW WKP01LSCR WMW01SSHL WRM01L WGP01LFEXPP, WLT01SPRA	WJM01L WBK01L, WBM02L, WNM01L, WPM01L WFM01L, WPM02L WTM01L, WJN01LWD, WAM02L, WHM01LWD, WCM01LSCR, WMG01LGS WMN01L, WPM03L WJN02LSCR, WRS02L, WPM04L	WAM01LBUYA, WRS01LSC, WAS01LMNT WLN01LQC, WSN01LQC WTD01LLABTECH, WNH01LQC WEK01LMNT,
8.2.2	Can still improve		WHM01L, WAS02LF		
8.2.3	Yes for the time being.		WBS01L		

SP1Q 8.2	Is this the best organisational structure for lean operations?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.2.4	Do not know. Not sure.		WAK01LIT WAR01SSC, WSR01LMNT	WBK01S	WSB01M, WWB01LSLS, WHB01LMNT, WNP01LDDES, WPDB01LDCOR WAM03LDCOR, WDR01MNPORG WHD01LMNT,
8.2.5	No		WJH01LWD	WBS02L, WDC01L	WRB01LDR, WGN01LQC, WOV01LMNT
8.2.6	Think so.				WEN01LMNT

SP1Q8.3	What would you do differently from the organisational structure to improve on the current situation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.3.1	Look and ways to reduce stock. Overstocking effects our performance we need more warehousing space.			WJM01L	
8.3.2	Take out another management level. Work more closely with employees.		WAC01L	WBS02L, WAM02L	
8.3.3	Work at even better communications.		WHM01L		

SP1Q8.3	What would you do differently from the organisational structure to improve on the current situation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.3.4	Do night shift deliveries.		WBS01L		
8.3.5	Do not know.		WAK01LIT, WSR01LMNT, WET01LSFTY	WDC01L	WSB01M, WWB01LSLS, WPDB01LDCOR, WEK01LMNT, WDR01MNPROG
8.3.6	Need more energy from the organisational development team.		WAL01L		
8.3.7	Nothing, more continuous improvement.		WYE01SF WPK01MSTK,		
8.3.8	Nothing.	WPP01LF WHS01LSLS, WAV01M WKW01LSY, WRK01L WCVDW01L, WHR01LTM	WBM01L, WWF01LSY, WJM01M WAE01LDWG WES01SFCW WKP01LSCR WMW01SSHL, WGP01LFEXPP WLT01SPRA	WBK01L, WBM02L, WNM01L, WFM01L WPM02L, WTM01L, WJN01LWD, WHM01LWD WMN01L, WMG01LGS,	WAM01LBUYA, WRS01LSC, WWB01LSLS WHB01LMNT, WAS01LMNT, WEN01LMNT WLN01LQC, WSN01LQC WRS02L, WTD01LLABTECH, WNH01LQC

SP1Q8.3	What would you do differently from the organisational structure to improve on the current situation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
				WPM03L WJN02LSCR,	
8.3.9	Not sure, will have to think about it.			WBK01S WPM01L	WNP01LDDES
8.3.10	We should appoint a quality manager plus look at better cross-functional interactions to improve the integration between functions.		WJH01LWD		
8.3.11	Provide feedback from trade shows.		WAR01SSC		
8.3.12	Increase the awareness of where the structural constraints are and deal with it. Focus more on continuous improvement. Resolve issues of design that continuously crop up despite informing die designers of the same mistakes that are continuously repeated.				WRB01LDR
8.3.13	Take more workers to the joint leadership meeting.			WCM01LSCR	
8.3.14	Some positional changes may help the organisation.		WAS02LF		
8.3.15	Bring in new technology.		WRM01L		

SP1Q8.3	What would you do differently from the organisational structure to improve on the current situation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
8.3.16	Establish cross-functional teams between suppliers and users. Reduce the number of first line managers, for example, one first line manager can run all the press teams.				WGN01LQC
8.3.17	Establish small group activity to resolve cross-functional issues.				WAM03LDCOR
8.3.18	Build stronger teams.			WPM04L	
8.3.19	More training of workers.				WHD01LMNT
8.3.20	Anodising report directly to chief operations director.				WOV01LMNT

SP1Q9	Could you describe which organisational functions or tasks are being performed by work teams within the manufacturing cells?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
9.1	None. Department teams have team members with responsibilities by task or function.			WJM01L, WDC01L	
9.2	Cells are integrated planning with dies with presses.		WAC01L		
9.3	Has not happened. Reduced number of heads with improved technology		WHM01L		

SP1Q9	Could you describe which organisational functions or tasks are being performed by work teams within the manufacturing cells?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
9.4	Inspection done by workers, Branches do own inspection.		WBS01L WWF01LSY,		
9.5	Do not know.	WHS01LSLS WAV01M, WKW01LSY	WAK01LIT, WYE01SF WJH01LWD, WAR01SSC WES01SFCW WMW01SSHL WGP01LFEXPP, WLT01SPRA	WPM01L WHM01LWD, WJN02LSCR	WSB01M, WAM01LBUYA WAS01LMNT, WGN01LQC WNH01LQC, WEK01LMNT WDR01MNPROG, WHD01LMNT, WOV01LMNT
9.6	None.		WAL01L, WSR01LMNT, WRM01L	WBM02L, WFM01L WPM02L, WTM01L, WMG01LGS, WPM03L WRS02L	WRB01LDR WRS01LSC, WLN01LQC WSN01LQC, WPDB01LDCOR WAM03LDCOR,
9.7	A number of offices have been taken over.		WBM01L		

SP1Q9	Could you describe which organisational functions or tasks are being performed by work teams within the manufacturing cells?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
9.8	All functions are done by the team in die and profiles manufacturing including inspection. Team is virtually self-directing		WJM01M	WBK01L, WB01KS,	
9.9	Employees in cells and in stockists doing inspection.		WPK01MSTK,	WAM02L	
9.10	Multi-tasking enabled one person doing more in finance. Team supports one another.	WPP01LF			WWB01LSLS
9.11	Profile team do own run outs previously done by a designated person. Profile team saw line reduced from three to two heads.			WBS02L	
9.12	Inspection done by the profiles team. Inspectors do stretching and inspection, workers are doing more maintenance work. Die corrections are done by the team.	WRK01L	WET01LSFTY	WNM01L,	
9.13	Team members do inspection and more maintenance tasks. Team members are filling in maintenance check sheets.	WCVDW01L	WAE01LDWG		WHB01LMNT
9.14	Data capture done by the mini business team.		.	WJN01LWD	

SP1Q9	Could you describe which organisational functions or tasks are being performed by work teams within the manufacturing cells?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
9.15	Bailed scrap was from a supplier that was taken over.		WKP01LSCR		
9.16	Multi-tasking of team members. Team members encouraged to do the first line manager's job.			WPM04L	WEN01LMNT
9.17	Workers run the mini business team sessions without the first line manager.			WCM01LSCR	
9.18	The chief operations director help the managing director.		WAS02LF		
9.19	The profile team know the billet sizes plus the recoveries achieved.			WMN01L	
9.20	In die manufacturing the team members plan the work, check the quality and do the maintenance of the machines.				WNP01LDDES
9.21	Truck drivers responsible for count, previously done by clerks.				WTD01LLABTECH
9.22	Inspection done by the teams; admin tasks done by teams; has happened throughout; many examples e.g. Drivers counting.	WHR01LTM			

SP1Q10	Has your organisation undergone significant change in terms of the number of hierarchical levels of the organisation? If so how has it changed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
10.1	Yes, it has been reduced from six to four levels.		WAC01L, WHM01L, WBS01L, WAK01LIT, WAL01L WYE01SF, WBM01L WET01LSFTY	WJM01L, WBK01L	
10.2	Too new to comment		WJM01M WPK01MSTK, WAR01SSC, WLT01SPRA	WBK01S	WDR01MNPROG
10.3	No changes	WKW01LSY	WWF01LSY WAS02LF,	WJN01LWD	
10.4	Reduced number of levels, by one. Chief operating director added.	WPP01LF WAV01M, WRK01L	WJH01LWD	WBS02L, WTM01L, WCM01LSCR	WWB01LSLS WNP01LDDES, WSN01LQC WAM03LDCOR, WNH01LQC

SP1Q10	Has your organisation undergone significant change in terms of the number of hierarchical levels of the organisation? If so how has it changed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
10.5	Reduced number of levels by two.	WCVDW01L	WAE01LDWG	WDC01L, WNM01L, WPM01L, WMN01L	
10.6	Do not know.		WSR01LMNT WES01SFCW WMW01SSHL WGP01LFEXPP,	WBM02L WFM01L, WPM02L, WAM02L WHM01LWD, WMG01LGS WJN02LSCR,	WSB01M, WAM01LBUYA WRS01LSC, WHB01LMNT, WAS01LMNT, WEN01LMNT, WLN01LQC, WPDB01LDCOR WEK01LMNT, WHD01LMNT
10.7	Yes but no details	WHS01LSLS,			
10.8	Has been increased by two levels.				WRB01LDR
10.9	Last seven years, Increased by one level with the chief operations director being appointed two years ago.		WKP01LSCR		
10.10	Reduce from 10 to 4		WRM01L		

SP1Q10	Has your organisation undergone significant change in terms of the number of hierarchical levels of the organisation? If so how has it changed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
10.11	Number of levels were reduced, but no specific details.			WPM03L WRS02L, WPM04L	
10.12	Last eight years no changes.				WTD01LLABTECH
10.13	Chief operations director added.				WGN01LQC WOV01LMNT,
10.14	In 1997 reduced from 8 to 4 levels now back to 5 since two years ago with the joining of the chief operations director,	WHR01LTM			

SP1Q11	What do you understand about Hoshin Kanri and policy deployment as far as your organisation is concerned?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
11.1	Strategic planning. Key 2 objectives and key 3 improving team activities.		WAC01L	WJM01L	
11.2	Strategic plan at top cascaded top down and bottom up. Team activities involved in the goals objectives and targets. Goals are fully aligned.	WKW01LSY, WRK01L, WCVDW01L, WHR01LTM	WHM01, WBS01L, WJH01LWD, WET01LSFTY,	WBK01L, WPM01L WFM01L, WTM01L,	WAM01LBUYA, WNP01LDDDES WSN01LQC, WTD01LLABTECH WGN01LQC,

SP1Q11	What do you understand about Hoshin Kanri and policy deployment as far as your organisation is concerned?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WAS02LF, WRM01L,	WJN01LWD, WPM04L	WNH01LQC WHD01LMNT, WOV01LMNT
11.3	Do not know.	WHS01LSLS	WAK01LIT, WWF01LSY, WPK01MSTK, WAR01SSC, WSR01LMNT, WAE01LDWG, WMW01SSHL, WGP01LFEXPP, WLT01SPRA	WBK01S, WDC01L, WBM02L WPM02L,	WRB01LDR, WRS01LSC WWB01LSLS, WHB01LMNT WAS01LMNT, WEN01LMNT, WPDB01LDCOR WEK01LMNT
11.4	Strategic plan that gave us the edge to compete with China.		WAL01L		
11.5	Strict policies and procedures.		WYE01SF		
11.6	Clearly outlined targets to be achieved.		WBM01L	WBS02L	
11.7	Every person and team has a target.	WPP01LF	WJM01M, WKP01LSCR	WJN02LSCR	WLN01LQC
11.8	Employees are listened to and their ideas are recognised in the strategic plan.				WSB01M
11.9	Part of the way W01 does business.	WAV01M			

SP1Q11	What do you understand about Hoshin Kanri and policy deployment as far as your organisation is concerned?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
11.10	Team goals. Setting objectives. Goal alignment.			WNM01L, WAM02L WHM01LWD, WCM01LSCR, WMG01LGS, WMN01L, PM03L, WRS02L	WDR01MNPROG
11.11	Everybody knows what is expected of him or her.		WES01SFCW		
11.12	Joint leadership meeting matches strategy with the targets.				WAM03LDCOR

SP1Q11.1	Are you able to explain how teamwork is applied to Hoshin Kanri in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
11.1.1	Yes the organisation has different teams for example QC team and a systems team.			WJM01L	
11.1.2	When there is an issue a cross-functional team is set-up to deal with it.		WAC01L		

11.1.3	Small group activities teams determine performance against set targets and action plans. Team's goals are aligned.		WHM01L, WBS01L, WBM01L WES01SFCW WKP01LSCR	WBK01L,, WNM01L, WJN01LWD WMN01L, WPM03L	
11.1.4	Partly, data is provided to teams for example, to check quality trends.		WAK01LIT		
11.1.5	Cascaded aligned objectives and targets from team level downwards and upwards.	WAV01M WCVDW01L,	WAL01L WJM01M, WRM01L	WBS02L WTM01L, WAM02L WPM04L,	
11.1.6	All are involved and work towards the same goal.		WYE01SF		
11.1.7	Do not know.	WHS01LSLS	WWF01LSY WPK01MSTK, WAR01SSC, WSR01LMNT, WAE01LDWG, WMW01SSH,L WGP01LFEXPP, WLT01SPRA	WBK01S, WDC01L WBM02L,	WRB01LDR, WRS01LSC, WWB01LSLS, WHB01LMNT, WAS01LMNT, WEN01LMNT WPDB01LDCOR, WEK01LMNT
11.1.8	All mini business teams have goals and targets. Direction fed down through teams	WPP01LF WKW01LSY,	WJH01LWD WET01LSFTY WAS02LF	WPM01L, WFM01L, WPM02L	WAM01LBUYA WLN01LQC, WNP01LDDES,

	and feedback and results fed upwards through teams at different layers.	WRK01L, WHR01LTM		WHM01LWD, WCM01LSCR WVG01LGS, WJN02LSCR WRS02L,	WSN01LQC, WTD01LLABTECH, WGN01LQC WAM03LDCOR, WNH01LQC. WDR01MNPROG, WHD01LMNT WOV01LMNT
11.1.9	Teams provide ideas that are taken into account when the strategic planning is done.				WSB01M

SP2Q1	Could you explain why specific organisational structure changes were made to accommodate lean implementation in terms of:	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	Blank refer to answers below.				

SP2Q1.1	Teamwork;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	We have an organisational development team that assists with twenty keys implementation throughout the organisation. The mini business area and unit teams work to team targets. There is a calendar for teamwork and all the employees are involved in teamwork throughout the organisation.		WJH01LWD	WJM01L, WBK01L, WDC01L WNM01L, WPM02L	WSB01M, WAM01LBUYA, WHB01LMNT
1.1.2	Departmental teams have improved with open door, more direct communications.		WAC01L		
1.1.3	No structural changes, but mini business activities teams are focused on key one. Discussed in morning sessions.		WHM01L, WBS01L, WAK01LIT		
1.1.4	First line or operations managers run small group mini business activity sessions. Provides visibility.		WAL01L WYE01SF,		WAM03LDCOR
1.1.5	Mini business activities teams and if there is an issue, a small cross-functional group is formed to deal with the issue.		WBM01L		
1.1.6	Do not know.		WAR01SSC WLT01SPRA,	WBK01S WMG01LGS,	WRB01LDR, WRS01LSC, WWB01LSLS ,

SP2Q1.1	Teamwork;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
				WPM03L WJN02LSCR,	WAS01LMNT WEK01LMNT, WDR01MNPROG WOV01LMNT
1.1.7	No structural changes.		WWF01LSY	WFM01L	WNP01LDDDES WSN01LQC, WGN01LQC
1.1.8	Decision taken to go for team structure. Top team meet once per week, Top and middle management team meet twice per week, and mini business meetings meet daily and unit managers meet once per day as well. Warehouse and distribution meet three times per week with the unit manager.	WPP01LF, WHS01LSLS, WKW01LSY, WCVDW01L	WJM01M, WPK01MSTK, WJH01LWD, WSR01LMNT, WAE01LDWG, WAS02LF, WRM01L, WGP01LFEXPP	WTM01L, WJN01LWD, WHM01LWD WCM01LSCR, WPM04L, WRS02L,	WHD01LMNT
1.1.9	Decision taken to go for team structure. Top team meet once per week, Top and middle management team meet twice per week, and mini business meetings meet daily and unit managers meet once per day as well.	WAV01M WRK01L,	WMW01SSHL	WBS02L, WPM01L WAM02L, WMN01L	WEN01LMNT, WPDB01LDCOR, WNH01LQC
1.1.10	The mini business team meetings are integral. Agenda is effective discuss			WBM02L	

SP2Q1.1	Teamwork;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	previous day's performance against target and the current day's plan. Also issue and problems are resolved. Ideas are generated.				
1.1.11	The organisational development department was established.		WET01LSFTY WKP01LSCR		
1.1.12	Our business taken over by W01 for distributing and the management team and the mini business teams are the team structure.		WES01SFCW		
1.1.13	Decision by previous managing director to go for current team structure system. Hong Kong model				WLN01LQC
1.1.14	More first line managers and a mini business team per first line manager.				WTD01LLABTECH
1.1.15	Decision in 1997 to go for a team structure: plus organisational development team; also managers focusing on being transparent; flow line structure; strategic decision to drive keys through the unit manager; investment in first line managers; every first line manager runs a flow line.	WHR01LTM			

SP2Q1.2	Empowerment;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1	Starting to happen.			WJM01L	
1.2.2	Workers lead team meeting as chairpersons. Given this opportunity twice per week.		WAC01L		
1.2.3	Sessions are held to cultivate ownership. Key one used and employee takes ownership for an area		WHM01L, WAS02LF	WBK01L,	
1.2.4	People given the opportunity in the mini business activity team sessions to participate,		WBS01L WAL01L, WES01SFCW		WAM01LBUYA
1.2.5	Last five years, lots of training to up skill and multi skill people. Organisational development leader plays important role.		WAK01LIT WPK01MSTK, WGP01LFEXPP		WAS01LMNT
1.2.6	Empowered through training by the organisational development team at the organisation and mini business, small group activities with employees providing ideas. People are up-skilled as well as multi-skilled. Employees are often given the opportunity to lead team meeting for one week. The first line manager acts as facilitator. Skills matrix drives the development. First line managers	WRK01L, WHR01LTM	WYE01SF WBM01L, WJM01M, WJH01LWD, WAE01LDWG WET01LSFTY WKP01LSCR, WMW01SSHL, WRM01L	WBM02L, WNM01L, WPM01L, WFM01L WPM02L, WTM01L, WJN01LWD, WAM02L, WHM01LWD,	WEN01LMNT, WLN01LQC WNP01LDDES, WTD01LLABTECH, WNH01LQC WHD01LMNT

SP2Q1.2	Empowerment;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	have been developed. There is a saying "First line managers rock!"			WCM01LSCR, WMN01L, WRS02L WPM04L	
1.2.7	Do not know.	WPP01LF, WHS01LSLS,	WAR01SSC, WLT01SPRA,	WBK01S, WPM03L	WRS01LSC, WHB01LMNT, WEK01LMNT, WDR01MNPORG, WOV01LMNT
1.2.8	Training and mini business department has promoted development of people from within the organisation.		WWF01LSY	WBS02L, WMG01LGS	
1.2.9	Not really done.		WSR01LMNT	WDC01L	
1.2.10	The training department arrange for the training of employees.				WSB01M
1.2.11	Open channel of communications and joint leadership meetings empower employees to feel free to express themselves.	WAV01M			
1.2.12	Aware of decision taken to take an innovative project management approach for systems designs	WKW01LSY			
1.2.13	Has not occurred.				WRB01LDR

SP2Q1.2	Empowerment;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.14	Flatter structure allow for decision making at lower levels for example in re-melt, the team changed the way furnaces were loaded.	WCVDW01L			
1.2.15	The development of first line managers.				WWB01LSLS
1.2.16	Multi-tasking implemented.			WJN02LSCR	WSN01LQC, WGN01LQC WAM03LDCOR,
1.2.17	Empowerment focused on idea generation from workers to improve the flow. Fifteen years ago the managing director asked the people how to change the output from 15 ton per day to 300 ton per day.				WPDB01LDCOR

SP2Q1.3	Leadership changes; any.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1	Yes a new managing director (1998) was put in charge of the organisation with new experience. This brought about the changes.			WJM01L	
1.3.2	Previous and current managing directors established twenty keys plus organisational	WPP01LF	WAC01L WHM01L,	WBK01L, WBM02L	WRB01LDR, WAM01LBUYA

SP2Q1.3	Leadership changes; any.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	development unit manager appointed to oversee organisational implementation of twenty keys for the total organisation. A warehouse and distribution operations manager also appointed.		WBS01L WAL01L, WYE01SF WBM01L, WWF01LSY WJH01LWD, WSR01LMNT	WTM01L, WHM01LWD,	
1.3.3	Organisational development unit manager appointed.		WAK01LIT, WPK01MSTK,		WHB01LMNT
1.3.4	No comment or do not know.		WJM01M WAR01SSC, WLT01SPRA	WBK01S WCM01LSCR, WPM03L	WDR01MNPROG WOV01LMNT,
1.3.5	Organisational business development manager and department established to drive the twenty keys. Operations manager appointed for warehouse and distribution. Operations manager appointed for the scrap receiving and processing unit.		WJH01LWD		
1.3.6	Organisational development manager to drive twenty keys and mini business team activities and the development of managers.			WBS02L, WDC01L	

SP2Q1.3	Leadership changes; any.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	A chief operating officer appointed three years go.				
1.3.7	No changes the last four years.		WMW01SSHL	WJN01LWD	WSB01M,
1.3.8	The current managing director was appointed and two years ago the chief operations director was appointed.	WHS01LSLS			WAM03LDCOR
1.3.9	The chief operations director was appointed two years ago. His appointment led to improvements in re-melt with output up by 66% and powder coating output up by 70%. Profits have increased by 25% and rejects reduced by 40%.	WAV01M			WSN01LQC
1.3.10	The development of first line managers and the appointment of the unit manager organisational development is important changes that was made since major change fifteen years ago.			WNM01L,	
1.3.11	The previous and current managing director and the unit manager business development are the main leadership changes for the organisation. First line managers developed		WAE01LDWG, WET01LSFTY, WRM01L, WGP01LFEXPP	WPM01L, WPM02L, WMN01L WRS02L, WPM04L	WPDB01LDCOR WGN01LQC, WNH01LQC

SP2Q1.3	Leadership changes; any.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	instead of supervisors. The chief operations director appointed two years ago.				
1.3.12	The operations manager in anodising was replaced about three years ago.			WFM01L	
1.3.13	The current managing director replaced the previous managing director and has continued with the progress of the organisation. The unit manager, organisational development drives the 20 keys.	WKW01LSY		WAM02L	WWB01LSLS, WLN01LQC,
1.3.14	The organisational development team under the leadership of the unit manager drives the lean process.	WRK01L			
1.3.15	Since 2006 positional changes only.				WRS01LSC
1.3.16	As discussed, flatter structure, the previous managing director changed the structure. The chief operations director was appointed two years ago. The organisational development department drive the keys implementation.	WCVDW01L			WNP01LDDES
1.3.17	Our company taken over by W01 has a new chief executive.		WES01SFCW		

SP2Q1.3	Leadership changes; any.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.18	The powder coating operations manager replaced a previous operations manager about two years ago.				WAS01LMNT
1.3.19	No significant changes last 11 years.				WEN01LMNT
1.3.20	Changes as follows; managing director who changed the organisation 15 years ago; replaced by current managing director (2007); chief operations director over manufacturing appointed two years ago; senior operations manager in place of current managing director when promoted; appointed maintenance manager; line manager organisational development appointed.		WAS02LF		
1.3.21	Last six years admin manager in GS replaced with promotion. An operations manager appointed as a promotion and the chief operations director appointed.			WMG01LGS	
1.3.22	Operations manager scrap receiving appointed 7 years ago and operations director appointed two years ago.		WKP0LSCR	WJN02LSCR	
1.3.23	More first line managers with growth.				WTD01LLABTECH

SP2Q1.3	Leadership changes; any.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.24	The chief operations director was appointed two years ago.				WEK01LMNT WHD01LMNT,
1.3.25	Previous managing director changed the organisation: current managing director appointed in 2007; current managing director, actually had a roll of assistant managing director; all aspects covered by the current managing director before his appointment; operations director appointed two to three years ago; structure remain four levels until the appointment of the chief operations director; organisational development department with unit manager part of structure since 2002.	WHR01LTM			

SP2Q1.4	.....other changes that are significant in terms of the lean programme?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.1	No comment	WPP01LF WHS01LSLS, WAV01M WKW01LSY,	WBS01L, WAK01LIT WAL01L, WYE01SF	WJM01L, WBK01L, WBK01S, WBS02L,	WSB01M, WRB01LDR WAM01LBUYA, WRS01LSC

SP2Q1.4	.....other changes that are significant in terms of the lean programme?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
		WRK01L, WCVDW01L, WHR01LTM	WBM01L, WWF01LSY, WJM01M WJH01LWD, WAR01SSC, WSR01LMNT WAE01LDWG WET01LSFTY WES01SFCW WMW01SSHL WRM01L, WGP01LFEXPP WLT01SPRA	WDC01L, WBM02L, WNM01L, WPM01L, WFM01L, WPM02L, WTM01L, WAM02L, WHM01LWD WCM01LSCR, WMG01LGS WMN01L, WPM03L WJN02LSCR, WRS02L WPM04L	WAS01LMNT WNP01LDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH, WGN01LQC, WAM03LDCOR, WNH01LQC, WEK01LMNT WDR01MNPORG, WHD01LMNT WOV01LMNT
1.4.2	Technology has much improved and changed the way we do things.		WAC01L		
1.4.3	With cleaning and organising teams are focussing on maintenance tasks and improving quality.		WHM01L		
1.4.4	Deaf people employed.		WAK01LIT		

SP2Q1.4	.....other changes that are significant in terms of the lean programme?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.5	Some acquisitions and training in the twenty keys are being done with employees from these organisations.		WPK01MSTK,		
1.4.6	The 20 keys the single most important initiative.				WHB01LMNT
1.4.7	Last seven years: energy conserved; Bailing is done when power consumption lower; efficient electric motors and improved metering.		WKP01LSCR		
1.4.8	When a manager is away, his duties are split up amongst team members and the work continues as normal.				WEN01LMNT
1.4.9	Changes as follows: scrap, bailing and re-melt brought in house; Cape Town manufacturing facility established to combat transport costs.		WAS02LF		
1.4.10	The top team provides lots of encouragement to the people to go with the 20 keys.				WLN01LQC

SP2Q2	Could you explain why organisational behaviour has changed to accommodate lean implementation in terms of:	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1	Blank refer to answers below.				

SP2Q2.1	Communications;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1.1	Has improved due to: daily mini business team meetings that are held every morning; management having an open door policy; management listening to ideas at the mini business team meetings; top management being close to the employees; management providing feedback at these meetings; a joint leadership monthly feedback meeting and a joint consultative committee meeting between management and NUMSA held monthly. Cross-functional teams also work to resolve cross-functional issues.		WKP01LSCR1	WJM01L, WBK01S, WAM02L, WPM04L	WPDB01LDCOR WTD01LLABTECH, WNH01LQC, WEK01LMNT WHD01LMNT
2.1.2	Improved with open door communications. For example a worker visited the managing director for an increase The managing director listened and carefully analysed the request. All the people in the department were given increases		WAC01L WBM01L, WPK01MSTK,	WBK01L,	

SP2Q2.1	Communications;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1.3	Has improved with 20 keys and more involvement from employees, training, employees providing feedback and input to resolving issues and improved visual controls through demarcations.		WHM01L, WRM01L, WGP01LFEXPP,	WHM01LWD	
2.1.4	Has improved remarkably with critical approach being utilised more and more: what, how; why; where; when; and who.		WBS01L		
2.1.5	Has improved with the small business activity meetings being held daily by all departments and work areas.	WPP01LF	WAK01LIT, WAL01L		
2.1.6	Has improved due to joint leadership meeting being held monthly. All managers are attending plus inviting employees. Up to 60 people attend the meeting. Feedback regarding organisational performance is openly provided.		WYE01SF	WDC01L	
2.1.7	Has improved with: technology through e mails; not too many management levels; and open door policy of managing director; top team taking time		WWF01LSY WAS02LF		

SP2Q2.1	Communications;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	out to listen; people communicate since they get asked for their opinions; joint leadership meeting and twice weekly top team feedback session.				
2.1.8	Has improved even more in the last three years with more engagement from top management with lower level employees. Also with the encouragement to empower and involve lower level employees in decision making.		WJM01M		
2.1.9	Has improved with: open approach by management; the team structure per the mini business team sessions, the joint leadership meetings where effective feedback is provided by top management and more affective commitment from employees.	WCVDW01L	WJH01LWD WMW01SSHL	WNM01L WPM02L, WTM01L, WJN01LWD, WMN01L WPM03L, WRS02L	WAM01LBUYA
2.1.10	Do not know.		WAR01SSC		
2.1.11	Has improved with top management open door approach and listening to employee feedback. Also more frequent		WET01LSFTY	WBS02L WCM01LSCR,	

SP2Q2.1	Communications;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	visits by top management to mini business team meetings. Encouragement and recognition by management is frequent.				
2.1.12	Improved with more discipline and passion for the business. Knowing where the business is going is constantly communicated. Employees are given opportunities to provide feedback.			WBM02L	
2.1.13	Last four years have improved due to the mini business team meetings and the cross-functional interaction between maintenance and first line managers. First line managers listen to ideas and provide feedback and also train the workers.				WSB01M
2.1.14	Free flowing, no functional silos in the organisation.	WHS01LSLS			
2.1.15	Last three years have improved with more time spent with all organisational levels. More training with current focus on conserving energy	WAV01M			

SP2Q2.1	Communications;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1.16	Have improved since the major changes fifteen years ago with the mini business team meetings, the joint leadership meeting, the joint consultative meeting and the top management going to the shop floor and engaging workers directly.		WAE01LDWG	WPM01L	
2.1.17	Has improved last 11 years with report back meeting daily to operations manager, who also provides feedback from top management. The joint leadership meeting also helped with communications through effective feedback from the top. Small group activities has improved communications regarding the effective dealing with occurring issues.			WFM01L	
2.1.18	Last 10 to 11 years has improved: with the mini business team meetings; report back session between top and middle management held every Wednesday; The unit manager organisational	WKW01LSY			WAS01LMNT

SP2Q2.1	Communications;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	development drives the mini business teamwork system of the organisation. There is more visibility of what is going on.				
2.1.19	Has improved: with the organisation's team structure; the mini business meetings; the unit managers going to and supporting mini business team meetings; the involvement and recognised contribution of employees; the feed down and feed up daily communications obtained from team sessions and the monthly joint leadership meeting held where top management informs employees of what is happening in the business and what the future holds. Measurements of targets are fully understood by all.	WRK01L			WNP01LDDDES WSN01LQC,
2.1.20	Last few years in die shop has always been a problem due to: repeated die design issues; the gap in cross-functional coordination; poor top down				WRB01LDR, WAM03LDCOR,

SP2Q2.1	Communications;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	communications as most is heard through the grape vine.				
2.1.21	Has improved due to the approach by management to invite employees to sit down and discuss issues and solve problems. The mini business team meeting has also contributed to effective communications. Small group activities help to resolve issues across the organisation. Employees are encouraged to provide feedback.				WRS01LSC, WLN01LQC
2.1.22	Always good per example set by the previous managing director and continuing with his replacement.				WWB01LSLS
2.1.23	No change.		WSR01LMNT		
2.1.24	Last three years improved with; open door; managers forced to go back to employees; pickers are able to meet with chief executive.		WES01SFCW		
2.1.25	Always good last nine years due to open door approach by managing director. No hidden agendas and it is easy to				WHB01LMNT, WGN01LQC, WOV01LMNT

SP2Q2.1	Communications;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	communicate. Information in the form of statistics and targets well communicated at the mini business team meeting.				
2.1.26	Has improved with open door approach and trust in employees to make higher level decisions. .				WEN01LMNT
2.1.27	Last six years always good, however, top management not always fluent, union issues not resolved, middle management non-disclosure of issues.			WMG01LGS	
2.1.28	Has improved with daily mini business meetings and improved time keeping discipline.			WJN02LSCR	
2.1.29	No change last two years. Have found the mini business meeting in the mornings led by the first line managers dealing with the agenda and following through on grievances by workers and feedback. The joint leadership meeting is also held.		WLT01SPRA		
2.1.30	Last few years find good communications, feedback, cooperation				WDR01MNPROG

SP2Q2.1	Communications;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	and good teamwork through the mini business team processes.				
2.1.31	Improved since major changes in 1997: culture is open and consultative; mini business meeting; twice a week meeting top with operations managers; workers may talk to the managing director and line managers do not take exception; joint leadership meeting; joint consultative committee with NUMSA and Solidarity;	WHR01LTM			

SP2Q2.2	respect for employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.2.1	Has improved with: feedback sessions from management; daily effective communications from management; managers asking workers to provide their inputs for decision making; there is a problem-solving approach and the good treatment of employees.			WJM01L WBS02L, WDC01L	WOV01LMNT

SP2Q2.2	respect for employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.2.2	Improved with free flowing communications.		WAC01L		
2.2.3	Difficult in the beginning due to negative attitudes” I am not a cleaner” but this has now improved.		WHM01L		
2.2.4	Improved because of: opportunities provided; stated recognition and demonstrated in the form of bonuses and certificates; effective feedback and dialogue per monthly joint leadership meeting.		WBS01L WAK01LIT, WAK01LIT WBM01L, WSR01LMNT, WGP01LFEXPP		WAS01LMNT
2.2.5	Improved due to the managing directors making the statement that employees come first. “Without employees there is no organisation.”		WAL01L		
2.2.6	Always good. Top management lead by example provides a positive climate. There is an unwritten code of conduct. Respect for family emphasised. Apologies when abrupt.	WPP01LF, WAV01M	WYE01SF WWF01LSY, WJM01M WJH01LWD,	WMG01LGS	

SP2Q2.2	respect for employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.2.7	Improved by leaders setting the example of respectful refined behaviour. Never humiliating a person. Directors ask employees how they are doing. No more threats and discipline is good.			WBK01L, WHM01LWD, WPM03L,	WLN01LQC
2.2.8	No change in last two to four years. Respect is reasonable.		WMW01SSHL	WBK01S	
2.2.9	Mini business meeting help to cultivate respect for people able to contribute more as they become more skilled. Issues and grievances effectively resolved at these meetings. Improved understanding from management. Management respect the skills of employees,		WPK01MSTK,	WPM02L, WTM01LWJN01LWD,	
2.2.10	Do not know.		WAR01SSC		
2.2.11	Improved since top man set the example of good leadership. He showed respect to the people by involving them at the outset and asking them to assist with new ideas. He was honest and sincere in his manner. He expected			WBM02L WPM04L,	

SP2Q2.2	respect for employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	more from employees and gave credit where credit was due. He set the tone and demonstrated transparency well.				
2.2.12	No change in last two to four years. Respect is reasonable. Some blame and employee defensiveness play a roll.				WSB01M
2.2.13	Respect is good due to the organisational culture "We are family."	WHS01LSLS			
2.2.14	Has improved with mini business team meetings that has a set agenda focusing on organisational values, working for a common goal, resolving issues and management seeking advice from employees. Employees given lots of leeway.		WRM01L	WNM01L WAM02L,	
2.2.15	Has improved with workers accepting responsibility for a clean work area, working in teams and the improved communications between workers and management.			WPM01L	
2.2.16	Last 11 years have improved with better discipline, better time keeping, better			WFM01L	

SP2Q2.2	respect for employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	protective clothing and equipment. Key one, organising and cleaning builds respect.				
2.2.17	Always good: leaders make an effort to greet all the employees of the organisation; leaders are approachable; there are no hidden agendas and being transparent is part of the organisational culture. Annual sports day help to cultivate respect for one another.	WKW01LSY	WAS02LF		
2.2.18	Has improved: with management improving their manners and the way they communicate with employees (“what is good for you is good for me”.); the sharing of profits; developing a family culture.	WRK01L			
2.2.19	Has improved for most managers behaving well with managed emotions and being approachable. Previous and current managing directors as well as the operations director are very approachable. Talking upwards are		WET01LSFTY	WCM01LSCR	WRB01LDR, WPDB01LDCOR, WHD01LMNT,

SP2Q2.2	respect for employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	easy for workers. Joint leadership meeting allows free flow of questions from employees. Climate of caring for employees. Positional power is not exploited by managers.				
2.2.20	Always good since 2001 after changes had occurred: managers have a way in behaving correctly; managers have a way in communicating well with employees; when mistakes are made the focus is on solving the problem and not criticising the person; there is an absence of shouting; employees involved in decision making; what is said is going to be done is done.		WAE01LDWG		WAM01LBUYA
2.2.21	Since 2006 has improved due to: the good way management approaches and deals with issues and problems; the consistent good behaviour of management; the fact that there is limited strife in the organisation; there is a no blame approach to issues and the				WRS01LSC

SP2Q2.2	respect for employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	fact that the discipline in the organisation is very good.				
2.2.22	Has improved with the culture of openness and less pressure.	WCVDW01L			
2.2.23	Has improved: Everyone has a place in the Sun; everyone has a say; management listen with care; workers know what they are doing; grievances are handled effectively and has changed management's behaviour for the better.				WWB01LSLS WNP01LDDES,
2.2.24	Feel respected.		WES01SFCW		
2.2.25	Last nine years always respected. How management behave for example funerals before tonnage.				WHB01LMNT
2.2.26	Improved through policy and setting a good code of conduct.		WKP01LSCR		
2.2.27	Has improved with; improved interaction amongst employees to get to know one another and cooperation with employees helping maintenance on the night shift.				WEN01LMNT

SP2Q2.2	respect for employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.2.28	Has improved due to: the effective handling of grievances; the managing director's approachability and personal recognition of employees; working without fear and the follow through from management to resolve issues.			WMN01L	
2.2.29	Has improved due to better discipline through standard operating procedures, sitting down and discussing how to do things better, empowering first line managers to resolve grievances.			WJN02LSCR	WSN01LQC WEK01LMNT,
2.2.30	Has improved with 20 keys, improved communications with shop stewards and workers acting responsibly, for example, when sick they phone in to let manager know.			WRS02L	
2.2.31	Good last two years due to effective listening by management, and regular feedback being provided by management.		WLT01SPRA		
2.2.32	Good last few years with NUMSA intervention dealing with management				WTD01LLABTECH WGN01LQC,

SP2Q2.2	respect for employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	and worker concerns. Negotiations as a way of discussing things.				
2.2.33	Respect an issue due to poor operations manager behaviour, however he did apologise for this.				WAM03LDCOR
2.2.34	No change but there is respect since people talk to one another				WNH01LQC
2.2.35	Good last few years find: no hounding; no standing behind a person; good leader manners; respect of a person's knowledge and skills.				WDR01MNPROG
2.2.36	High degree of respect; belief in people; recognition for achievements; no buffalo behaviour and respect of contributions.	WHR01LTM			

SP2Q2.3	leadership behaviour;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.3.1	Communications and the approach has improved significantly. No more shouting and more respectful behaviour. Solution focused.			WJM01L	WOV01LMNT

SP2Q2.3	leadership behaviour;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.3.2	Always good, but even better since promotion to die shop manager.		WAC01L		
2.3.3	Was more driven, but now less so, as employees are taking on more ownership of their respective areas. Less checking and more trust and recognition.		WHM01L		
2.3.4	Aimed to achieve the vision. Very focused. Style of effective communications. People focus on improving and developing people. Always positive and creating a positive environment.		WBS01L		
2.3.5	Since introduction of twenty keys always good.		WAK01LIT WPK01MSTK, WRM01L		
2.3.6	Aggressive in growth but not aggressive when approaching employees.		WAL01L		
2.3.7	Positive behaviour by leaders provides a positive climate in the organisation.		WYE01SF WMW01SSHL		WHB01LMNT
2.3.8	Wonderful way of managing by providing feedback makes one understand how you are doing.		WBM01L		

SP2Q2.3	leadership behaviour;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.3.9	Always good since the change; humble, non-autocratic refined, well-mannered style; open and approachable; always positive; targets set are achieved; people are encouraged; results driven; consultative style; well mannered; approachable and respectful; able to talk to top management without constraints; mistakes allowed and easily resolved.	WPP01LF WHS01LSLS, WKW01LSY	WJM01M WAE01LDWG	WBK01L, WBS02L WPM01L, WTM01L WCM01LSCR, WPM04L WMN01L,	WAM01LBUYA WWB01LSLS, WLN01LQC, WPDB01LDCOR,
2.3.10	No change last two years			WBK01S	
2.3.11	Always effective, open but firm, respects a person's skills, always food behaviour and support.		WWF01LSY		WDR01MNPORG
2.3.12	Vibrant, respectful approach, approachable, follow through, never lets you down.		WJH01LWD		
2.3.13	Do not know.		WAR01SSC		
2.3.14	Improved a lot with leaders interacting directly with workers. So much care that the managing director gave his cell phone number for people to contact him id the need arises.			WDC01L	

SP2Q2.3	leadership behaviour;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.3.15	Has improved with leaders always willing to listen. Managers greet the people and show respect through their good behaviour.			WBM02L	WAS01LMNT, WTD01LLABTECH
2.3.16	No change last four years but leaders behave well.				WSB01M
2.3.17	Always good, positive and committed.	WAV01M			
2.3.18	Always good since the change in 2000. New managing director set the tone and his influence is still with the organisation. Open communications daily and effective handling of grievances. Always positive and encouraging.			WNM01L, WPM03L	WHD01LMNT
2.3.19	Has improved with leaders dealing better with employee grievances, not shouting at employees and being very polite during discussions with employees. They listen to understand and they share information openly in feedback sessions.			WFM01L, WRS02L,	WEN01LMNT
2.3.20	Has improved with leaders: providing more and clear direction; handling grievances until final conclusion; being down to earth	WRK01L	WKP01LSCR	WJN01LWD, WAM02L	WNP01LDDES

SP2Q2.3	leadership behaviour;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	when interacting with employees; listening better; not shouting and managing emotions; being professional in the way things are done. Making it easier to work at the organisation.				
2.3.21	Has improved for most managers behaving well and being approachable. Previous and current managing directors as well as the operations director are very approachable.				WRB01LDR
2.3.22	Since 2006 has improved since management is making it easier to work at the organisation.				WRS01LSC
2.3.23	Has become; more open; involving employees; making joint decisions with employee inputs; seeking consensus and being more approachable.	WCVDW01L	WET01LSFTY		
2.3.24	Has improved with the training and development of first line managers receiving supervision training arranged by the organisational development department. Also learning how to work with		WGP01LFEXPP	WPM02L	WSN01LQC, WNH01LQC,

SP2Q2.3	leadership behaviour;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	people and learned how to run a mini small business.				
2.3.25	Has improved but no detail as to how and why.		WSR01LMNT		
2.3.26	Lead by example.		WES01SFCW		
2.3.27	Unhappy with superior's behaviour but top management always good.			WHM01LWD	
2.3.28	Has improved due to: the drive of the organisational development team; small group activities; black empowerment; improvement projects and safety.		WAS02LF		
2.3.29	Mainly positive, however see arrogance when people are promoted.			WMG01LGS	
2.3.30	Good leadership but behaviour not always good. Inconsistent behaviour.			WJN02LSCR	
2.3.31	Last two years find leadership average and inconsistent.		WLT01SPRA		
2.3.32	Top management always good due to direct open approach, but problems with operations manager due to visual favouritism.				WGN01LQC

SP2Q2.3	leadership behaviour;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.3.33	Has gotten worse in the die shop due to leadership behaviour.				WAM03LDCOR
2.3.34	Last eight years always good: strict values maintained; high standards maintained; Always supportive; adult behaviour and always reasonable.				WEK01LMNT
2.3.35	Consultative; stay humble; love of people; results focussed since results change attitudes to positive; fairness all important;	WHR01LTM			

SP2Q2.4	attitudes of employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.4.1	Have improved with; The organisational growth; improved daily communications; the mini business meetings cultivates employee involvement; employees knowing where the organisation is going; workers given the opportunity to learn; employees able to provide feedback and to provide initiatives for which they are rewarded and recognised; concerns being	WCVDW01L	WPK01MSTK, WAE01LDWG WAS02LF WRM01L	WJM01L, WTM01L, WJN01LWD, WAM02L, WCM01LSCR, WMN01L, WPM04L	WAS01LMNT, WLN01LQC, WNH01LQC, WEK01LMNT

SP2Q2.4	attitudes of employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	effectively dealt with; more respectful, trustful and better leadership; the incentive bonuses and employees' awareness of the results of the organisation and employees having more responsibilities in terms of the keys.				
2.4.2	Improved to a much friendlier atmosphere.		WAC01L		
2.4.3	Improved with workers taking more ownership of the process. More discussion and dialogue. The bonus system assists. Good order and discipline prevails.		WHM01L	WPM03L,	
2.4.4	From passive to a passion to participate and contribute.		WBS01L		
2.4.5	Has improved: with the improved organisational performance; positive feedback from top management; recognition by management; incentive bonuses and employees helping each other through better cooperation, for example, between maintenance and production.		WAK01LIT, WAL01L, WET01LSFTY WKP01LSCR, WGP01LFEXPP,	WMG01LGS	WEN01LMNT

SP2Q2.4	attitudes of employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.4.6	Vision has provided alignment and support from employees resulting in a positive attitude. The incentive bonuses have helped to improve attitudes.	WPP01LF	WYE01SF		
2.4.7	Wonderfully positive since people are mentioned in recognition by the management.		WBM01L		
2.4.8	Employees take pride in their work. Agree that W01 is a good place to work for			WBK01L,	
2.4.9	Has improved with improved results, incentive bonuses and resolving grievances.			WBK01S, WJN02LSCR	WSN01LQC
2.4.10	No changes. Remains positive.	WAV01M	WWF01LSY		WHB01LMNT WNP01LDDES,
2.4.11	Has improved even more over the last three years due to more growth and improved organisational performance, leading to increased bonuses and more opportunities for employee.		WJM01M,		
2.4.12	In warehouse and distribution, improved through renewed focus on keys. Keys taken seriously. Recognition from top		WJH01LWD	WHM01LWD	

SP2Q2.4	attitudes of employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	management more frequent, bonuses has increased with increased organisational performance. Vision makes all realise to strive for the same goal.				
2.4.13	Do not know.		WAR01SSC		
2.4.14	Has improved with more involvement from employees through the mini business meeting, improved incentive bonuses, more job security with improved organisational performance. More upgrading as more skills are acquired. More recognition for example, in the form of t-shirts and mugs with a person's name on it. More awareness of results. More participation in the achieving of results and breaking previous production records.			WBS02L WDC01L, WBM02L WNM01L, WFM01L, WPM02L	WSB01M
2.4.15	Positive due to incentive bonuses and the performance of the business	WHS01LSLS			
2.4.16	Has improved with: employees involved in the teamwork and the team having to achieve the targets set; employees knowing what, how, where and when to do			WPM01L	

SP2Q2.4	attitudes of employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	things; employees cooperating with each other to achieve the targets; teams competing against each other.				
2.4.17	Have become more positive with more involvement in team activities.	WKW01LSY			
2.4.18	Has improved with: employee involvement in team processes; the recognition employees receive when they contribute to improvements; employees appreciating the transparency of management; employees appreciating the openness of communications and being able to directly communicate with any manager and the managing director; employees being totally aware of business processes through the incentive bonus system.	WRK01L			WPDB01LDCOR
2.4.19	Attitude of watching one's back. Disciplinary procedure is being taken too far.				WRB01LDR
2.4.20	Always good as experienced since 2001 due to: the good way employees are treated by the management; the				WAM01LBUYA

SP2Q2.4	attitudes of employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	continuous pay out of incentive bonuses; the participation of employees.				
2.4.21	Since 2006 has improved with: better discipline in the organisation; the management dealing well with employee grievances and concerns; higher incentive bonuses being paid out.				WRS01LSC
2.4.22	Improved due to: know that you will be listened to; know where you are going; incentive bonuses help; recognition in participation.				WWB01LSLS
2.4.23	No change workers requires constant supervision.		WSR01LMNT		
2.4.24	In organisation taken over by W01, positive due to the active support from W01.		WES01SFCW		
2.4.25	Can sense the strike season coming up so attitudes are changing demanding more entitlement.		WMW01SSHL		
2.4.26	Has improved with management doing more in appreciation such as the annual sport day and celebrating success with take outs.			WRS02L	

SP2Q2.4	attitudes of employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.4.27	Last two years find workers positive due to job security but, do not always understand.		WLT01SPRA		
2.4.28	Has improved due to the way issues are dealt with in terms of the management approach. NUMSA shop stewards play a positive role in this regard.				WTD01LLABTECH
2.4.29	No change since 2006: find it good and positive as is reflected in worker willingness to perform and achieve the targets; effective mini business teamwork; a low absenteeism rate; high morale level; incentive bonuses help to maintain a positive attitude.				WGN01LQC, WOV01LMNT,
2.4.30	In die shop deteriorated due to management behaviour.				WAM03LDCOR
2.4.31	Since three year ago in die manufacturing attitudes: vary from positive to negative depending on issues; are volatile due to sensitivities; miscommunications occurring once per every three months.				WDR01MNPROG
2.4.32	Results change attitudes: Incentive bonuses create an awareness of the	WHR01LTM			

SP2Q2.4	attitudes of employees;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	organisational performance; organisational structure and team structures cultivate respect; development of first line managers cultivates respect.				

SP2Q2.5	Other?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.5.1	No comment.	WPP01LF, WHS01LSLS WAV01M, WKW01LSY, WRK01L, WCVDW01L, WHR01LTM	WAC01L, WHM01L WBS01L, WAK01LIT, WAL01L, WYE01SF WBM01L, WWF01LSY WJM01M, WJH01LWD, WAR01SSC, WSR01LMNT, WAE01LDWG, WET01LSFTY,	WJM01L, WBK01L, WBK01S, WBS02L, WDC01L, WBM02L, WNM01L, WPM01L WFM01L, WPM02L WTM01L, WJN01LWD WAM02L, WCM01LSCR	WSB01M, WRB01LDR, WAM01LBUYA, WRS01LSC, WWB01LSLS, WHB01LMNT, WAS01LMNT, WEN01LMNT, WLN01LQC, WNP01LDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH, WGN01LQC

SP2Q2.5	Other?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WES01SFCW, WKP01LSCR, WMW01SSHL, WAS02LF, WRM01L, WGP01LFEXPP, WLT01SPRA	WHM01LWD, WMN01L WVG01LGS, WPM03L WJN02LSCR, WRS02L WPM04L	WAM03LDCOR, WNH01LQC, WEK01LMNT, WDR01MNPROG WHD01LMNT, WOV01LMNT
2.5.2	Joint leadership meeting and joint consultative meeting with shop stewards has helped the relationships.		WPK01MSTK		

SP3.1Q1	Can you recall how you felt when lean was introduced to your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1	Apprehensive, feared the situation. Did not understand it. Feared retrenchments that happened.		WKP01LSCR, WGP01LFEXPP	WJM01L, WBM02L WPM01L, WPM02L WTM01L, WJN01LWD WAM02L,	WWB01LSLS WLN01LQC,

SP3.1Q1	Can you recall how you felt when lean was introduced to your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
				WMN01L WPM04L,	
1.2	Sceptical, but no fear. Doubted that it will work with so much to be done.		WAC01L WBS01L, WAK01LIT		WHD01LMNT
1.3	Saw it as a mountain to climb.		WHM01L		
1.4	New to the organisation at the time, not affected.	WAV01M WKW01LSY,	WAL01L WJM01M, WPK01MSTK, WMW01SSHL, WLT01SPRA	WFM01L, WHM01LWD, WCM01LSCR, WVG01LGS, WNP01LDDES	WAM01LBUYA, WHB01LMNT WRS01LSC, WAS01LMNT WSN01LQC, WTD01LLABTECH WGN01LQC, WAM03LDCOR, WNH01LQC, WEK01LMNT WDR01MNPROG, WOV01LMNT
1.5	Confused.		WBM01L		
1.6	Sceptical and feared for the situation.			WBK01L, WJN02LSCR	

SP3.1Q1	Can you recall how you felt when lean was introduced to your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.7	Too new to comment.		WAR01SSC WES01SFCW	WYE01SF, WBK01S	WSB01M
1.8	Felt it was gradually introduced so no complaints or concerns.		WWF01LSY		
1.9	Felt vulnerable due to previous management utilising a buddy system.	WPP01LF			
1.10	Felt positive and welcomed the opportunity. Accepted the challenge.		WJH01LWD WAE01LDWG WET01LSFTY WAS02LF	WBS02L, WDC01L WNM01L, WPM03L, WRS02L	WRB01LDR, WEN01LMNT
1.11	Saw it as just another thing. (Not again)	WHS01LSLS			WPDB01LDCOR
1.12	Negative and uncertain felt forced into it.	WRK01L			
1.13	Uncertain	WCVDW01L			
1.14	Unable to comment.		WSR01LMNT		
1.15	Concerned		WRM01L		
1.16	Part of the decision.	WHR01LTM			

SP3.1Q1.1	How did others feel?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	Apprehensive, feared the situation. There were retrenchments. Workers felt that they had not been consulted.		WAE01LDWG WET01LSFTY WKP01LSCR WRM01L WGP01LFEXPP	WJM01L, WBS02L, WBM02L, WPM01L, WPM02L, WTM01L, WJN01LWD, WAM02L WMN01L, WRS02L WPM04L,	WWB01LSLS, WLN01LQC
1.1.2	Sceptical, but no fear.		WAC01L WBS01L,		WHD01LMNT
1.1.3	Saw it as a mountain to climb.		WHM01L		
1.1.4	“No! Not again?” sceptical attitude.		WAK01LIT		WPDB01LDCOR
1.1.5	Do not know.	WPP01LF WHS01LSLS, WKW01LSY	WAL01L WJM01M, WPK01MSTK, WES01SFCW, WLT01SPRA,	WFM01L WHM01LWD, WCM01LSCR, WMG01LGS WNP01LDDES, WJN02LSCR	WSB01M WRB01LDR, WRS01LSC WSN01LQC, WTD01LLABTECH, WGN01LQC, WAM03LDCOR

SP3.1Q1.1	How did others feel?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
					WNH01LQC, WEK01LMNT WDR01MNPROG, WOV01LMNT
1.1.6	It was already in use at the time when I started with the organisation.	WAV01M	WYE01SF, WAR01SSC, WMW01SSHL	WBK01S	WAM01LBUYA, WAS01LMNT,
1.1.7	Confused.		WBM01L		
1.1.8	Sceptical and feared for the situation.			WBK01L,	
1.1.9	No concerns.		WWF01LSY		
1.1.10	Welcomed it due to opportunity to keep ones job.		WJH01LWD		
1.1.11	There was some negativity and resistance to the changes.			WDC01L	WEN01LMNT
1.1.12	Welcomed the challenge.		WAS02LF	WNM01L, WPM03L	
1.1.13	Negative and uncertain felt forced into it.	WRK01L			
1.1.14	Uncertain	WCVDW01L			
1.1.15	Unable to comment		WSR01LMNT		
1.1.16	Think employees were curious with no fear.				WHB01LMNT

SP3.1Q1.1	How did others feel?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.17	Mixed reaction: did not come as a surprise since people were well consulted about the process and some saw it as an opportunity.	WHR01LTM			

SP3.2Q1	Do you feel that the lean programme has been fully implemented? Please elaborate how you see this in terms of organisational behaviours regarding:	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1	No, more to be done.	WHR01LTM	WBS01L, WWF01LSY WJM01M, WPK01MSTK, WSR01LMNT WAE01LDWG WET01LSFTY WES01SFCW	WJM01L, WBK01S, WAM02L	WRB01LDR, WAM03LDCOR WHD01LMNT, WOV01LMNT
1.2	80% there.		WAC01L WAK01LIT, WKP01LSCR WAS02LF	WBK01L, WBS02L, WBM02L, WJN01LWD	WAS01LMNT, WGN01LQC
1.3	No more to be done. Ten years to go.		WHM01L		

SP3.2Q1	Do you feel that the lean programme has been fully implemented? Please elaborate how you see this in terms of organisational behaviours regarding:	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4	50% there.	WHS01LSLS	WAL01L WRM01L, WGP01LFEXPP	WDC01L, WVG01LGS	WEN01LMNT,
1.5	90% there.	WPP01LF	WYE01SF,		
1.6	Yes.	WRK01L,	WBM01L, WJH01LWD, WLT01SPRA	WNM01L, WPM01L WFM01L, WPM02L, WHM01LWD, WCM01LSCR, WPM03L, WJN02LSCR WRS02L,	WRS01LSC, WHB01LMNT WLN01LQC, WNP01LDDDES, WSN01LQC WPDB01LDCOR, WTD01LLABTECH WNH01LQC,
1.7	Do not know.		WAR01SSC, WMW01SSHL		WSB01M, WAM01LBUYA, WWB01LSLS WDR01MNPROG,
1.8	Work in progress 60% there.	WAV01M			WTD01LLABTECH

SP3.2Q1	Do you feel that the lean programme has been fully implemented? Please elaborate how you see this in terms of organisational behaviours regarding:	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.9	Yes, but, with continuous improvement.	WKW01LSY, WCVDW01L,		WTM01L, WMN01L WPM04L,	WEK01LMNT

SP3.2Q1.1	How people feel about the leadership of the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	50 : 50		WHM01L	WJM01L	WAS01LMNT, WTD01LLABTECH
1.1.2	Confident.		WAC01L		
1.1.3	Strong, positive and confident. Trust their judgement. Can see their performance for example buying other organisations. High degree of respect.	WPP01LF, WKW01LSY WCVDW01L, WHR01LTM	WBS01L, WAK01LIT, WAL01L, WYE01SF, WBM01L WWF01LSY, WJM01M WPK01MSTK, WJH01LWD, WAR01SSC, WAE01LDWG	WBK01L, WBS02L WBM02L, WNM01L, WPM01L WPM02L, WTM01L, WJN01LWD, WAM02L, WHM01LWD WCM01LSCR,	WAM01LBUYA, WWB01LSLS, WRS01LSC, WHB01LMNT WEN01LMNT, WNP01LDDES, WSN01LQC, WPDB01LDCOR, WAM03LDCOR WNH01LQC, WEK01LMNT

SP3.2Q1.1	How people feel about the leadership of the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WET01LSFTY, WES01SFCW, WKP01LSCR, WMW01SSHL, WGP01LFEXPP	WMN01L WPM03L, WJN02LSCR WRS02L, WPM04L	WDR01MNPROG, WOV01LMNT
1.1.4	60:40 Confidence and trust.		WAS02LF	WBK01S	
1.1.5	Not fully trusted due to the issue of job grades not having been resolved.			WDC01L	
1.1.6	Workers are positive due to the manner in which change is communicated and driven and the positive results experienced from the growth of the organisation.				WSB01M
1.1.7	Not sure, think employees are ok with the leadership.	WHS01LSLS			
1.1.8	Positive and 80% of employees has confidence in the leadership.	WAV01M	WRM01L		
1.1.9	70% have confidence and trust in the leadership			WFM01L	WHD01LMNT
1.1.10	90% have confidence and trust in the leadership. Top management respected for the incentive bonuses.	WRK01L			WLN01LQC WGN01LQC,

SP3.2Q1.1	How people feel about the leadership of the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.11	Good, confident and trust in the previous and current managing director as well as the current operations director.				WRB01LDR
1.1.12	No comment.		WSR01LMNT WLT01SPRA,		

SP3.2Q1.2	participation of employees regarding lean disciplines and techniques;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1	Participation more than before.			WJM01L	
1.2.2	Improving with daily mini business team meetings.		WAC01L	WAM02L	
1.2.3	Improved from passive to more active involvement, wanting to be involved.		WHM01L		
1.2.4	Before no involvement, now participating and solution focused.		WBS01L		
1.2.5	Improved because of recognition and incentive bonuses.		WAK01LIT WWF01LSY,		
1.2.6	Variable, negative to positive		WAL01L		
1.2.7	80% to 95% of employees participate since through mini business meetings, seeing the benefits, working to targets	WCVDW01L	WYE01SF, WBM01L WAE01LDWG	WBK01L WDC01L, WPM02L,	WHB01LMNT WEN01LMNT,

SP3.2Q1.2	participation of employees regarding lean disciplines and techniques;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	and receiving feedback, curiosity, recognition and incentive bonuses. Young people are keen to learn. Filling in maintenance check sheets assists with participation.		WKP01LSCR WAS02LF	WPM02LWJN01 LWD, WHM01LWD, WPM03L	WLN01LQC WNH01LQC,
1.2.8	Total involvement and participation through: mini business meetings and small group activities; see better results; easier to work; awareness through incentive bonuses; management encouraging employees; employees wanting to provide ideas that are constructive; Interest generated through project work and involving the team members in the detail and the respect employees have for each other.		WGP01LFEXPP	WBK01L, WBM02L, WPM04L	WPDB01LDCOR, WEK01LMNT, WOV01LMNT
1.2.9	Not much, but has improved with involvement. Visible, but not too often.		WAR01SSC	WBK01S	
1.2.10	Has improved over the last three years with renewed focus on key one organising and cleaning, but also more focus on key 11, quality.		WJM01M		

SP3.2Q1.2	participation of employees regarding lean disciplines and techniques;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.11	Has improved over the last five years due to increased bonuses, more training and more recognition with certificates.		WPK01MSTK,		
1.2.12	Do not know.	WPP01LF WKW01LSY,			
1.2.13	In warehouse and distribution employees participate 100%, but it took three years to get to this level. Employees asked to chair meetings help cultivate participation.		WJH01LWD		
1.2.14	80% active participation in the mini business meetings. More focus on solutions last three years.			WBS02L	
1.2.15	Last four years participation has improved with employees filling in maintenance check sheets.				WSB01M
1.2.16	Very good due to the mini business team meetings. Lots of training and encouragement. Employees are keen to learn more.	WHS01LSLS	WET01LSFTY		
1.2.17	See 100% participation since it has become a way of life, employees are empowered and they see the	WAV01M		WRS02L	WWB01LSLS

SP3.2Q1.2	participation of employees regarding lean disciplines and techniques;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	improvements in the organisational performance that have resulted in improved benefits. Accept responsibility for cleanliness, machine care and training casual workers				
1.2.18	80% to 90% participation due to: employees interested in the measurements and targets; employees seeing the results; employees being acknowledged by management; appreciation for being provided the opportunity to participate; recognition being received in the team meetings from team members and management alike; receiving feedback from the top regarding the results and how the organisation is doing; and the attendance of top management at the team meetings.			WNM01L WTM01L, WMN01L	WSN01LQC
1.2.19	70% for permanent employees not the casual workers. Participation is good because of: teamwork; the employees being more aware of the need to achieve			WPM01L	

SP3.2Q1.2	participation of employees regarding lean disciplines and techniques;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	the results that lead to benefits; and the employees receiving acknowledgement from the top for their performance and contributions.				
1.2.20	70% to 80% participation due to: teamwork; visual management; action plans from meetings allocating responsibilities and employees sharing ideas for improvement with management; following through to resolve issues.		WRM01L	WFM01L, WCM01LSCR	
1.2.21	In the mini business team meeting there is 85% percent participation from literate people. 95% of the people of the organisation are literate.	WRK01L			
1.2.22	Participation is low, with 10% to 20% of employees, participating in the team meetings.				WRB01LDR, WGN01LQC
1.2.23	The participation in team activities are 18 out of 20. Most employees participate. Participation is mainly work related and key one, cleaning and organising.				WAM01LBUYA

SP3.2Q1.2	participation of employees regarding lean disciplines and techniques;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.24	Since 2006 not that active because, in scrap and bailing department see only four to six out of 25 employees actively participating.			WJN02LSCR	WRS01LSC
1.2.25	Poor, only two out of sixteen in maintenance participate.		WSR01LMNT		
1.2.26	Branch and operations managers report active participation in mini business meetings.		WES01SFCW		
1.2.27	In organisation taken over by W01, employees do participate since they want to know how the organisation is doing and they provide ideas to a lesser degree.		WMW01SSHL		
1.2.28	In maintenance about 50% participation due to employees seeing the improvements as a result of the lean process and the leader motivating the team members to participate.				WAS01LMNT
1.2.29	Passive in GS, due to employees avoiding confrontation.			WMG01LGS	

SP3.2Q1.2	participation of employees regarding lean disciplines and techniques;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.30	In die manufacturing there is 50% participation. Employee participation is inconsistent.				WNP01LDDDES
1.2.31	Last two years find 98% participation due to improved awareness of the organisational performance and results. Find that one on one sessions help to cultivate understanding by workers.		WLT01SPRA		
1.2.32	Active participation due to the fact that the keys are viewed as a lawful instruction.				WTD01LLABTECH
1.2.33	In die shop 50% participation due to the employees enjoying the process of generating ideas to work smarter and not harder.				WAM03LDCOR
1.2.34	No active participation, more one way instructions from the manager.				WDR01MNPORG
1.2.35	Six out of eight people participate due to the competence of the first line manager making sure employees are involved.				WHD01LMNT`
1.2.36	Participation occurs in the mini business team meetings where first line managers encourage workers to participate in the 20	WHR01LTM			

SP3.2Q1.2	participation of employees regarding lean disciplines and techniques;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	<p>keys. The business development team, champions specific keys aligned to current operations strategy and continuous improvement. Current focus is on quality, maintenance, energy saving and continuously improving our environment.</p> <p>Another forum is our joint leadership meeting that is held once a month and employees are invited to the meeting. At the meeting employees are encouraged to provide us with feedback and proposals regarding where our business is going.</p> <p>Top management, visits mini business team areas to engage the teams, during their respective sessions. Participation is further stimulated with our open-door approach, which encourages any employee to engage management regarding any subject, issue or proposal.</p>				

SP3.2Q1.3	changes in roles and responsibilities from before lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1	Have drastically changed with workers going beyond the previous line drawn for them and accepting additional responsibilities due to keys. Employees feel driven to achieve the targets set. Employees feel it is the right thing to do.		WGP01LFEXPP	WJM01L, WRS02L WPM04L,	WTD01LLABTECH, WNH01LQC WHD01LMNT,
1.3.2	Positive with team tasks being multi-skilled and employees given opportunities to make decisions regarding work and given the opportunity to lead team sessions. Also opportunities to be up-skilled and be promoted to higher job grades.		WAC01L WYE01SF, WBM01L, WJM01M WAE01LDWG WET01LSFTY WES01SFCW	WBK01L, WAM02L	
1.3.3	All team members get a chance to talk to the team and to lead sessions.		WHM01L		
1.3.4	Responsibilities by areas clearly identified therefore less conflict.		WBS01L WRM01L		
1.3.5	No changes	WHS01LSLS	WAK01LIT, WSR01LMNT	WBK01S, WDC01L WBM02L,	WSB01M, WAM01LBUYA, WAS01LMNT, WDR01MNPROG

SP3.2Q1.3	changes in roles and responsibilities from before lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.6	By task and function.		WAL01L WMW01SSHL		
1.3.7	Occurring due to employees being allocated new responsibilities.			WBK01L	
1.3.8	More multi-skilled disciplined employees.	WCVDW01L	WWF01LSY	WJN01LWD, WHM01LWD WJN02LSCR,	
1.3.9	Do not know.	WPP01LF, WKW01LSY,	WPK01MSTK, WAR01SSC WLT01SPRA	WFM01L, WCM01LSCR	WWB01LSLS WNP01LDDES, WSN01LQC WGN01LQC, WOV01LMNT
1.3.10	Teamwork plus focus plus responsibility realised through the twenty keys process has led to roll changes with workers taking more responsibility for their work areas. More training and development has resulted in up-skilling and multiskilling of workers. Workers are making higher level decisions. Workers take responsibility for planning to achieve the targets set.	WAV01M	WJH01LWD	WBS02L WPM01L, WPM02L WMN01L,	WEN01LMNT,

SP3.2Q1.3	changes in roles and responsibilities from before lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.11	Cleaning and organising and involvement in team meetings with maintenance check sheets and updating graphs, has given employees more responsibility.			WNM01L WTM01L, WPM03L	WRS01LSC, WHB01LMNT, WLN01LQC, WPDB01LDCOR, WAM03LDCOR
1.3.12	Employees have acquired team roles in terms of each team member has a responsibility to support the team. Employees understand and appreciate this.	WRK01L		WMG01LGS	
1.3.13	Yes people have been given more responsibility without more pay.				WRB01LDR
1.3.14	Participating in keys have improved the job satisfaction of employees.		WKP01LSCR		
1.3.15	Employees realise responsibilities because of profit sharing.		WAS02LF		
1.3.16	Has changed due to employees providing ideas beyond their task area.				WEK01LMNT
1.3.17	Roles have changed with the introduction of the 20 keys process and employees taking responsibility for cleaning and organising the workplace. Role changes	WHR01LTM			

SP3.2Q1.3	changes in roles and responsibilities from before lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	have also occurred with employees participating in team meetings as team leaders and participating in the recording of performance to targets and other attributes.				

SP3.2Q1.4	knowledge of lean disciplines;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.1	Gained a lot of knowledge and understand four out of 20 keys well.			WJM01L	
1.4.2	Understand six to seven out of twenty keys well		WAC01L	WJN01LWD	
1.4.3	50% to 100% of four to ten keys.	WPP01LF	WHM01L WET01LSFTY WGP01LFEXPP, WLT01SPRA	WTM01L WAM02L, WHM01LWD, WCM01LSCR WPM03L,	WSB01M, WLN01LQC, WNP01DDES, WSN01LQC, WTD01LLABTECH WNH01LQC, WDR01MNPROG WOV01LMNT,

SP3.2Q1.4	knowledge of lean disciplines;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.4	Good understanding of key one, organising and cleaning, teamwork and goals, and maintenance.		WBS01L	WPM04L	WWB01LSLS WAM03LDCOR, WHD01LMNT
1.4.5	Fifteen out of twenty keys		WAK01LIT		
1.4.6	Lots of room for improvement.		WAL01L		
1.4.7	70% to 85% two to ten keys.	WRK01L, WCVDW01L	WYE01SF WBM01L, WJM01M WPK01MSTK, WJH01LWD WES01SFCW WKP01LSCR WMW01SSHL WRM01L	WBK01L, WBS02L, WDC01L, WNM01L, WPM01L, WFM01L WPM02L, WMN01L, WRS02L	WEK01LMNT
1.4.8	Limited. The literacy is sometimes a problem in the mini business team sessions.			WBK01S	WGN01LQC, WGN01LQC
1.4.9	20% to 30% of twenty keys.		WWF01LSY,WSR 01LMNT		
1.4.10	Do not know.	WKW01LSY	WAR01SSC		

SP3.2Q1.4	knowledge of lean disciplines;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.11	Total understanding of cleaning and organising, teamwork, targets and eliminating waste.				
1.4.12	Almost all employees understand what: cleaning and organising; time control; maintenance and quality is about.	WHS01LSLS			
1.4.13	90% of six keys focused on.	WAV01M			
1.4.14	Low for cleaning and organising, maintaining equipment, teamwork and quality.				WRB01LDR
1.4.15	Good understanding of most of the keys but not the keys of concurrent manufacturing, developing suppliers, leading technology, and some others not often used.				WAM01LBUYA
1.4.16	In scrap and bailing department employees do not know the keys to well.			WJN02LSCR	WRS01LSC
1.4.17	Employees understand cleaning and organising, goals, teamwork, and quality well as these are often discussed and utilised in the mini business team sessions.		WAE01LDWG		

SP3.2Q1.4	knowledge of lean disciplines;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.18	Cleaning and organising and maintenance well understood.				WHB01LMNT, WAS01LMNT WEN01LMNT,
1.4.19	Accounts understand key one 100% and quality 80%.		WAS02LF		
1.4.20	In GS not much but has improved with more supervision training.			WMG01LGS	
1.4.21	Employees understand cleaning and organising well as well as the teamwork through the mini business activities.				WPDB01LDCOR
1.4.22	Employees gain consistent knowledge of lean process through the mini business team sessions and the organisation's training programmes that is managed by the business development unit. All management down to first line managers have been highly trained in business processes and lean techniques. Workers experience lean through practical applications such as cleaning and organising, participating in teams and achieving set targets. Other important	WHR01LTM			

SP3.2Q1.4	knowledge of lean disciplines;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	application are; quick change-overs; commitment to time and discipline; reducing cycle times; improving processes; improving quality; filling in maintenance check sheets; promoting flow; resolving delays; maintaining visible controls; utilising Kanban areas and skips; becoming multi-skilled; achieving one day deliveries between respective units; and providing creative ideas for continuous improvement.				

SP3.2Q1.5	changes in attitudes towards lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.5.1	Workers are happy to contribute in team sessions.			WJM01L	
1.5.2	Has improved with the team sessions leading to involvement and learning. Also the benefits that have been gained. Recognition, certificates and bonuses and	WPP01LF WHS01LSLS, WCVDW01L	WAC01L, WBS01L, WAK01LIT, WAL01L	WDC01L, WBM02L WTM01L, WPM03L,	WHB01LMNT WEK01LMNT, WOV01LMNT

SP3.2Q1. 5	changes in attitudes towards lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	knowing the way forward. Employees feel it is the right thing to do.		WAE01LDWG, WGP01LFEXPP	WRS02L WPM04L,	
1.5.3	Employees have become more of a driving force.		WHM01L		
1.5.4	Employees have become extremely positive.		WYE01SF		
1.5.5	Employees have changed to a new way of life.		WBM01L		
1.5.6	Positive attitude with everybody participating and giving ideas for improvement at small group meetings.			WBK01L,	
1.5.7	No change.		WSR01LMNT, WLT01SPRA	WBK01S, WMG01LGS	WGN01LQC
1.5.8	Has improved with more recognition given.		WWF01LSY		
1.5.9	Last three years always positive and no change, Daily mini business sessions keeping the focus.		WJM01M		
1.5.10	Improved due to: employees working to achieve a target; more stability; quicker feedback to employees; increased bonuses; recognition when employees contribute; employees being more aware		WJH01LWD	WMN01L	WLN01LQC, WSN01LQC WTD01LLABTECH ,

SP3.2Q1. 5	changes in attitudes towards lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	of the results and the benefits from it; successes that are celebrated; more awareness and more empowerment.				
1.5.11	Do not know.		WAR01SSC		
1.5.12	Has improved with increased bonuses and less disciplinary hearings.			WBS02L	
1.5.13	Has improved last four years due to employees receiving bonuses as the company improved its financial performance after the 2009 recession. Increased bonus pay-outs motivated workers even more.			WJN02LSCR	WSB01M
1.5.14	No changes last three years. Employees accept the keys.	WAV01M			
1.5.15	Has become more positive due to incentive bonuses, awareness of the organisational results and effective grievance handling.			WNM01L	
1.5.16	Improved due to; incentives; mini team meetings; improved discipline; improved trust; improved time keeping and the recognition by the top for team			WPM01L, WJN01LWD, WCM01LSCR	WAS01LMNT

SP3.2Q1. 5	changes in attitudes towards lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	achievements and contributions. Recognition from management for a job well done. Managing director's involvement. Workers learning and being exposed to the concept of working smarter not harder.				
1.5.17	Improved due to: mini business team meetings; the positive way employees participate in team sessions; the competition between teams and the incentive bonuses being paid out.			WFM01L	
1.5.18	New to the branches of the organisation and have found that there are some resistance.	WKW01LSY			
1.5.19	Positive due to: organisation improving its results; working in a neater environment; participation and involvement in team sessions; targets set; recognition of team performances; celebrating team successes and the incentive bonuses that are linked to team achievements and	WRK01L	WKP01LSCR WAS02LF, WRM01L	WPM02L WHM01LWD,	

SP3.2Q1. 5	changes in attitudes towards lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	receiving feedback from the top in the joint leadership meetings.				
1.5.20	Positive, people want to go with it and see it in terms of creating more job security as the organisational performance improves. Attitudes improving with continuous improvement of the organisation.		WET01LSFTY		WRB01LDR
1.5.21	Workers feel alright with the keys since they can see the advantages of working in a clean environment. It also provides a safe workplace.				WAM01LBUYA, WDR01MNPROG
1.5.22	Employees are positive since: they are keen to learn; they can see the benefits the keys bring to the organisation; they see the results and growth of the organisation; the incentive bonuses are indicators of how well the organisation is doing				WRS01LSC WPDB01LDCOR
1.5.23	Initially apprehensive, now acceptance and awareness.				WWB01LSLS
1.5.24	Positive due to mini business team meetings concerns are fully dealt with.			WAM02L	
1.5.25	Totally for it.		WES01SFCW		

SP3.2Q1. 5	changes in attitudes towards lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.5.26	Positive last year but has changed due to looming 2014 strikes in organisation taken over by W01.		WMW01SSHL		
1.5.27	Positive but not always applied.				WEN01LMNT
1.5.28	Learned to accept the keys since it is stressed continuously. Employees understand that it is not going away and that management is fully supporting its utilisation.				WNP01LDDES WHD01LMNT,
1.5.29	Employee have made cleaning and organising a habit.				WAM03LDCOR
1.5.30	Employs are positive due to more learning, for example, how to solve problems and how to develop action plans.				WNH01LQC
1.5.31	Attitudes have changed remarkably over the past fifteen years, with the lean process of the 20 keys, mainly due to our: ongoing training and development, utilising the organisational development unit as well as outside consultants; workers experiencing the benefits of organisational growth and performance	WHR01LTM			

SP3.2Q1. 5	changes in attitudes towards lean;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	through our gain-sharing programme; open leadership style of engaging workers and encouraging participation; ongoing cleaning and organising programme; continuous improvement programme that recognises employee contributions; maintenance plan involving workers filling in check sheets; focus on good discipline and responding quickly and effectively to employee concerns. Other effective measures is the participation of worker representatives in our joint consultative committee and inviting workers to participate in our monthly joint leadership meetings.				

SP3.2Q1. 6	Respect shown by management towards the employees of the organisation; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.6.1	Has improved with more communications plus feedback plus improved leadership		WBS01L WET01LSFTY	WJM01L	WTD01LLABTECH

SP3.2Q1. 6	Respect shown by management towards the employees of the organisation; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	approach. NUMSA has played a positive role.				
1.6.2	Has improved with management: willing to listen; giving instant feedback; accommodating employees; dealing fully with employee concerns; encouraging employees; listening to ideas shared by the employees in the mini business activities; involving employees in decision making.		WAC01L, WKP01LSCR	WAM02L,	WPDB01LDCOR
1.6.3	Always very good since the major changes by the previous managing director. Find management always approachable and they always listen well. Find them respectful of knowledge and skills: in the way they communicate; providing instant feedback; support of the keys process; their good manners and always being positive.	WPP01LF WKW01LSY,	WHM01L WAK01LIT, WAL01L, WJM01M, WPK01MSTK, WJH01LWD WAR01SSC, WSR01LMNT WMW01SSHL	WBK01L, WBS02L, WDC01L, WBM02L	WAM01LBUYA WGN01LQC, WNH01LQC WHD01LMNT, WOV01LMNT
1.6.4	Has improved with top team playing down emotion. Politics and gossip discouraged.		WYE01SF		

SP3.2Q1. 6	Respect shown by management towards the employees of the organisation; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.6.5	Has improved with management attending mini business team meeting and interacting directly with employees.		WBM01L, WLT01SPRA,	WHM01LWD, WMN01L,	WAM03LDCOR
1.6.6	No change.			WBK01S, WVG01LGS	WSB01M
1.6.7	Focus on hygiene has improved self-respect. Having objectives leads to respect.		WWF01LSY		
1.6.8	Since the major changes to new management, always good due the way things are being done at the organisation.	WHS01LSLS			
1.6.9	Very good due to interdependence realised by management and employees alike. Managers understand the job content and contributions of workers better and has shown more appreciation, respect and recognition as a result. Managers are down to earth and respect a person's ability.	WAV01M		WTM01L WJN01LWD	WAS01LMNT WDR01MNPROG,
1.6.10	Has improved with teamwork and the 20 keys process. Also the example set by the			WNM01L, WPM04L	WHB01LMNT, WLN01LQC

SP3.2Q1. 6	Respect shown by management towards the employees of the organisation; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	top team, the stressing of the organisational values and the teams being respected by management for their contribution and participation.				
1.6.11	Top team recognise team and employee contributions.			WPM01L	
1.6.12	Always good: due to the way leaders share information with employees; feedback shared by the top with employees at the joint leadership sessions and the training that is continuously provided by the organisation to improve the abilities of employees. No unilateral decisions are made and employees are involved in the decision making process.	WRK01L	WAE01LDWG WES01SFCW	WFM01L	WEN01LMNT
1.6.13	Managing director and operations direct has a high degree of respect as indicated in the way they approach and deal with ordinary employees. However the behaviour of line managers is an issue in this regard.				WRB01LDR

SP3.2Q1. 6	Respect shown by management towards the employees of the organisation; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.6.14	Improved due to improved discipline in the organisation, management following through regarding issues and concerns and the employees learning from the process. Management go out of their way to make people understand and to resolve problems.			WPM02L	WRS01LSC WNP01LDDES,
1.6.15	More discipline has resulted in good order. Work to an agenda and emotions are well managed. Management also are very approachable. Workers are being pulled in and this leads to improved participation and involvement.	WCVDW01L	WGP01LFEXPP		
1.6.16	Always good since previous autocratic style of leadership.				WWB01LSLS
1.6.17	Improved due to: mini business team meetings; the high trust existing between management and employees and the incentive bonuses.			WCM01LSCR	

SP3.2Q1. 6	Respect shown by management towards the employees of the organisation; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1,6,18	Self- respect is cultivated through participation in the keys in the mini business team.		WAS02LF		
1.6.19	Improved with management having good manners and the skills to deal with employee issues.				
1.6.20	Has improved due to good discipline. (key 10 discipline and commitment)			WPM03L	WSN01LQC
1.6.21	Improved due to incentive bonuses and more overtime.			WJN02LSCR	
1.6.22	Has improved with management willing to train and develop the employees.			WRS02L	
1,6.23	Mostly good, however there are occasions when managers lose their cool. Example of a loss of a tool worth R9000.				WEK01LMNT
1.6.24	Respect has since the major changes fifteen years ago, been a fundamental value. As management we discuss respect for people often as the corner stone of human behaviour. We demonstrate respect through recognising employees as	WHR01LTM			

SP3.2Q1. 6	Respect shown by management towards the employees of the organisation; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	part of the family of our business. Where possible we consult on future direction by asking employees for their views and opinions. Through our communications and teamwork systems we maintain effective contact with workers and ensure that a respectful climate is maintained. We make a point of greeting employees and asking them how they are and how their families are doing. We assist employees when they have issues in or outside the workplace. Follow through goes with respect and we make a point to resolve concerns and issues to final conclusion.				

SP3.2Q1. 7	.....any other changes in behaviour that you specifically have witnessed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.7.1	No comment	WPP01LF,WH S01LSLS WAV01M, WKW01LSY	WAC01L WHM01L, WYE01SF WBS01L	WJM01L, WBK01L, WBS02L, WDC01L,	WSB01M, WAM01LBUYA WRS01LSC, WWB01LSLS,

SP3.2Q1. 7	.....any other changes in behaviour that you specifically have witnessed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
		WRK01L, WCVDW01L	WAK01LIT, WJH01LWD WAL01L, WBM01L, WWF01LSY WJM01M, WPK01MSTK WAR01SSC, WSR01LMNT, WAE01LDWG, WET01LSFTY, WES01SFCW, WKP01LSCR, WMW01SSHL WRM01L, WGP01LFEXPP, WLT01SPRA,	WBM02L, WNM01L WPM01L, WFM01L WPM02L, WTM01L, WCM01LSCR WJN01LWD, WAM02L, WHM01LWD WMN01L, WGM01LGS WPM03L, WJN02LSCR, WRS02L, WPM04L	WHB01LMNT WAS01LMNT, WEN01LMNT WLN01LQC, WNP01LDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH WAM03LDCOR, WNH01LQC, WEK01LMNT, WDR01MNPORG WHD01LMNT, WOV01LMNT
1.7.2	Behaviour changes are results driven.			WBK01S	
1.7.3	The power of the union is an issue in the organisation.				WRB01LDR
1.7.4	Employees take pride in being at W01.		WAS02LF		

SP3.2Q1. 7	.....any other changes in behaviour that you specifically have witnessed?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.7.5	Cleaning and organising has become a habit.				WGN01LQC
1.7.6	I think we have covered most of the details.	WHR01LTM			

SP4Q1	Having discussed changes in organisational structure and behaviour for your organisation, how would you describe the change in organisational culture since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1	Making it work, seriously supported by all.			WJM01L	
1.2	Happy culture, willingness, helpful, supportive, stand together, friendly and a better working environment. One roof culture.		WAC01L	WRS02L	WWB01LSLS WNP01LDDES,
1.3	Improve the customer service. Satisfy customers.		WHM01L	WBM02L, WFM01L,	
1.4	Family.		WBS01L, WAL01L WYE01SF, WWF01LSY, WJH01LWD, WAE01LDWG,	WBK01L, WPM01L WPM02L, WTM01L WAM02L,	WHB01LMNT WEN01LMNT, WLN01LQC WPDB01LDCOR, WGN01LQC

SP4Q1	Having discussed changes in organisational structure and behaviour for your organisation, how would you describe the change in organisational culture since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WES01SFCW, WAS02LF, WLT01SPRA,	WVG01LGS WPM04L,	WHD01LMNT, WVO01LMNT
1.5	Have changes from casual to structure.		WAK01LIT		
1.6	Respectful		WBM01L		
1.7	No comment.			WBK01S, WPM03L WJN02LSCR,	WRS01LSC, WAS01LMNT, WSN01LQC, WEK01LMNT
1.8	Clean and green culture		WJM01M		
1.9	Best quality and delivery.				
1.10	From cloak and dagger fifteen years ago to a more open family culture	WPP01LF WCVDW01L,			
1.11	Tight effective culture.		WAR01SSC		
1.12	Teamwork and family.			WBS02L WHM01LWD,	
1.13	The organisation functions like a chain.			WDC01L	

SP4Q1	Having discussed changes in organisational structure and behaviour for your organisation, how would you describe the change in organisational culture since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.14	Driven productive culture.		WGP01LFEXPP	WMN01L	WSB01M, WNH01LQC WDR01MNPROG,
1.15	Positive culture; make a plan, do things right, focus on customer service, quality and delivery; awareness; focus.	WHS01LSLS	WET01LSFTY		WAM03LDCOR
1.16	Entrepreneurial culture.	WAV01M			
1.17	Quicker and cheaper			WNM01L	WTD01LLABTECH
1.18	Positive one citizen culture. Employees own the organisation.	WKW01LSY			
1.19	A culture of respect and leadership.	WRK01L			
1.20	Teamwork culture.				WRB01LDR
1.21	Do it in the right way.				WAM01LBUYA
1.22	People united in goals achievement.			WJN01LWD	
1.23	Everyone for himself.		WSR01LMNT		
1.24	Lean culture		WKP01LSCR		
1.25	Functional yet flexible.		WMW01SSHL		
1.26	Linked trust with effective communications		WCM01LSCR		
1.27	Clear vision and goal		WRM01L		

SP4Q1	Having discussed changes in organisational structure and behaviour for your organisation, how would you describe the change in organisational culture since lean implementation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.28	Not having been with the company at the time of the major changes, I am unable to comment on the previous dispensation. However, I have been given feedback from employees that have been with the organisation for a number of years and they have commented on the day and night difference in the organisational culture. The phrase “we are family” is probably a very good description of our culture.	WHR01LTM			

SP5.1Q1	Do you think that your organisation has self-directed teams working at implementing and continuously improving what they do?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1	Yes.	WAV01M	WHM01L WYE01SF, WBS01L WWF01LSY	WJM01L, WBK01L, WHM01LWD WPM04L,	WWB01LSLS WHD01LMNT, WOV01LMNT

SP5.1Q1	Do you think that your organisation has self-directed teams working at implementing and continuously improving what they do?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2	Yes, getting there.	WKW01LSY WRK01L, WCVDW01L	WAC01L, WBM01L, WJM01M, WET01LSFTY, WMW01SSH,L WGP01LFEXPP,	WBS02L WJN01LWD, WMN01L, WPM03L WRS02L,	WRB01LDR, WHB01LMNT
1.3	Do not know.		WAK01LIT, WAR01SSC		WSB01M
1.4	Not yet.	WPP01LF, WHS01LSLS	WAL01L, WPK01MSTK, WJH01LWD, WSR01LMNT, WAE01LDWG, WES01SFCW, WKP01LSCR, WAS02LF, WRM01L, WLT01SPRA,	WBK01S, WDC01L WBM02L, WNM01L WPM01L, WFM01L WPM02L, WTM01L WAM02L WCM01LSCR, WMG01LGS, WJN02LSCR	WAM01LBUYA, WRS01LSC, WAS01LMNT WEN01LMNT, WLN01LQC WNP01LDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH WGN01LQC, WAM03LDCOR WNH01LQC,

SP5.1Q1	Do you think that your organisation has self-directed teams working at implementing and continuously improving what they do?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
					WEK01LMNT WDR01MNPORG,
1.5	The mini business team system and processes, encourages that employees under the leadership of the first line managers take the initiative to get on with in in the workplace. We take care to empower employees by testing the effectiveness of how things are being resolved by the workers, without management intervention. We ensure that recognition is given for initiatives and we maintain an approach of listening rather than dictating. We encourage self-direction by providing good business guidelines to employee teams.	WHR01LTM			

SP5.1Q1.1	Are you able to point out examples of this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	Yes the despatch team can work without a supervisor.		WBM01L	WJM01L	
1.1.2	No example.	WPP01LF, WHS01LSLS	WAC01L, WAL01L, WJH01LWD, WAR01SSC, WSR01LMNT, WAE01LDWG, WET01LSFTY, WES01SFCW, WKP01LSCR, WMW01SSHL, WAS02LF, WRM01L, WGP01LFEXPP, WLT01SPRA	WBK01S, WDC01L WBM02L, WNM01L WPM01L, WFM01L WPM02L, WTM01L, WAM02L WCM01LSCR, WVG01LGS WPM03L, WJN02LSCR	WSB01M WRB01LDR, WAM01LBUYA, WRS01LSC, WLN01LQC WNP01LDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH, WGN01LQC, WAM03LDCOR WNH01LQC, WEK01LMNT, WDR01MNPROG
1.1.3	Die manufacturing team able to function without a leader.		WHM01L	WBK01L,	
1.1.4	Packing team make decisions what and when to pack.		WBS01L		
1.1.5	Do not know.		WAK01LIT WPK01MSTK,		

SP5.1Q1.1	Are you able to point out examples of this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.6	Debtors' team.		WYE01SF		
1.1.7	Powder coating maintenance team.	WCVDW01L	WWF01LSY		WAS01LMNT
1.1.8	Profile team.		WJM01M	WBS02L, WMN01L, WRS02L	
1.1.9	The Vereeniging press team.	WAV01M			
1.1.10	The Vereeniging and Cape Town teams.	WKW01LSY			
1.1.11	Profile teams under the leadership of a first line manager function virtually independently.	WRK01L			
1.1.12	Despatch team profiles to powder coating.			WJN01LWD	
1.1.13	Sales team				WWB01LSLS
1.1.14	Maintenance team				WHB01LMNT WOV01LMNT,
1.1.15	The re-melt team				WEN01LMNT
1.1.16	The billet cutting team.			WHM01LWD	
1.1.17	The anodising team.			WPM04L	WHD01LMNT
1.1.18	Examples of effective self-direction are: employees maintaining standard operating practices through their first line managers; allowing employees to	WHR01LTM			

SP5.1Q1.1	Are you able to point out examples of this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	improve flow lines by applying their techniques and methods; allowing schedule changes to be made by the mini business teams based on their respective interactions with customers; and allowing employees to make decisions regarding which aluminium compositions and product types to run during operation.				

SP5.1Q1.2	Do you think that these teams are empowered to a substantial level in terms of decisions impacting the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1	Yes despatch team can decide on how to change the delivery schedule without the help of a manager.		WBM01L	WJM01L	
1.2.2	No comment.		WAL01L, WSR01LMNT	WBK01S, WBM02L	WSB01M, WSN01LQC
1.2.3	Yes, Die manufacturing team can decide on changing the design of a die if need be.		WAC01L	WBK01L,	

SP5.1Q1.2	Do you think that these teams are empowered to a substantial level in terms of decisions impacting the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.4	Do not know.		WAK01LIT, WAR01SSC		
1.2.5	Packing team can decide what, how and when to pack.		WABS01L		
1.2.6	Not there yet.	WPP01LF, WHS01LSLS,	WHM01L, WPK01MSTK, WJH01LWD, WAE01LDWG, WES01SFCW, WKP01LSCR, WMW01S,SHL, WAS02LF, WRM01L, WGP01LFEXPP, WLT01SPRA	WDC01L, WNM01L, WPM01L WFM01L, WPM02L WTM01L, WAM02L WCM01LSCR, WMG01LGS WPM03L, WJN02LSCR WPM04L,	WRB01LDR, WAM01LBUYA, WRS01LSC, WLN01LQC, WNP01LDDDES, WPDB01LDCOR, WTD01LLABTECH, WGN01LQC, WAM03LDCOR WNH01LQC, WEK01LMNT WDR01MNPROG,
1.2.7	Yes debtors team resolve issues without the manager needing to intervene.		WYE01SF		
1.2.8	Powder coating maintenance team are empowered to make decisions normally	WCVDW01L	WWF01LSY		WAS01LMNT

SP5.1Q1.2	Do you think that these teams are empowered to a substantial level in terms of decisions impacting the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	done by the manager. Double jiggling and example.				
1.2.9	Profites team decide what to run and resolve issues on the line without line manager involvement. Empowered up to a certain level.	WRK01L	WJM01M	WBS02L, WRS02L	
1.2.10	Teams are empowered but are controlled through signing authority provided.	WAV01M			
1.2.11	Yes they are empowered to take strategic decisions regarding their particular area of business.	WKW01LSY			
1.2.12	Team can make decisions normally taken by a superior. Superior consulted after decision taken.			WJN01LWD	WWB01LSLS, WHB01LMNT WHD01LMNT, WOV01LMNT
1.2.13	Teams change production schedule when they see the need for it.		WET01LSFTY		

SP5.1Q1.2	Do you think that these teams are empowered to a substantial level in terms of decisions impacting the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.14	In re-melt section, millwrights are often allowed to take on unit manager's responsibility.				WEN01LMNT
1.2.15	The billets team ensure that presses never run out of material.			WHM01LWD	
1.2.16	Profile team able to decide which alloy and which billet to run.			WMN01L	
1.2.17	I have already explained the extent of empowerment through the examples mentioned before. Empowerment comes from our mini business team processes which allows for elevating employees to become leaders in their own right and if they demonstrate ability. Through our first line management processes, we maintain respect for employee initiatives without management interventions. Nurturing employee creativity can only take place in a teamwork environment and this is	WHR01LTM			

SP5.1Q1.2	Do you think that these teams are empowered to a substantial level in terms of decisions impacting the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	one of the corner stones of how we do things at our organisation.				

SP5.1Q1.3	To what extent would you say has self-directed teams taken over the roles and responsibilities in the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1	Two teams in the warehouse local and coastal despatch working without a line manager or controller.			WJM01L	
1.3.2	Not yet, but getting there.	WPP01LF, WAV01M	WAC01L WHM01L, WBS01L WBM01L, WWF01LSY WJM01M, WPK01MSTK, WMW01SSHL	WBK01L, WBS02L, WNM01L, WMN01L WGP01LFEX PP, WPM03L	WRB01LDR, WHB01LMNT,
1.3.3	Do not know.		WAK01LIT, WAR01SSC		WSB01M

SP5.1Q1.3	To what extent would you say has self-directed teams taken over the roles and responsibilities in the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.4	Not done yet.	WHS01LSLS WKW01LSY, WRK01L WCVDW01L,	WAL01L, WJH01LWD, WSR01LMNT, WAE01LDWG, WET01LSFTY, WES01SFCW, WKP01LSCR, WAS02LF, WRM01L, WLT01SPRA,	WBK01S, WDC01L WBM02L, WPM01L, WFM01L, WPM02L WTM01L, WJN01LWD, WAM02L, WHM01LWD, WCM01LSCR , WMG01LGS WJN02LSCR, WRS02L WPM04L,	WAM01LBUYA WRS01LSC, WWB01LSLS, WAS01LMNT, WEN01LMNT WLN01LQC, WPDB01LDCOR, WNP01LDDES WSN01LQC, WTD01LLABTECH, WGN01LQC, WAM03LDCOR WNH01LQC, WEK01LMNT WDR01MNPORG, WHD01LMNT WOV01LMNT,
1.3.5	Cape Town branch working without a manager		WYE01SF		
1.3.6	Despite the recognition of self –directed teamwork we have not become totally	WHR01LTM			

SP5.1Q1.3	To what extent would you say has self-directed teams taken over the roles and responsibilities in the organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	dependent on this aspect as being a format of organisational structure. We maintain a flat effective structure of first line manger reporting to operations manager reporting to a business unit manager. We recognise and respect the fact that first-line managers run their respective mini business teams in a self -directed manner.				

SP5.2Q1	Lean theory suggests that organisations should restructure along the value stream of the organisation.	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1	Blank see answers below.				

SP5.2Q1.1	Do you think that your organisation has achieved this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	Yes	WPP01LF WRK01L,	WHM01L, WBS01L WAL01L, WYE01SF,	WJM01L, WBK01L, WBS02L,	WSB01M, WAM01LBUYA, WHB01LMNT,

SP5.2Q1.1	Do you think that your organisation has achieved this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
		WCVDW01L WHR01LTM	WWF01LSY,, WPK01MSTK, WAE01LDWG, WES01SFCW, WKP01LSCR, WMW01SSHL, WAS02LF, WRM01L, WGP01LFEXPP,	WBM02L, WNM01L, WPM01L, WFM01L, WPM02L, WTM01L WJN01LWD, WAM02L WHM01LWD, WCM01LSCR, WMN01L, WPM03L WJN02LSCR, WPM04L	WAS01LMNT WEN01LMNT, WLN01LQC WNP01LDDES, WSN01LQC WEK01LMNT, WHD01LMNT
1.1.2	No but well on its way.		WAC01L, WBM01L,		WWB01LSLS WNH01LQC,
1.1.3	Do not know.	WHS01LSLS	WAK01LIT, WJM01M, WAR01SSC, WSR01LMNT, WLT01SPRA,	WBK01S WDC01L,	WRB01LDR WRS01LSC, WPDB01LDCOR, WGN01LQC WDR01MNPROG,

SP5.2Q1.1	Do you think that your organisation has achieved this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.4	No		WJH01LWD WET01LSFTY	WVG01LGS	WTD01LLABTECH, WAM03LDCOR WOV01LMNT,
1.1.5	To some extent	WAV01M			
1.1.6	No, ongoing process.	WKW01LSY			
1.1.7	Not sure.			WRS02L	

SP5.2Q1.2	If so, how has the organisation achieved this in terms of restructuring and working in specific ways?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1	Effective flow of communications and the leadership setting the way to do it.			WJM01L, WFM01L	WHB01LMNT
1.2.2	Systems are in place.		WAC01L		
1.2.3	Quality has improved.		WHM01L		
1.2.4	Developing the telescope for the organisation.		WBS01L		
1.2.5	Do not know.	WHS01LSLS	WAK01LIT, WAL01L WJM01M, WAR01SSC, WSR01LMNT,	WBK01S, WDC01L WPM01L, WPM02L, WAM02L	WRS01LSC, WWB01LSLS WAS01LMNT, WPDB01LDCOR, WNH01LQC

SP5.2Q1.2	If so, how has the organisation achieved this in terms of restructuring and working in specific ways?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WMW01SSHL WLT01SPRA,		WEK01LMNT, WDR01MNPROG
1.2.6	Teamwork structure consisting of a combination of mini business teams. The organisational development team doing training and development and the joint leadership sessions. Teams empowered to make decisions.	WPP01LF WRK01L, WCVDW01L	WYE01SF WBM01L, WAE01LDWG WES01SFCW	WBK01L, WNM01L WTM01L, WMN01L WPM03L,	WSB01M, WLN01LQC WHD01LMNT,
1.2.7	Teamwork and the well-defined vision.		WWF01LSY		
1.2.8	Organisation well integrated across the different functions and departments.		WPK01MSTK, WGP01LFEXPP		
1.2.9	Not achieved yet.	WKW01LSY	WJH01LWD WET01LSFTY	WMG01LGS WRS02L,	WRB01LDR WTD01LLABTECH, WGN01LQC, WAM03LDCOR, WOV01LMNT
1.2.10	One operations manager taken out and one operator doing the work that was previously done by two operators.			WBS02L	

SP5.2Q1.2	If so, how has the organisation achieved this in terms of restructuring and working in specific ways?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.11	Training and development of employees. Multi-tasking. Development of first line managers.		WKP01LSCR	WBM02L, WJN01LWD	
1.2.12	Managing groups of manufacturing cells as business units or profit centres.	WAV01M			
1.2.13	Employees have been made to work in this way.				WAM01LBUYA
1.2.14	No problems experienced with the current structure.				WEN01LMNT
1.2.15	Multi-tasking system for employees.			WHM01LWD	
1.2.16	Highly motivated employees achieving the objectives.			WCM01LSCR	
1.2.17	Continuous improvement is a given. Clear vision and goal.		WAS02LF WRM01L		
1.2.18	Lots of improvements.				WNP01LDDES
1.2.19	Targets are being achieved.			WJN02LSCR	
1.2.20	As if things happen automatically.				WSN01LQC
1.2.21	What has been implemented, works well.			WPM04L	
1.2.22	I believe we have achieved this through the structure of a first line manager	WHR01LTM			

SP5.2Q1.2	If so, how has the organisation achieved this in terms of restructuring and working in specific ways?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	running a flow line, reporting to an operations manager responsible for a number of flow lines reporting to a business unit manager, responsible for running a full-fledged business unit as a profit centre. This is further strengthened by means of effective and regular cross business-unit team meetings and interactions.				

SP5.2Q1.3	Do you think that teamwork has played a significant role?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1	Yes	WPP01LF, WHS01LSLS WAV01M, WKW01LSY, WRK01L WCVDW01L WHR01LTM	WAC01L, WHM01L, WBS01L, WAK01LIT, WAL01L, WWF01LSY WYE01SF WBM01L, WPK01MSTK, WJH01LWD, WSR01LMNT, WAE01LDWG, WET01LSFTY, WES01SFCW, WKP01LSCR, WMW01SSHL, WAS02LF, WRM01L, WGP01LFEXPP, WLT01SPRA	WJM01L, WBK01L, WBS02L, WBM02L, WNM01L, WPM01L WFM01L, WPM02L WTM01L, WJN01LWD WAM02L, WHM01LWD WCM01LSCR, WMG01LGS WMN01L, WPM03L WJN02LSCR, WRS02L WPM04L,	WSB01M , WAM01LBUYA, WRS01LSC, WWB01LSLS, WHB01LMNT, WAS01LMNT, WEN01LMNT, WLN01LQC, WNP01LDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH, WGN01LQC WAM03LDCOR, WNH01LQC, WEK01LMNT, WDR01MNPROG WHD01LMNT, WOV01LMNT
1.3.2	No comment.		WJM01M, WAR01SSC	WBK01S, WDC01L	

SP5.2Q1.3	Do you think that teamwork has played a significant role?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.3	Starting to.				WRB01LDR

SP5.2Q1.4	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.1	There are open discussions and teamwork by work area and cross-functionally how to improve things. Employees know what is expected of them.		WSR01LMNT,	WJM01L, WPM04L	WHB01LMNT WNH01LQC, WEK01LMNT WHD01LMNT,
1.4.2	Departmental mini business teamwork in the morning sessions, cross-functional team with engineering and die manufacture.		WAC01L WET01LSFTY		WAM01LBUYA
1.4.3	Ownership and self-direction.		WHM01L		
1.4.4	Mini business meetings every day plus team that trains and develops for continuous improvement and the twenty keys		WBS01L WAL01L, WBM01L WES01SFCW WKP01LSCR	WBK01L, WNM01L, WPM02L WTM01L,	WSB01M, WDR01MNPROG
1.4.5	Do not know.		WAK01LIT WJM01M, WAR01SSC	WBK01S, WDC01L	

SP5.2Q1.4	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.6	Teamwork structure consisting of a combination of mini business teams and the small group activities. The organisational development team doing training and development and the joint leadership sessions.	WRK01L WCVDW01L,	WYE01SF WMW01SSHL WAS02LF WGP01LFEXPP,	WBS02L, WAM02L, WHM01LWD WMN01L, WRS02L	WAS01LMNT, WNP01LDDES WGN01LQC,
1.4.7	The vision has encouraged the teams to work well together towards becoming the best in field. A clear target has been provided.		WWF01LSY	WBM02L	WTD01LLABTECH
1.4.8	Bonus system encourages cooperation amongst the functions.		WPK01MSTK,		
1.4.9	Teamwork system plus key one focus. W01 is not a person but group of people working as a team.	WPP01LF			WWB01LSLS
1.4.10	It has helped to integrate functions.		WJH01LWD		
1.4.11	Employees support one another through teamwork and there are opportunities to bounce ideas of one another.	WHS01LSLS			WAM03LDCOR
1.4.12	Teams operating cells are incentivised. Teams are allowed and empowered to	WAV01M		WCM01LSCR	

SP5.2Q1.4	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	exercise their initiatives. Teams achieve objectives.				
1.4.13	Teamwork and trust in the organisation and everybody working together to achieve a common goal.			WPM01L	
1.4.14	Teams work to set targets throughout the organisation. Teams work together.			WFM01L, WVG01LGS	
1.4.15	The established team structure consisting of top, middle and mini business team session held throughout the organisation.	WKW01LSY			
1.4.16	Teamwork is starting to work much better.				WRB01LDR
1.4.17	Employees bond together in teams to resolve problems.				WRS01LSC
1.4.18	Multi- tasking.			WJN01LWD	
1.4.19	Effective cross-functional teamwork sales, manufacturing and drawing office.		WAE01LDWG		
1.4.20	Team have good communication, cooperation and joint decision making.				WEN01LMNT
1.4.21	Teamwork has cultivated a better understanding of the business by all and the effective feedback assists the structure.		WRM01L	WJN02LSCR	

SP5.2Q1.4	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.4.22	Mini business team and small group activities contribute to the organisational success.			WPM03L	WLN01LQC, WSN01LQC WPDB01LDCOR,
1.4.23	Teamwork make things work since the support is always there.		WLT01SPRA		
1.4.24	Teams work together to achieve a common goal.				WOV01LMNT
1.4.25	The team structure is well developed and has been tested and improved on through the years of application. We maintain consistent process of team sessions and follow through as follows: Top team meets once per week, Top team with operations mangers meet twice a week to coordinate cross-functional activities and communications. The mini business teams meet daily under the leadership of the first line managers, and the first line mangers meet daily with the business unit mangers and operations mangers. Meetings have set agendas that deal with continuous improvement, resolving issues, past and	WHR01LTM			

SP5.2Q1.4	Can you expand on this?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	future business performance, operational plans and strategic planning, organisational values and the 20 keys applications.				

SP6Q1	Has your organisation approached lean as a total strategy in terms of Hoshin Kanri and policy deployment?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1	Yes	WPP01LF, WHS01LSLS WCVDW01L,	WHM01L, WBS01L WAL01L, WYE01SF, WBM01L, WJM01M, WJH01LWD, WES01SFCW, WSR01LMNT, WET01LSFTY, WKP01LSCR, WMW01SSHL, WLT01SPRA,	WJM01L, WBK01L, WBK01S WNM01L, WPM01L WFM01L, WPM02L WTM01L, WJN01LWD WAM02L, WMG01LGS, WPM03L, WJN02LSCR WRS02L, WPM04L	WRB01LDR, WAM01LBUYA WRS01LSC, WEN01LMNT, WLN01LQC, WNP01LDDES WSN01LQC, WPDB01LDCOR, WTD01LLABTECH WGN01LQC, WAM03LDCOR WNH01LQC, WDR01MNPROG WOV01LMNT,

SP6Q1	Has your organisation approached lean as a total strategy in terms of Hoshin Kanri and policy deployment?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2	Very close, but still some issues.		WAC01L		
1.3	Getting there		WAK01LIT		
1.4	No comment.		WWF01LSY WPK01MSTK, WAR01SSC	WDC01L	WWB01LSLS WHD01LMNT,
1.5	Not totally.			WBS02L	
1.6	Do not know.		WAE01LDWG	WBM02L, WHM01LWD WCM01LSCR	WHB01LMNT WEK01LMNT,
1.7	Think so.				WSB01M
1.8	It is part of the total strategy	WAV01M, WKW01LSY WRK01L,	WAS02LF, WRM01L, WGP01LFEXPP	WMN01L	WAS01LMNT
1.9	I believe we have applied lean in the form of the 20 keys as a total strategy and it continuous to be an integral part of our business planning. Hoshin Kanri is similar to the current fundamental keys of teamwork and goal alignment, which is continuously being focused on in our regular management team and mini business team sessions.	WHR01LTM			

SP6Q1	Has your organisation approached lean as a total strategy in terms of Hoshin Kanri and policy deployment?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	Utilising the business development unit, we consistently ensure that team goals are aligned to our business strategy.				

SP6Q1.1	Could you explain how and why this was done?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.1	Cascading objectives down the organisation to each team.			WJM01L, WBS02L	
1.1.2	Improved performance to targets plus continuous improvement. Improve the organisation.		WAC01L. WMW01SSHL, WLT01SPRA	WBK01L, WBK01S, WFM01L WTM01L, WPM03L, WJN02LSCR WRS02L, WPM04L	WPDB01LDCOR, WAM03LDCOR, WDR01MNPROG
1.1.3	To compete globally. To become a world class organisation. To keep China out.	WCVDW01L	WHM01L, WJH01LWD WET01LSFTY WES01SFCW	WMN01L	WRB01LDR, WLN01LQC WNP01LDDES, WSN01LQC

SP6Q1.1	Could you explain how and why this was done?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.4	All focus on the vision		WBS01L		WGN01LQC
1.1.5	Daily mini business team meetings.		WAK01LIT		
1.1.6	Focus on key one identified responsibilities by area.		WAL01L		
1.1.7	By means of all the team activities.		WYE01SF		
1.1.8	The structure has changed. Less offices, more teamwork.		WBM01L		
1.1.9	No comment.	WAE01LDWG	WWF01LSY WPK01MSTK, WAR01SSC WAS02LF WRM01L	WDC01L, WBM02L, WHM01LWD WCM01LSCR,	WWB01LSLS, WHB01LMNT, WEN01LMNT, WEK01LMNT WHD01LMNT,
1.1.10	All teams have objectives and targets. Communications upwards and downward to assess how the organisation is doing. Joint leadership meetings provide feedback how the organisation is doing.	WPP01LF	WJM01M		
1.1.11	To be the best in Africa and to compete globally.	WKW01LSY WRK01L,	WKP01LSCR		
1.1.12	Production driven organisation. Reduced waste focus.				WSB01M

SP6Q1.1	Could you explain how and why this was done?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.1.13	Vision of one day delivery directly relates the strategy to the twenty keys approach.	WHS01LSLS			
1.1.14	To develop an entrepreneurial culture.	WAV01M			
1.1.15	To improve profitability.			WNM01L	
1.1.16	To improve skills and the organisational performance.			WPM01L	WNH01LQC
1.1.17	To provide a safe working environment.				WAM01LBUYA
1.1.18	To resolve problem in the organisation.				WRS01LSC
1.1.19	To work easier.			WPM02L	WTD01LLABTECH
1.1.20	Employees giving support to grow the business.			WJN01LWD	
1.1.21	Works for the organisation.		WSR01LMNT		
1.1.22	To achieve flow and the vision.			WAM02L	
1.1.23	It assists to organise the workplace.				WAS01LMNT
1.1.24	To create awareness of how things should be done.			WMG01LGS	
1.1.25	To expand the organisation.		WGP01LFEXPP		
1.1.26	To cover all aspects of the total organisation.				WOV01LMNT
1.1.27	We followed a teamwork approach at the outset when the business was re-structured in 1997 to 1998. The lean thinking approach	WHR01LTM			

SP6Q1.1	Could you explain how and why this was done?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	encourages teamwork and people involvement and we believed that this would be a fundamental part of our restructuring process. The reason for believing so strongly in the process comes from an inherent belief that a consultative approach is the best way to effect radical and fundamental change. I guess it has to do with having been a management consultant for a number of years before my current involvement in this organisation.				

SP6Q1.2	In hindsight what and how will you do things differently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.1	Meet with line managers to improve the customer service.			WJM01L	
1.2.2	More training in development in all the keys.		WAC01L		
1.2.3	Nothing	WPP01LF WHS01LSLS, WAV01M, WCVDW01L	WHM01L, WBS01L, WAK01LIT, WAL01L,	WBK01L, WDC01L WBM02L, WNM01L	WSB01M, WAM01LBUYA WHB01LMNT, WAS01LMNT

SP6Q1.2	In hindsight what and how will you do things differently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WYE01SF, WWF01LSY, WJM01M, WPK01MSTK, WSR01LMNT, WAE01LDWG, WET01LSFTY, WES01SFCW, WKP01LSCR, WMW01SSHL, WAS02LF, WRM01L, WGP01LFEXPP, WLT01SPRA	WPM01L, WPM02L WTM01L, WJN01LWD WHM01LWD, WCM01LSCR, WMG01LGS WPM03L, WJN02LSCR, WPM04L	WEN01LMNT, WLN01LQC WNP01LDDES, WPDB01LDCOR, WTD01LLABTECH WEK01LMNT, WHD01LMNT
1.2.4	Small improvements, here and there.		WBM01L		
1.2.5	Integrate the structure.			WBK01S	
1.2.6	Have to think about it.		WJH01LWD	WRS02L	WGN01LQC WNH01LQC,
1.2.7	Do not know.		WAR01SSC		WDR01MNPROG
1.2.8	Improve the current technology.			WBS02L	
1.2.9	Increase capacity.			WFM01L	

SP6Q1.2	In hindsight what and how will you do things differently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.2.10	Would not purchase sites so far away from the organisation.	WKW01LSY			
1.2.11	Do more artisan training.	WRK01L			
1.2.12	Know who you employ.				WRB01LDR
1.2.13	Do it the same way but with more continuous improvement.				WRS01LSC
1.2.14	Will make sure that customers do not compete with manufacturing with imports.				WWB01LSLS
1.2.15	Extend the joint leadership meeting to include the workers.			WAM02L	
1.2.16	Resolve the issue of customer returns.			WMN01L	
1.2.17	Keep bonuses back until December. Higher educated people.				WSN01LQC
1.2.18	Top management to come down to the shop floor with words of encouragement.				WAM03LDCOR
1.2.19	Take one management level out.				WOV01LMNT
1.2.20	I believe there is always a better way, and hence our approach to continuously improve our business, However, I think that our organisation have achieved a unique model of combining organisational structure and behaviour with lean thinking	WHR01LTM			

SP6Q1.2	In hindsight what and how will you do things differently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	as an effective means of achieving world class levels of performance.				

SP6Q1.3	Can you identify the lean disciplines and techniques that have been implemented by way of teamwork in any form in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.1	Key one, cleaning and organising and key two, rationalising the system and managing by objectives, and key 13 eliminating waste, was heavily focused on by all the teams.		WET01LSFTY	WJM01L	
1.3.2	Key one, cleaning and organising and key two, rationalising the system and managing by objectives, time control and commitment and improving quality. Quick changeovers, improving methods, reducing inventory, multi-skilling, methods and conserving energy.		WAC01L, WHM01L WAE01LDWG WKP01LSCR WRM01L, WGP01LFEXPP	WJN01LWD WAM02L, WHM01LWD WCM01LSCR, WJN02LSCR WRS02L,	WLN01LQC, WNP01LDDES, WEK01LMNT

SP6Q1.3	Can you identify the lean disciplines and techniques that have been implemented by way of teamwork in any form in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.3	Cleaning and organising, key one main focus then work done on maintenance, key nine and eliminating waste.		WBS01L		WTD01LLABTECH
1.3.4	As per the mini business team.		WAK01LIT		
1.3.5	Problem-solving using the five why's Kanban and poke yoke.		WAL01L		
1.3.6	Cleaning and organising, quality, SOP's, visibility, team activities.		WYE01SF		
1.3.7	Cleaning and organising key one, Objectives key two, teamwork key three, reducing lead time to customer key four, quick changeovers key five, improving methods key six, quality, key8 coupled manufacturing, key nine , maintenance key nine and time control and commitment key 10.	WCVDW01L	WBM01L	WBK01L, WBS02L WDC01L, WPM01L WFM01L, WPM02L WTM01L, WPM03L	
1.3.8	No comment.		WMW01SSHL	WBK01S	WGN01LQC

SP6Q1.3	Can you identify the lean disciplines and techniques that have been implemented by way of teamwork in any form in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.9	Cleaning and organising main focus and objectives key three.	WPP01LF	WWF01LSY		WAM03LDCOR WDR01MNPROG,
1.3.10	Key one, cleaning and organising always and recently over the last three years key 11 quality.		WJM01M		
1.3.11	Five why's problem-solving, teamwork and continuous improvement.		WPK01MSTK WES01SFCW		
1.3.12	Key one cleaning and organising and mini business activities was the main focus.		WPP01LF, WAR01SSC		WRB01LDR, WAM01LBUYA, WWB01LSLS, WPDB01LDCOR,
1.3.13	Keys one to 14 but not key seven as follows: cleaning and organising; objectives; teamwork; reduce inventory and lead times; quick changeovers; methods improved; coupled manufacturing; maintenance; time disciplines; quality system; developing		WJH01LWD	WNM01L	

SP6Q1.3	Can you identify the lean disciplines and techniques that have been implemented by way of teamwork in any form in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	suppliers; reduce waste; empowering workers.				
1.3.14	In despatch cleaning and organising, teamwork, meeting the target, reducing waste.			WBM02L	
1.3.15	Teams' current focus is on key nine.				WSB01M
1.3.16	Cleaning and organising, goal alignment, time control and commitment, skills, and currently maintenance and quality.	WHS01LSLS		WPM04L	WSN01LQC
1.3.17	Cleaning and organising key one, goal alignment key two, teamwork key three, maintenance key nine, time control and commitment key 10, Quality key 11, eliminating waste key 13, empowering workers key 14 and production scheduling key 16.	WAV01M			
1.3.18	Do not know.	WKW01LSY			

SP6Q1.3	Can you identify the lean disciplines and techniques that have been implemented by way of teamwork in any form in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.19	Nine keys covering: cleaning and organising; developing standard operating procedures; goal alignment; teamwork; seven wastes; continues improvement; quality assurance; maintenance; time keeping; methods improvement and cycle time reduction.	WRK01L			WNH01LQC
1.3.20	Key one, cleaning and organising, key nine, maintenance and key 13 waste		WSR01LMNT		WRS01LSC, WHB01LMNT. WAS01LMNT
1.3.21	Cleaning and organising and maintenance.				WEN01LMNT, WHD01LMNT
1.3.22	In accounts cleaning and organising, teamwork, and multi-skilling.		WAS02LF		
1.3.23	Impact project focus in profiles on quick changeovers; teamwork and cleaning and organising.			WMN01L	

SP6Q1.3	Can you identify the lean disciplines and techniques that have been implemented by way of teamwork in any form in your organisation?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
1.3.24	In GS: cleaning and organising; teamwork; goals; standard operating procedures; waste reduction and quality (credit notes).			WMG01LGS	
1.3.25	Last two years the focus is on cleaning and organising, small group activities and teamwork, maintaining equipment, and quality.		WLT01SPRA		
1.3.26	Cleaning and organising, teamwork, goal alignment, maintenance and workplace discipline.				WOV01LMNT
1.3.27	As confirmed before, the fundamental keys are cleaning and organising teamwork and goal alignment which is achieved through cascading of goals down wards and coordinating and valuing feedback upwards, through the team sessions.	WHR01LTM			

SP6Q2	If teamwork was extensively utilised with your lean implementation programme, please explain what these teams are or were and.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1	Organisational development team working with all departments, focused on key one cleaning and organising.		WAL01L, WYE01SF WSR01LMNT,	WJM01L WBK01L,	WNH01LQC
2.2	Mainly small group activities by area and cross-functional teamwork with engineering and die manufacturing.		WAC01L WBM01L,		
2.3	Previous managing director and current managing director formed a cross-functional team. Currently there is a team working on mini business activities and key one, cleaning and organising.		WHM01L, WBS01L WWF01LSY,	WBK01S	
2.4	Cannot remember.		WAK01LIT		
2.5	No comment		WJM01M, WAR01SSC	WFM01L	WSB01M WWB01LSLS, WPDB01LDCOR,
2.6	First line managers trained by training department, came from training and commenced with keys implementation.		WPK01MSTK		
2.7	The commencement of the 20 keys came three years after the new managing director	WPP01LF	WJH01LWD		

SP6Q2	If teamwork was extensively utilised with your lean implementation programme, please explain what these teams are or were and.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	started and after the structural changes had occurred. He utilised consultants plus the top team plus middle management to help implement the 20 keys, Finance team focus on key one cleaning and organising.				
2.8	Not sure but key one cleaning and organising was main focus please keys that made changes possible, Key 10 and 11 was also emphasised.			WBS02L	
2.9	The training department or organisational development department, which was established after the previous managing director took over the organisation.		WET01LSFTY WES01SFCW WKP01LSCR	WDC01L WJN01LWD, WAM02L, WAM02L WHM01LWD,	WRS01LSC, WAM03LDCOR
2.10	The mini business teams was formed to implement the keys.	WAV01M		WBM02L	
2.11	The organisational development department and the top team.	WHS01LSLS			WHB01LMNT WEN01LMNT,
2.12	The previous managing director, the current managing director and the unit manager	WCVDW01L	WAE01LDWG, WAS02LF,	WNM01L, WPM01L,	WHD01LMNT

SP6Q2	If teamwork was extensively utilised with your lean implementation programme, please explain what these teams are or were and.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	organisational development implemented the twenty keys.		WRM01L, WGP01LFEXPP,	WPM02L WTM01L, WMN01L WPM03L, WRS02L WPM04L,	
2.13	Do not know.	WKW01LSY	WMW01SSHL WLT01SPRA,	WCM01LSCR, WVG01LGS, WJN02LSCR	WAM01LBUYA WWB01LSLS, WAS01LMNT, WLN01LQC, WNP01LDDES WSN01LQC, WTD01LLABTECH WGN01LQC, WEK01LMNT WDR01MNPROG,
2.14	The top team plus operations managers plus outside consultants implemented the 20 keys.	WRK01L			

SP6Q2	If teamwork was extensively utilised with your lean implementation programme, please explain what these teams are or were and.....	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.15	The top management team implemented the 20 keys.				WRB01LDR
2.16	Was informed that it was the previous managing director.				WOV01LMNT
2.17	At the outset, we utilised consultants and I was part of that team of consultants. Since the major changes, we are coordinating our efforts and activities utilising our business development team, who act as champions for the 20 keys. The established management team also acted as implementation teams of the 20 keys. Current focus is on quality and maintenance continuous improvement. There is also a consistent drive and project to continuously improve on our emissions quality towards protecting the environment.	WHR01LTM			

SP6Q2.1	.....what their respective roles and responsibilities are or were?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1.1	The organisational development department made sure that employees are trained and that things are being done, for example, checking for maintenance and equipment etc.		WAE01LDWG WAS02LF WRM01L	WJM01L	WHD01LMNT
2.1.2	The training department team members represented their respective tasks and functions.		WAC01L,		
2.1.3	The roll of the organisational development team was one of training, coaching, developing, providing coordination and assuring the relevant implementations of the keys. Focus on measurement and goal alignment, quality management and continuous improvement. Outside training arranged as and when required.		WHM01L WBS01L, WET01LSFTY, WES01SFCW, WKP01LSCR, WGP01LFEXPP,	WBK01L, WMN01L, WPM03L	WHB01LMNT WNH01LQC,
2.1.4	The people implementing the keys were focused on continuous improvement.		WAK01LIT		
2.1.5	The organisational development team worked on the basis of their respective tasks and functions at the time.		WAL01L, WWF01LSY	WBM02L	

SP6Q2.1	.....what their respective roles and responsibilities are or were?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1.6	The previous managing director and current managing director formed a cross-functional team to implement keys. The area teams developed and improved picking, loading. The local, coastal and despatch team developed into effective teams		WBM01L		
2.1.7	The cross-functional team formed by the previous managing director and current managing director was focused on continuous improvement.			WBK01S	
2.1.8	Too new to the organisation to comment.		WJM01M, WAR01SSC, WMW01SSHL, WLT01SPRA,		WSB01M
2.1.9	The organisational development team, Implemented the keys through training and providing new learning with the respective mini business management teams.	WHS01LSLS	WY01SF WSR01LMNT		WAM03LDCOR,
2.1.10	Their role of the consultants implementing the keys was to get the organisation cleaned up and organised in all the areas	WPP01LF	WJH01LWD		

SP6Q2.1	.....what their respective roles and responsibilities are or were?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	and to get all the people involved in taking responsibility for their respective areas. Impact projects were planned and implemented with employee involvement to achieve effective change.				
2.1.11	Not sure.			WBS02L WFM01L, WVG01LGS	WAM01LBUYA WWB01LSLS, WLN01LQC WAS01LMNT, WNP01LDDES, WEK01LMNT
2.1.12	The main focus of the established training department formed by the new managing director after 2000, was cleaning and organising.			WDC01L	
2.1.13	The mini business teams operate under the leadership of the first line manager and they implement the keys in terms of allocated tasks by function.	WAV01M		WAM02L	
2.1.14	The previous managing director and the unit manager business development			WNM01L WPM02L, WTM01L	

SP6Q2.1	.....what their respective roles and responsibilities are or were?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	implemented the keys through impact projects throughout the organisation.				
2.1.15	The previous managing director, the current managing director and the unit manager organisational development worked at restructuring the organisation. Initially impact projects were utilised.			WPM01L, WPM04L	
2.1.16	Do not know	WKW01LSY		WCM01LSCR WJN02LSCR,	WAM01LBUYA WSN01LQC, WPDB01LDCOR, WTD01LLABTECH WGN01LQC, WEK01LMNT WDR01MNPROG, WOV01LMNT
2.1.17	The top team plus operations managers acted as mentors and facilitators for the mini business team meetings who was given the task to implement the relevant keys. Key one, cleaning and organising was initially focussed on.	WRK01L		WHM01LWD	

SP6Q2.1	.....what their respective roles and responsibilities are or were?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.1.18	Delegated what had to be done to the operations and first line managers who were running the mini business team meetings. First line managers were developed.	WCVDW01L		WRS02L	WRB01LDR
2.1.19	The organisational development department set out to resolve issues and to drive the keys' implementation.			WJN01LWD	WRS01LSC
2.1.20	The organisational development department focused on training and development of employees plus coaching for better cooperation between operators and maintenance.				WEN01LMNT
2.1.21	As consultants, we formed team with employees and conducted impact projects to gain quick and effective turnaround of the business. The major focus was on cleaning and reorganising the business and to achieve the business targets that had been set to achieve the required output levels of aluminium extrusion demand.	WHR01LTM			

SP6Q2.2	Did these teams participate in lean implementation regarding disciplines and techniques?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.2.1	Yes all the departmental and area teams focussed on cleaning and organising and objectives.			WJM01L, WDC01L, WBM02L, WHM01LWD	
2.2.2	The twenty keys were and still is, being implemented and utilised in the small group activities taking place every morning.		WAC01L		
2.2.3	The main team focused on coordination driving mainly key one cleaning and organising and also applicable keys to the area.		WHM01L WAL01L, WKP01LSCR	WJN01LWD	
2.2.4	Yes the initial focus by the consultant was key one cleaning and organising with setting targets, emphasising small group activities, maintenance, time control, quality and saving energy.	WPP01LF	WBS01L WAK01LIT, WJH01LWD	WBK01L, WBS02L	
2.2.5	Mainly cleaning and organising to give people responsibility but also quality and small group activities.		WYE01SF		
2.2.6	Yes through the mini business teams that had been developed.		WBM01L		

SP6Q2.2	Did these teams participate in lean implementation regarding disciplines and techniques?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.2.7	Yes to implement relevant keys.		WWF01LSY, WPK01MSTK, WSR01LMNT, WAE01LDWG, WES01SFCW, WAS02LF, WRM01L, WGP01LFEXPP	WBK01S, WBS02L WTM01L, WAM02L WPM03L, WRS02L	WHB01LMNT, WEN01LMNT,
2.2.8	Too new to comment		WJM01M, WAR01SSC, WMW01SSHL, WLT01SPRA,	WFM01L	WSB01M
2.2.9	The top team and the organisational development team focused on impact projects to implement applicable keys by unit and area.	WHS01LSLS		WPM02L, WPM04L	
2.2.10	The mini business teams all participate in the implementation of the keys.	WAV01M			
2.2.11	Yes The previous managing director and the unit manager business development implemented the keys through impact			WNM01L WMN01L,	WHD01LMNT

SP6Q2.2	Did these teams participate in lean implementation regarding disciplines and techniques?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	projects throughout the organisation. They trained demonstrated and delegated.				
2.2.12	Yes the focus of the previous managing director, current managing director and the unit manager organisational development was to implement 10 to 11 keys.	WCVDW01L		WPM01L	
2.2.13	Do not know.	WKW01LSY		WCM01LSCR, WVG01LGS, WJN02LSCR,	WAM01LBUYA, WWB01LSLS, WAS01LMNT, WLN01LQC, WNP01LDDES, WSN01LQC WPDB01LDCOR, WTD01LLABTECH WGN01LQC, WEK01LMNT WDR01MNPROG, WOV01LMNT
2.2.14	The top team and operations managers implemented the keys through the mini	WRK01L			

SP6Q2.2	Did these teams participate in lean implementation regarding disciplines and techniques?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	business teams. Unit and operations managers acted as team mentors.				
2.2.15	Cleaning and organising, maintenance and time keeping and commitment.				WRB01LDR
2.2.16	Yes the organisational development team members visited the shop floor to show how it should be done.		WET01LSFTY		WRS01LSC WAM03LDCOR, WNH01LQC
2.2.17	As consultant, we led the respective teams by example, demonstrating at shop floor level what it meant to have a clean and organised workplace. A key that was fundamental, was to achieve quick changeovers of less than three minutes given the discrete nature of the product mix. We also realised and understood the techniques required to achieve continuous flow. In this regard, we based our flow lines on global best practises.	WHR01LTM			

SP6Q2.3	Specifically which lean techniques have featured prominently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.3.1	Encouraging continuous improvement with neatness and rewarding employees with certificates.		WAC01L WHM01L,	WJM01L	
2.3.2	Mainly key one cleaning and organising with teamwork, setting targets, emphasising small group activities, maintenance, time control, quality and saving energy.	WPP01LF	WBS01L WAK01LIT, WAL01L, WYE01SF WJH01LWD, WET01LSFTY	WBS02L	
2.3.3	Cleaning and organising key one, Objectives key two, teamwork key three, reducing lead time to customer key four, quick changeovers key five, reducing inventory, improving methods key six, quality focus key 11, maintenance key nine and time control and commitment key 10, key 15 multi-skilling. Key20 technology.	WCVDW01L	WBM01L, WAS02LF WRM01L WGP01LFEXPP,	WBK01L, WPM02L WTM01L, WJN01LWD WAM02L, WPM04L	
2.3.4	Do not know.	WKW01LSY	WWF01LSY	WBK01S WFM01L, WCM01LSCR WMG01LGS, WJN02LSCR	WAM01LBUYA, WWB01LSLS, WAS01LMNT, WLN01LQC WNP01LDDES,

SP6Q2.3	Specifically which lean techniques have featured prominently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
					WSN01LQC WPDB01LDCOR, WTD01LLABTECH WGN01LQC, WEK01LMNT WDR01MNPROG, WOV01LMNT
2.3.5	Too new to comment		WJM01M, WAR01SSC, WLT01SPRA		WSB01M
2.3.6	Last five years. the five whys technique was implemented with renewed emphasis on key one		WPK01MSTK		
2.3.7	Main focus was on cleaning and organising the factory.		WSR01LMNT WAE01LDWG WKP01LSCR WMW01SSHL	WDC01L, WHM01LWD, WPM03L WRS02L,	WAM03LDCOR
2.3.8	In despatch mainly key one cleaning and organising, teamwork, and eliminating waste.			WBM02L	
2.3.9	Top team focus was on impact projects to clean up the organisation, achieve quick	WHS01LSLS			

SP6Q2.3	Specifically which lean techniques have featured prominently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	changeovers, reduce lead time to improve customer service				
2.3.10	Mini business teams focus on organising and cleaning, allocated goals, teamwork, maintenance checks, time keeping and quality assurance system.	WAV01M			
2.3.11	The previous managing director and the unit manager business development implemented the keys through impact projects throughout the organisation and all the keys were in trained.			WNM01L	
2.3.12	The top 11 keys were focused on by the previous and current managing director and the unit manager business development.			WPM01L	
2.3.13	Nine keys as follows: cleaning and organising; developing standard operating procedures; goal alignment; teamwork; seven wastes; continues improvement; quality assurance; maintenance; methods improvement and cycle time reduction.	WRK01L			WNH01LQC

SP6Q2.3	Specifically which lean techniques have featured prominently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.3.14	Key one cleaning and organising, maintain equipment, key nine and time keeping and commitment.				WRB01LDR
2.3.15	In scrap and bailing to focus is on key one cleaning and organising and key nine maintenance.				WRS01LSC
2.3.16	The organisational development team focused on cleaning and organising and methods utilising problem-solving and continuous improvement.		WES01SFCW		
2.3.17	In maintenance mainly key nine and key one cleaning and organising.				WHB01LMNT WEN01LMNT, WHD01LMNT
2.3.18	Impact project focus of getting quick changeovers in profiles. Also teamwork and cleaning and organising.			WMN01L,	
2.3.19	Fundamental was teamwork, organising and cleaning and goal alignment, followed by the techniques to achieve continuous flow. Quick changeovers of less than three minutes have been achieved in all our business units, with few exceptions such as	WHR01LTM			

SP6Q2.3	Specifically which lean techniques have featured prominently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	powder coating where change-overs take up to twenty minutes for colour changes. Inventories have been effectively reduced with our make to customer order policy.				

SP6Q2.4	Could you expand on how and why these techniques have featured prominently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.4.1	To get the organisation cleaned up and reorganised, to work better. To reduce waste and achieve time savings. To allocate responsibilities.		WET01LSFTY WMW01SSHL WRM01L	WJM01L, WBM02L WPM02L, WPM03L WRS02L,	WAM03LDCOR, WNH01LQC WHD01LMNT,
2.4.2	Team working cross-functionally on die design to improve product and die designs.		WAC01L		
2.4.3	Cultivate ownership, change the mind-set of people, and get people involved in teamwork and take on new responsibilities.		WHM01L WYE01SF, WPK01MSTK WAE01LDWG WKP01LSCR	WHM01LWD	
2.4.4	To reorganise the business and to achieve the vision of one day delivery.		WBS01L		

SP6Q2.4	Could you expand on how and why these techniques have featured prominently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.4.5	To obtain quick access to information.		WAK01LIT		
2.4.6	Spin offs for continuous improvement of the organisation.		WAL01L		
2.4.7	To improve flow and to achieve the vision.		WBM01L	WBK01L,	
2.4.8	To initiate the process, to achieve continuous improvement and flow.	WCVDW01L		WBK01S	
2.4.9	Do not know.		WWF01LSY	WFM01L WCM01LSCR, WVG01LGS, WJN02LSCR	WAM01LBUYA, WWB01LSLS, WAS01LMNT, WLN01LQC WNP01LDDES, WSN01LQC, WPDB01LDCOR, WTD01LLABTECH WGN01LQC, WEK01LMNT WDR01MNPORG, WVO01LMNT
2.4.10	Too new to comment	WKW01LSY	WJM01M, WAR01SSC, WLT01SPRA		WSB01M
2.4.11	To change the mind- set of the employees.	WPP01LF		WDC01L	

SP6Q2.4	Could you expand on how and why these techniques have featured prominently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.4.12	To change the organisation around. To achieve the targets set.		WJH01LWD WAS02LF WGP01LFEXPP,	WBS02L WTM01L, WAM02L	
2.4.13	To achieve improved productivity and customer service.	WHS01LSLS	WSR01LMNT		
2.4.14	Cleaning and organising, plus goal alignment plus teamwork provides the foundation for the lean process.	WAV01M			
2.4.15	To clean up and improve the organisation.			WNM01L	WRB01LDR, WRS01LSC
2.4.16	To improve the skills of the organisation.			WPM01L	
2.4.17	To establish a quality drive organisation and to establish team responsibilities.	WRK01L			
2.4.18	To establish a practical and easier way of working and to assess progress.			WJN01LWD WPM04L,	
2.4.19	To achieve vision, quality, and 35 day turn-around of inventory.		WES01SFCW		
2.4.20	To improve the maintenance of plant and equipment.				WHB01LMNT, WEN01LMNT
2.4.21	Profile impact projects to reap quick benefits.			WMN01L	

SP6Q2.4	Could you expand on how and why these techniques have featured prominently?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
2.4.22	To achieve world class levels of performance, the keys of cleaning and organising, teamwork and goal alignment are the pillars for a platform from where we implemented the keys to achieve continuous flow, which in turn could only have been achieved with sequential arranging of manufacturing facilities, eliminating cross flows, achieving quick change-overs and establishing an organisational structure which were able to effectively deal with a make to order policy.	WHR01LTM			

SP6Q3	Are the teams operating in manufacturing cells self-directing in terms of achieving flow and pull?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.1	Yes since each person has clear cut responsibilities.			WJM01L	
3.2	Not fully yet.	WKW01LSY WRK01L, WCVDW01L	WAC01L, WHM01L, WBS01L, WBM01L,	WBK01L, WBS02L WDC01L, WJN01LWD	WSB01M WRB01LDR, WWB01LSLS, WHB01LMNT

SP6Q3	Are the teams operating in manufacturing cells self-directing in terms of achieving flow and pull?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WWF01LSY, WGP01LFEXPP	WMN01L, WRS02L WPM04L,	WAS01LMNT, WHD01LMNT, WOV01LMNT
3.3	Do not know.		WAK01LIT WAR01SSC,		
3.4	No	WPP01LF, WHS01LSLS WAV01M,	WAL01L, WPK01MSTK, WJH01LWD, WSR01LMNT, WAE01LDWG, WET01LSFTY, WES01SFCW, WKP01LSCR, WMW01SSHL, WAS02LF, WRM01L, WLT01SPRA,	WBK01S WBM02L, WNM01L, WPM01L WFM01L, WPM02L WTM01L, WAM02L WHM01LWD, WCM01LSCR WMG01LGS, WPM03L WJN02LSCR,	WAM01LBUYA, WRS01LSC, WEN01LMNT, WLN01LQC WNP01LDDES, WSN01LQC WPDB01LDCOR, WTD01LLABTECH WGN01LQC, WAM03LDCOR WNH01LQC, WEK01LMNT WDR01MNPROG,
3.5	Yes but they still have managers over seeing.		WYE01SF		

SP6Q3	Are the teams operating in manufacturing cells self-directing in terms of achieving flow and pull?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
3.6	This has been discussed before. Our first-line managers are leading substantially empowered teams that man manufacturing cells or flow lines and the cells operate as mini business units. We believe that this structure was key towards achieving the business performance levels we currently have.	WHR01LTM			

SP6Q4	Are you able to provide examples of lean techniques being applied to cellular manufacturing such as:	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
	Blank see answers below.				

SP6Q4.1	Taguchi;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.1.1	Discussions and cross-functional team meeting regarding improved die design.		WAC01L	WJM01L	

SP6Q4.1	Taguchi;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.1.2	Three D design approach has been used introducing new and updated technology to the die manufacturing process.		WHM01L		
4.1.3	Do not know.	WHS01LSLS WKW01LSY, WRK01L WCVDW01L,	WBS01L WYE01SF, WBM01L, WWF01LSY WJM01M, WPK01MSTK, WPP01LF, WJH01LWD, WAR01SSC, WSR01LMNT, WAE01LDWG, WET01LSFTY WES01SFCW, WKP01LSCR WMW01SSHL, WAS02LF, WRM01L, WGP01LFEXPP, WLT01SPRA	WBK01L, WBK01S WDC01L, WBM02L, WNM01L, WPM01L, WFM01L, WPM02L WTM01L, WJN01LWD WAM02L, WHM01LWD WCM01LSCR, WMG01LGS WMN01L, WPM03L, WJN02LSCR, WRS02L, WPM04L,	WSB01M, WRB01LDR, WAM01LBUYA, WRS01LSC, WWB01LSLS WHB01LMNT, WAS01LMNT, WEN01LMNT, WLN01LQC WNP01LDDES, WSN01LQC WPDB01LDCOR, WTD01LLABTECH, WGN01LQC, WAM03LDCOR, WNH01LQC, WEK01LMNT WDR01MNPORG,

SP6Q4.1	Taguchi;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
					WHD01LMNT WOV01LMNT,
4.1.4	Developed software for quality management system.		WAK01LIT		
4.1.5	New self-cleaning paint gun technology.		WAL01L,		
4.1.6	Standard operating procedures helped with design quality and process.			WBS02L	
4.1.7	To some extent with systems design interacting with manufacturing.	WAV01M			
4.1.8	We have developed software that work like Taguchi. This is a computer aided design package that accounts for product tolerances and process capability.	WHR01LTM			

SP6Q4.2	cycle time reduction;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.2.1	Do not know.		WBS01L, WAK01LIT WYE01SF, WWF01LSY WPK01MSTK,	WJM01L, WBM02L, WPM01L WFM01L, WMG01LGS	WSB01M, WAM01LBUYA WRS01LSC, WWB01LSLS, WLN01LQC,

SP6Q4.2	cycle time reduction;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WAR01SSC, WSR01LMNT, WAE01LDWG, WET01LSFTY, WES01SFCW, WMW01SSHL, WAS02LF, WGP01LFEXPP		WPDB01LDCOR, WAM03LDCOR
4.2.2	To some extent example of improved technology, modifying presses and heaters on extrusion presses. Also increasing the speed of presses. Utilising rollers		WAC01L	WBS02L WNM01L, WPM02L WTM01L, WHM01LWD WMN01L, WRS02L	WGN01LQC, WNH01LQC WEK01LMNT,
4.2.3	Improved technology of CNC back milling and machining.		WHM01L	WBK01L,	WNP01LDDES WDR01MNPROG,
4.2.4	One day delivery with manual powder coating lines.		WAL01L	WDC01L	
4.2.5	Improved cutting jigs and saw settings.		WBM01L		
4.2.6	Busy with a project to improve flow in anodising.			WBK01S	

SP6Q4.2	cycle time reduction;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.2.7	Presses speeded up in profiles.	WHS01LSLS, WRK01L	WJM01M WJH01LWD, WRM01L	WJN01LWD	WHB01LMNT
4.2.8	Accounts now take three days and used to take eight.	WPP01LF			
4.2.9	Focused on continuously through continuous improvement Kaizen. Many achievements and also international standards followed	WAV01M			
4.2.10	Has been applied in all the manufacturing processes utilising continuous improvement.	WKW01LSY WCVDW01L,			
4.2.11	Cycle time reduced with improved die design.				WRB01LDR
4.2.12	Back milling of die reduced die manufacturing cycle times.			WAM02L	
4.2.13	Automatic loading of bailing machine previously loaded by a forklift.		WKP01LSCR		
4.2.14	More jigs per cycle in powder coating.				WAS01LMNT WHD01LMNT,
4.2.15	Improved loading of furnaces let to more melts per shift being achieved.				WEN01LMNT

SP6Q4.2	cycle time reduction;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.2.16	Conveyer for sorting reduced sorting time.			WCM01LSCR	
4.2.17	Improved jig designs for anodising to increase through-put.			WPM03L	WOV01LMNT
4.2.18	Adjust speed of scrap bailing machine.			WJN02LSCR	
4.2.19	Using better heaters and hollow dies on profiles lines.				WSN01LQC
4.2.20	Nothing last two years.		WLT01SPRA		
4.2.21	Improved delivery with night shift loading of trucks.				WTD01LLABTECH
4.2.22	Optimised jigging in anodising.			WPM04L	
4.2.23	We have reduced run times on extrusion presses utilising latest technology heating and hydraulic pumping methodology. We have focused on ergonomic factors regarding placement of tooling required to effect efficient flow and changeovers.	WHR01LTM			

SP6Q4.3	One-piece flow;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.3.1	Do not know.		WAC01L, WBS01L,	WJM01L, WBK01L,	WSB01M WRB01LDR,

SP6Q4.3	One-piece flow;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WAK01LIT, WYE01SF, WJM01M WPK01MSTK, WAR01SSC, WAE01LDWG, WET01LSFTY, WES01SFCW, WMW01SSHL, WAS02LF, WRM01L, WGP01LFEXPP,	WBS02L WBM02L, WNM01L WPM01L, WFM01L WJN01LWD, WAM02L, WHM01LWD WCM01LSCR, WMG01LGS WPM03L, WJN02LSCR, WRS02L	WAM01LBUYA, WWB01LSLS WRS01LSC, WHB01LMNT, WEN01LMNT, WNP01LDDES WSN01LQC, WPDB01LDCOR, WTD01LLABTECH, WGN01LQC, WAM03LDCOR WNH01LQC, WEK01LMNT WDR01MNPROG,
4.3.2	Not yet.	WKW01LSY	WHM01L		
4.3.3	New self-cleaning gun achieve this.		WAL01L, WWF01LSY	WDC01L	WHD01LMNT
4.3.4	Improved cutting and jigs have made one-piece flow possible.		WBM01L		WLN01LQC
4.3.5	Implemented in anodising plant by means of fixtures.			WBK01S	

SP6Q4.3	One-piece flow;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.3.6	Not really applicable because the organisation makes to order.	WPP01LF WHS01LSLS,	WJH01LWD		WAS01LMNT
4.3.7	Do not agree with this technique.	WAV01M			
4.3.8	Not used. Not applicable	WRK01L WCVDW01L,	WSR01LMNT WKP01LSCR	WPM02L WTM01L, WMN01L	
4.3.9	Fully implemented for anodising continuous flow.			WPM04L	WOV01LMNT
4.3.10	We seldom get one-piece orders, however our ability to do change-overs of less than three minutes, enables us to achieve one-piece flow. We achieve one customer order flow with our make to order policy. We achieve one day delivery between business units and three day delivery on customer orders	WHR01LTM			

SP6Q4.4	Kanban;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.4.1	See it on the manufacturing cells, working like a chain.			WJM01L	

SP6Q4.4	Kanban;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.4.2	Do not know.		WAC01L WHM01L, WBS01L, WAK01LIT WYE01SF, WBM01L, WWF01LSY, WJM01M, WPK01MSTK, WAR01SSC, WAE01LDWG, WET01LSFTY, WES01SFCW, WKP01LSCR, WMW01SSHL, WAS02LF WGP01LFEXPP,	WBK01L, WBK01S, WPM01L, WFM01L, WJN01LWD, WAM02L, WHM01LWD, WCM01LSCR WMG01LGS, WJN02LSCR	WSB01M, WRB01LDR, WAM01LBUYA, WWB01LSLS, WRS01LSC, WEN01LMNT, WLN01LQC, WNP01LDDES, WPDB01LDCOR, WAM03LDCOR WDR01MNPORG, WHD01LMNT
4.4.3	Working like this together with receiving. Using skips.		WAL01L	WDC01L	
4.4.4	Not really used accept with the billets section.	WPP01LF WHS01LSLS, WAV01M	WJH01LWD, WSR01LMNT,	WBS02L WNM01L, WPM02L	WSN01LQC WNH01LQC, WEK01LMNT

SP6Q4.4	Kanban;	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
		WRK01L, WCVDW01L	WRM01L, WLT01SPRA,	WTM01L, WMN01L WRS02L,	
4.4.5	See it in some warehouses.			WBM02L	
4.4.6	Do not use.	WKW01LSY	WLT01SPRA		WGN01LQC
4.4.7	Used in manufacturing cells.				WHB01LMNT
4.4.8	Powder coating skips before and after the flow line.				WAS01LMNT WTD01LLABTECH,
4.4.9	Skips utilised in anodising.			WPM03L	WPM04L WOV01LMNT,
4.4.10	We do not employ a card system, but we have visual Kanban between re-melt and extrusions and we utilise skips between extrusions and anodising and powder coating.	WHR01LTM			

SP6Q4.5	SMED	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.5.1	Being achieved, but some set-up take more than fifteen minutes.			WJM01L	WTD01LLABTECH

SP6Q4.5	SMED	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.5.2	Fully achieved with die manufacture.		WAC01L	WBK01L, WAM02L	WNP01LDDES
4.5.3	85% achieved.in die manufacturing		WHM01L		
4.5.4	Do not know.		WBS01L, WAK01LIT, WYE01SF, WWF01LSY, WAR01SSC, WET01LSFTY, WES01SFCW, WMW01SSHL, WAS02LF WGP01LFEXPP,	WBM02L, WHM01LWD WCM01LSCR, WMG01LGS WPM03L, WJN02LSCR, WRS02L	WSB01M, WRB01LDR, WAM01LBUYA WRS01LSC, WWB01LSLS WEN01LMNT, WPDB01LDCOR, WAM03LDCOR WDR01MNPROG, WHD01LMNT
4.5.5	Achieving less than twenty minutes to avoid contamination of product.		WAL01L	WDC01L	WLN01LQC
4.5.6	Not totally achieved.		WBM01L		
4.5.7	Fully achieved for anodising.			WBK01S, WFM01L	WPM04L WOV01LMNT,
4.5.8	Fully achieved for profiles press changeovers under three minutes. With hot seat changeovers the press does not stop. Dead cycle reduced.	WHS01LSLS, WKW01LSY, WRK01L	WJM01M, WPK01MSTK, WSR01LMNT, WAE01LDWG,	WBS02L, WNM01L WPM02L, WTM01L	WHB01LMNT, WSN01LQC, WGN01LQC,

SP6Q4.5	SMED	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WRM01L, WLT01SPRA	WJN01LWD, WMN01L	WNH01LQC, WEK01LMNT
4.5.9	Fully achieved for the organisation but at less than 15 minutes.	WPP01LF, WCVDW01L	WJH01LWD	WPM01L	
4.5.10	Fully achieved for profiles.	WAV01M			
4.5.11	Not applicable to scrap and bailing.		WKP01LSCR		
4.5.12	Powder coating has achieved 15 minutes changeovers.				WAS01LMNT
4.5.13	This was a fundamental key to achieve effective flow in all our manufacturing plants. We have achieved less than three minute change-overs for extrusions and less than twenty minutes for powder coating. Anodising changeovers takes seconds one product to the next.	WHR01TTM			

SP6Q4.6	Poka-yoke and Jidoka; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.6.1	Do not know.	WPP01LF, WHS01LSLS	WBS01L, WAK01LIT, WPK01MSTK,	WJM01L WBS02L, WDC01L	WSB01M, WRB01LDR, WAM01LBUYA

SP6Q4.6	Poka-yoke and Jidoka; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
		WKW01LSY, WRK01L	WYE01SF, WBM01L, WWF01LSY, WJM01M, WAR01SSC, WSR01LMNT, WAE01LDWG, WET01LSFTY, WES01SFCW, WMW01SSHL, WAS02LF, WRM01L, WGP01LFEXPP, WLT01SPRA,	WBM02L, WPM02L WTM01L, WJN01LWD WAM02L, WHM01LWD WCM01LSCR, WMG01LGS WMN01L, WPM03L WJN02LSCR, WRS02L WPM04L,	WRS01LSC, WWB01LSLS, WHB01LMNT WAS01LMNT, WEN01LMNT WSN01LQC, WPDB01LDCOR, WGN01LQC WAM03LDCOR, WNH01LQC WEK01LMNT, WDR01MNPORG WHD01LMNT,
4.6.2	Not yet.	WCVDW01L, WHR01LTM	WAC01L WJH01LWD,	WBK01S, WNM01L, WPM01L WFM01L,	WLN01LQC WNP01LDDES, WTD01LLABTECH, WOV01LMNT
4.6.3	CNC. Machines stop automatically when tool breaks.		WHM01L	WBK01L,	
4.6.4	Baking ovens provided with alarm system.		WAL01L		
4.6.5	Still very limited for the organisation.	WAV01M			

SP6Q4.6	Poka-yoke and Jidoka; and	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.6.6	Not applicable to scrap and bailing.		WKP01LSCR		
4.6.7					

SP6Q4.7	Heijunka?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
4.7.1	Do not know.	WPP01LF WHS01LSLS, WAV01M WKW01LSY, WRK01L	WBS01L, WAK01LIT, WJH01LWD, WAL01L, WYE01SF, WBM01L, WWF01LSY, WJM01M, WPK01MSTK, WAR01SSC, WSR01LMNT, WET01LSFTY, WES01SFCW, WMW01SSHL, WAS02LF, WRM01L,	WJM01L, WBK01L, WBK01S, WBS02L WDC01L, WBM02L WNM01L, WPM01L WFM01L, WPM02L WTM01L, WJN01LWD WAM02L, WHM01LWD WCM01LSCR, WGM01LGS	WSB01M WRB01LDR, WAM01LBUYA WRS01LSC, WWB01LSLS, WHB01LMNT WAS01LMNT, WEN01LMNT, WLN01LQC, WNP01LDDES WSN01LQC, WPDB01LDCOR, WTD01LLABTECH WGN01LQC, WAM03LDCOR WNH01LQC,

SP6Q4.7	Heijunka?	Grouped responses by organisational level			
		Senior	Middle	Operational	Non-management
			WGP01LFEXPP, WLT01SPRA	WMN01L, WPM03L, WJN02LSCR WRS02L,	WEK01LMNT WDR01MNPROG,
4.7.2	Yes scheduling in the die shop.		WAC01L		
4.7.3	Not applicable make to order and scrap and bailing continuous to one process.	WCVDW01L	WWH01L WKP01LSCR		
4.7.4	Full make to order flow achieved for anodising.			WPM04L	WOV01LMNT
4.7.5	Fully make to order for powder coating.				WHD01LMNT
4.7.6	We achieve level scheduling by making to customer order.	WHR01LTM			

APPENDIX L - GATHERED DATA FROM APPENDIX A

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	SM	SM	SM	SM	SM	SM	MM	MM	MM	MM
	DF01S	LV01L	BK01S	PC01L	RM01SE	CJ01SEN	SM01S	AS01M	MM01L	BD01SS
Hoshin Kanri and strategic planning	3	2	2.5	0.7	3.2	0.2	3	3.33	1	1.7
Policy deployment	3	2.67	3.67	1.7	3.7	0	2.5	4	2.3	2
Value defined from customer viewpoint	3	3.33	2.17	1	3.7	0.3	3.33	3.67	1.2	1.3
Seven Wastes identified for the total organisation	4	2.67	3.33	1.7	2.3	0	4	4	1.3	2.3
Problem-solving	3.33	3.33	4	0.7	3.3	0	3.33	3.67	0.3	1
Kaizen or continuous improvement	3.9	3	3.54	2	3.7	0.5	3.64	2.72	3.2	2.6
Five S or continuously neat organisation	3.7	2.75	2.71	3.7	2.6	1.1	3.3	3	2	3

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Taguchi or design quality into the product	3	3.5	3.75	2	1.8	0.8	2.75	2.5	0.3	2.8
Cycle time reduction	2.4	2.2	3.6	1.2	3.2	1	3.4	2	0.4	2.2
SMED or one digit exchange of die	3.2	1	1.6	1.4	2	0.8	1.6	1.2	0.4	0.4
Value stream mapping	2.78	1.89	1.75	0.8	2	0.4	3.5	1.22	0.3	0.6
Cellular manufacturing	3	1.2	2.2	1.2	0	0.4	1	1.6	0.4	0.4
One-piece flow	1.75	0.75	1.2	1	0	1	1	2	0.5	0
Poka-yoke and Jidoka or mistake proofing and automatic inspection	0.67	1.33	1.4	1.2	0.6	0.8	1	1.83	0.8	0
Kanban or pull production control	1	1.4	0.71	0	1.2	0.6	1	1.8	0.2	0

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Heijunka or level production scheduling	1	0.75	1	0	0	0.7	0.5	1.33	0	0
Visual Management	3	1.8	3.8	2.8	1.2	1.8	3.6	2.6	2	2.4
Total productive maintenance	1.5	1.4	2	0.3	0	0.8	0.71	2.17	1.20	0
Standard work	2	1.5	3.5	2	2.2	1	3.5	2.17	0.7	1.8
Teamwork and total employee involvement	2.6	0.875	2.57	1	2.1	0.3	2.71	2.57	0.1	0.9

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	MM	MM	OM	OM	OM	OM	OM	OM	OM	OM
	SR01LF	JH01L	PP01M	MM01S	JC01L	ZB01S	JL01S	MM01M	HM01S	TN01S
Hoshin Kanri and strategic planning	3.5	4	1.3	2	1.67	3.50	3	2.8	2.2	1.5
Policy deployment	4	2.3	2	4	1.67	3.67	3.33	3.3	2.7	2

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Value defined from customer viewpoint	3.2	3	1.5	3	1.5	3.5	3.17	3.2	1.7	2.5
Seven Wastes identified for the total organisation	4	2	2.3	3	0.67	2	3	3	3	3
Problem-solving	3.3	1.7	1	3	3.67	3.67	3.33	2	0.3	2.3
Kaizen or continuous improvement	3.8	2.5	1.6	3.36	1.81	2.29	3	3.9	2.9	2.8
Five S or continuously neat organisation	3.9	2.6	1.6	2.71	2.57	2.5	3.14	4	2.4	3
Taguchi or design quality into the product	1.8	3	1	2.5	1.75	2.5	3.25	3	1.5	0.8
Cycle time reduction	2.6	2.6	1	2.2	2.2	3	2.8	2.6	2.2	2.6
SMED or one digit exchange of die	1.8	1.4	0.6	2.4	1.17	3	2.8	2	1.2	2

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Value stream mapping	1.7	1.1	0.6	2.22	1.33	1.78	2.78	2.6	1.3	1.7
Cellular manufacturing	1.2	1.6	0	2	2.4	1.8	3.2	1	0.8	1
One-piece flow	1	1	1	2.2	0.75	2.4	3	1	1	1
Poka-yoke and Jidoka or mistake proofing and automatic inspection	1.2	1.2	0.5	2.33	0.67	0.33	2.83	2	1	1
Kanban or pull production control	1.4	0.6	0.6	2	1.2	1.4	3	1	0.8	1
Heijunka or level production scheduling	0	1	0	2	1	0	2.75	1	0.7	0
Visual Management	2.8	2.4	2.4	2.8	1.4	2.6	3	3.2	2.8	2
Total productive maintenance	2	1	1.20	2.33	1.17	1.7	2.17	1.2	1	1
Standard work	1.7	2	2.3	2.83	1.13	3.8	3	3.2	2.5	1.8

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Teamwork and total employee involvement	2.3	1.7	1	2	1.14	1.97	2.85	2.6	1.4	2.4

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	OM	OM	OM	OM	OM	OM	WS	WS	WS	WS
	EV01S	ME01L	MT01M	BS01L	DT01SQ	AW01LP	SB01S	GM01S	MV01M	PM02S
Hoshin Kanri and strategic planning	1.8	2.5	2.7	2.67	2.8	3	4.17	2.3	2.7	3.3
Policy deployment	1.7	2	2.7	2.67	2	3.3	3.67	3.3	3.3	4
Value defined from customer viewpoint	1.5	2.5	2.4	2	2.7	2.7	4	3.5	1.8	3
Seven Wastes identified for the total organisation	2.3	2.7	1.7	3	1.7	2.3	3.67	3.3	0.7	1.7
Problem-solving	3.3	3	2.7	1.33	1.7	3.7	3.67	3.3	1	2.6

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Kaizen or continuous improvement	2.6	3	2.7	2.9	2	3.4	3.27	3.9	1.72	3.7
Five S or continuously neat organisation	2.6	2.9	2.1	2	1.7	2.9	3	2.9	2.3	2
Taguchi or design quality into the product	2	2	2.5	1	1	2.8	2.25	2	1	2.8
Cycle time reduction	2	2.6	2.2	2.6	1.4	3	3	2.6	2.8	2.2
SMED or one digit exchange of die	0.6	1	0.4	0.33	1.6	2.2	1.4	2.5	1.4	2.6
Value stream mapping	1.4	2.1	1.2	1.78	1.4	2.4	3.2	2.2	0.9	1
Cellular manufacturing	1	1	2.4	1	0.8	1.8	2.2	1.2	0	1
One-piece flow	1.3	1	2.2	1	0.8	1	2.2	1	0	1
Poka-yoke and Jidoka or mistake proofing and	1.6	1	0	1	0	1	0.67	1.3	0	1

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
automatic inspection										
Kanban or pull production control	1.8	0	0	0	0	0	0.8	1	0	1
Heijunka or level production scheduling	1.7	1	0	0	0	0	1.25	1	0	1
Visual Management	1.6	2.4	2.2	1.8	1.8	2.4	2.6	2.2	0	2.8
Total productive maintenance	1	1	1.3	0.71	0.3	0	1.33	1.5	1.3	1.1
Standard work	1.5	2.3	2.3	2	2	2.3	2.33	2.7	2.5	2.3
Teamwork and total employee involvement	2	2	2.3	2.29	1.1	1.1	2.11	2.7	1.4	1.7

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	WS	WS	SM	SM	SM	MM	MM	MM	MM	MM
	CM01L	AS01LE	NF01LI	JC01LS	AJ01LA	RB01MF	PG01LF	DM01LF	JH01LS	RL01MEN

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Hoshin Kanri and strategic planning	3.2	1	1	1.7	0.3	0.7	1.7	3.2	1.7	0.2
Policy deployment	3.3	2	2.3	3.7	2.3	2.7	3.3	2.7	1.3	0.7
Value defined from customer viewpoint	3.2	1.8	0.5	3	1.5	0	3.3	2.3	2.3	0.8
Seven Wastes identified for the total organisation	3.7	2	1.3	3.7	1.7	0	4	0	1.3	0.3
Problem-solving	3.3	0	0	1.3	1.3	1	3.7	0	3.7	0.3
Kaizen or continuous improvement	3.5	2.9	1.4	3.8	1.8	3.1	3	1.2	1.8	0.8
Five S or continuously neat organisation	3.3	3.1	3	0	2.3	2.4	3.1	3.9	4	0.7
Taguchi or design quality into the product	3.6	1.3	1	2.3	3	2.3	1.5	3	2.5	0.8
Cycle time reduction	2	2.4	0	0.4	0.8	1.2	2.4	2	1	0.4

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
SMED or one digit exchange of die	3.2	0	0.2	0	1	0.6	0.4	0	1	0.3
Value stream mapping	0.2	0.6	1	0	2.3	0	1.7	1.8	1.8	0.1
Cellular manufacturing	0.7	0	0.2	0	2	0	0	2	0.8	0.2
One-piece flow	1	0	0.8	0	1.8	0	0	0	2	0
Poka-yoke and Jidoka or mistake proofing and automatic inspection	1	0	0	0	1	0	0.3	0	0	0.3
Kanban or pull production control	1	0	1	0	0	0	0	0	1	0.4
Heijunka or level production scheduling	0	0	0	0	0.7	0	0	0	0	0
Visual Management	2.4	2.2	0.8	0.6	2.2	1.4	2.2	2.4	3	0.8
Total productive maintenance	0.8	0	0.3	0	0	0	0	0	0.4	0.5

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	2.3	1.3	0.7	0.5	2.3	0	1.8	2.2	1.8	0.5
Standard work										
Teamwork and total employee involvement	1.1	1.1	0.3	1.3	2.3	0.6	1.7	1.7	1.4	0.1

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	MM	MM	MM	MM	OM	OM	OM	OM	OM	WS
	DK01SEN	PJ01SEN	JV01SEN	MV01MS	SB01LS	PN01LF	GS01SA	DB01SEN	GA01LS	AT01M
Hoshin Kanri and strategic planning	0.3	2	1.7	1.3	0	2.5	0	2.2	0	0.5
Policy deployment	0.3	2.7	1.7	1.7	4	2.3	1	2	2	2
Value defined from customer viewpoint	0.2	4	2	1.2	1.8	2.5	1.5	0.5	1.3	1.5
Seven Wastes identified for the total organisation	0.3	2.7	2	1	0	2	0	2	0	1

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Problem-solving	0.3	3.7	2.3	2	2	1.7	2	1	1	1
Kaizen or continuous improvement	0.6	2.5	2.6	2.6	0	2.7	2.4	1.8	2	1
Five S or continuously neat organisation	1.3	3	2.3	2.3	2	3.4	1.7	1.9	1.6	2
Taguchi or design quality into the product	1.8	2.8	1.3	1.8	0	1.3	2	1.5	1.5	0.3
Cycle time reduction	0	1.6	1.6	0.4	0	1.6	0	3	1.2	0
SMED or one digit exchange of die	0.4	1.5	0.2	0	0	2	0	0	0	0
Value stream mapping	0.3	0	0.5	1.7	2	1.8	1.6	0.1	0	2
Cellular manufacturing	0.2	0	0.4	1	0	1	0.6	0.8	0	0
One-piece flow	0	0.4	0	0	0	1	0	0.4	0	0

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Poka-yoke and Jidoka or mistake proofing and automatic inspection	0.3	1.8	1	1	0	1	0	0.2	0	0
Kanban or pull production control	1	1.4	0.8	1	0	1	0	0.4	0	0
Heijunka or level production scheduling	0	1	1.5	0	0	0	0	1	0	0
Visual Management	1.4	2.4	1.8	2.2	3	2.8	2.8	2.6	2	1.8
Total productive maintenance	0.7	1.7	0.2	0	0	0	0	1.1	0	0.7
Standard work	0.8	1.7	1.3	2.2	3	2.3	2.2	1	1.7	2.7
Teamwork and total employee involvement	0.3	1.7	0.9	0.4	2.3	2	1.4	0.5	0.7	1.2

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	WS	WS	WS	WS	WS	WS	WS	WS	WS	WS
	SN01L	PM01L	MN01ST	MJ01M	AG01L	AM01MF	NG01SS	TR01S	CH01LS	PM01SS
Hoshin Kanri and strategic planning	1.7	1.7	0.7	0.8	0	2.5	0.8	4	2.2	2.2
Policy deployment	3.3	0.7	0.7	1.3	0.75	3.7	2	4	1.7	1
Value defined from customer viewpoint	1.5	0.3	0.3	0	1.2	3.5	2.2	2	1.3	2.2
Seven Wastes identified for the total organisation	2	0	1	0	0	3	0	0	0	2.3
Problem-solving	2.3	0.3	1	0	1	2.7	2	0	2	3.6
Kaizen or continuous improvement	3.1	0.4	1.5	0	0.6	2.7	2.8	2	2.3	3.6
Five S or continuously neat organisation	4	2.9	2.9	3	0	3.6	3.7	3	2.1	2.3
Taguchi or design quality into the product	2.5	0.5	0	0	0	1.8	0	0	2	2.3

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A										
Cycle time reduction	3.2	0	0	0	0	0	2.6	2.6	0.8	0	2.8
SMED or one digit exchange of die	2.4	0.8	0	0	0	0	1	0	0	0	0
Value stream mapping	2.1	1.1	1.2	0	0	0	2.1	2.3	1.3	0.3	1.1
Cellular manufacturing	2.6	0	0	0	0	0	1	0	0	0	1
One-piece flow	2.8	0.4	0	0	0	0	0	0	0	0	1
Poka-yoke and Jidoka or mistake proofing and automatic inspection	2.4	0	0	0	0	0	1	0	0	0	1
Kanban or pull production control	3.2	0.2	0	0	0	0	0	0.6	0	0	0
Heijunka or level production scheduling	1.3	0	0	0	0	0	0	0	0	0	0
Visual Management	1.4	1	4	0	0	0	2.4	3	2.8	2.6	2.4

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Total productive maintenance	1.3	0	0.7	0	0	0	0	0	0	0
Standard work	3.7	0	1.8	3	0	2.2	2.5	2	1	2.3
Teamwork and total employee involvement	2.4	0.1	1.4	1.3	0.89	1.6	1.4	1.3	1.4	1.3

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	WS	WS	SS	SS	SS	WS	TM	TM	TM	TM
	EM01L	AK01SE	BL01L	MM01L	DR01L	JM01SEN	WHR01LTM	WPP01LF	WHS01LSLS	WAV01M
Hoshin Kanri and strategic planning	0	2.5	1.5	0	0.5	0.8	3.1	2.8	2	3.5
Policy deployment	0	2.67	1.67	0	1	1.3	3.7	3.3	3	3.7
Value defined from customer viewpoint	2.7	2	1.5	0	1.8	1.7	2.8	1.8	0.3	2.7

Seven Wastes identified for the total organisation	0	0	0	0	0.67	0	2.3	1	1	1.7
Problem-solving	3.9	1.33	1.18	0	0	1	2.7	1.3	1	0
Kaizen or continuous improvement	1.7	3.27	2.57	0	0.7	2.4	3.5	3.4	1.3	3.4
Five S or continuously neat organisation	2.8	3.85	0.75	0	2.33	3.1	3.3	3.7	2.7	3.2
Taguchi or design quality into the product	1.8	1.5	0.8	0.5	1	2.3	2.5	2.8	2.5	2
Cycle time reduction	1	0.8	0.5	1	0.8	1.8	2.6	3.6	1.4	1.8
SMED or one digit exchange of die	1.8	0	1.33	1	0	0.6	3.4	4	1.6	3.6
Value stream mapping	0	1.44	2	1	0.56	1.6	2.9	3.3	0.8	2.5
Cellular manufacturing	0	0	0	0.8	2	1	3	4	1.8	1
One-piece flow	0	0	0	0.25	0	0	3.3	4	1.3	1.7

Poka-yoke and Jidoka or mistake proofing and automatic inspection	0	0	0.5	0	0.17	0	2.2	2.2	1	1.8
Kanban or pull production control	0	0	0	0	0	0	3.2	3.8	2.6	3
Heijunka or level production scheduling	0	0	0	0	0	0	3.3	4	1.3	2
Visual Management	3.6	2.8	2	0.2	2.4	2.8	3.4	3.8	2.8	3
Total productive maintenance	1	0	0.57	0.29	0.43	0	2.5	2.7	2	1.8
Standard work	1.7	2	0.5	0.5	0.67	1.3	3	3.3	2.3	2.5
Teamwork and total employee involvement	1.7	1.14	0.86	0.88	0.625	1.9	3.6	3.6	2.3	2.1

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	TM	TM	TM	MM	MM	MM	MM	MM	MM	MM

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	WKW01L SY	WRK01 L	WCRVDW 01L	WHM01 L	WAC01 L	WBS01L	WAK0 1L	WAL01L	WYE01S F	WBM01L
Hoshin Kanri and strategic planning	3.2	3.2	3	3.8	2.5	2.5	3	3.7	3.7	3
Policy deployment	4	3.7	3.7	4	4	2.7	3	2.7	3.3	3.7
Value defined from customer viewpoint	3.7	3.5	1.8	3.7	3.3	1.8	0.7	1.5	3.3	3
Seven Wastes identified for the total organisation	2	3	2	4	4	2.7	0	4	3.3	3
Problem-solving	3	3	2	3.7	4	0.7	2	3	2.7	3
Kaizen or continuous improvement	2.9	3.1	2.5	3.8	3.8	1.9	3.3	3.7	3.3	3.2
Five S or continuously neat organisation	3.5	3.4	3.7	3.3	3.7	3.4	3.9	3.3	3.6	4

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Taguchi or design quality into the product	4	2.5	2	4	3	4	2.3	1.8	3.8	3
Cycle time reduction	3.6	2.6	2	3.8	2.8	3.2	0.8	1.8	3.6	3
SMED or one digit exchange of die	4	3	2.7	3.5	3.7	2.8	1	3.2	2.3	2.4
Value stream mapping	4	2.2	1.1	4	2.8	3.3	2.3	3.3	3.4	3
Cellular manufacturing	3.8	2.8	1.8	3.5	2.6	2.4	1.2	2.8	1	3
One-piece flow	4	3	0.8	3	2	2.5	1.2	3	2.6	3
Poka-yoke and Jidoka or mistake proofing and automatic inspection	2.7	2.8	1.4	3	1	1.7	2.8	2.7	2.5	3.33
Kanban or pull production control	3.7	2.6	0.4	3	2	3.2	0.6	2.4	1.8	3.6

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Heijunka or level production scheduling	4	3	0.3	3	1	2.3	1.5	1	2.5	3.5
Visual Management	4	2.6	2.6	3	4	4	2.4	4	4	2.8
Total productive maintenance	3.2	2.5	2.5	3.1	2	2	2.5	2.7	2.7	1.7
Standard work	4	2.7	2.5	4	3.7	4	3	3.3	4	3.7
Teamwork and total employee involvement	2.2	2.6	2.7	4	2.3	3.4	2.4	3.6	3.8	3.3

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM
	WWF01 LSY	WJM0 1M	WPK01 MSTK	WJH01 LWD	WAR01 SSC	WSR01L MNT	WAE01L DWG	WET01LSF TY	WES01S FCW	WKP01LS CRP
Hoshin Kanri and strategic planning	2.7	3	2.7	1	0	1	2.5	2.7	4	3.7

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Policy deployment	2	4	2.3	2.3	0	3	3.3	3.3	4	3.3
Value defined from customer viewpoint	2	3.7	1.8	1.7	0	1.2	2.5	2.7	4	3.3
Seven Wastes identified for the total organisation	2	2.7	2	2	0.7	3	3	3.3	3.3	2.7
Problem-solving	2	3	1	2.7	0.7	3.3	0.3	3	3.9	2.7
Kaizen or continuous improvement	1.9	3.8	2.1	1.6	0.8	2.9	2.6	3.4	3.6	2.9
Five S or continuously neat organisation	3	4	2.6	2.3	0.9	2.1	4	2.9	3.8	3
Taguchi or design quality into the product	1.5	3.5	0	3	0.5	1.5	3.5	2.5	4	2.8
Cycle time reduction	0.4	1.6	3	1.4	0.2	1.6	3	2.8	0	2.4

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
SMED or one digit exchange of die	0	4	2	0	0	1.5	3.4	3.2	1.3	3
Value stream mapping	1.4	4	1	1.8	0.6	1	2.6	2.6	0.4	2.9
Cellular manufacturing	0	4	0	1.8	0	0	3	2.6	0	2.6
One-piece flow	0.3	3.6	3	0	0	0.4	3	1.6	3	2.4
Poka-yoke and Jidoka or mistake proofing and automatic inspection	0.2	3.7	1	0	0.4	0.8	1	2.2	4	2.8
Kanban or pull production control	0	2.8	0	2.2	0.2	0.2	1.2	2.4	0	1.8
Heijunka or level production scheduling	0	4	0	0	0	0.5	0.7	2	4	3.3
Visual Management	1	4	2.8	2.2	1	1.2	3.8	2.8	4	3.6

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Total productive maintenance	0	3.8	0	0.2	0.7	1	2	2.1	0.7	3.1
Standard work	0	4	1	0.2	0.8	1.3	1.5	2.6	4	3.3
Teamwork and total employee involvement	0.7	3.4	2.4	1	0.5	1	2.4	2.8	3.4	3.4

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	MM	MM	MM	MM	MM	OM	OM	OM	OM	OM
	WMW01SS HL	WAS02LF	WRM01 L	WGP01LFE XPP	WLT01SP RA	WJM01L	WBK01 L	WBK01 S	WBS02 L	WDC01 L
Hoshin Kanri and strategic planning	2.3	3.5	2.7	2.5	3.3	3.3	4	1.7	4	2.7
Policy deployment	2.3	3.3	3	4	3.3	3.7	4	3	4	2.7
Value defined from customer viewpoint	1.7	4	2.8	1.5	1.7	3.5	4	2.2	4	3

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Seven Wastes identified for the total organisation	2.3	3	2.7	3	3	2.3	3.7	1.7	4	2
Problem-solving	2.3	3	2.3	3	1	3.7	3.7	1.3	4	3
Kaizen or continuous improvement	2	3	2.6	3.2	3	3.3	4	1.9	4	2.7
Five S or continuously neat organisation	2.2	2.3	2.1	2.9	4	3.4	4	3.3	4	3.6
Taguchi or design quality into the product	2	0	2.3	1.5	2.3	2.3	3.8	2.5	4	2.3
Cycle time reduction	0	0	2.6	1	1.2	2.8	4	2	4	2.5
SMED or one digit exchange of die	1	0	2.8	0.7	2.2	2.4	4	2.7	4	3

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Value stream mapping	0	0	2.2	0	2.1	3	4	1.6	4	2
Cellular manufacturing	0.1	0	2.2	0.6	0.8	3.2	4	2.4	4	2.8
One-piece flow	0.2	0	2	0	0.8	4	4	2.8	0	2.8
Poka-yoke and Jidoka or mistake proofing and automatic inspection	0	0	2	0.5	1.6	2.8	4	2.2	3.5	3
Kanban or pull production control	0.6	0	1.6	0	0.4	3.2	4	1.6	3	2.8
Heijunka or level production scheduling	0	0	1.5	0	1	2.5	4	1.5	4	2.3
Visual Management	0.8	0	2.2	2.2	3.8	3.2	4	3.4	4	3.2

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Total productive maintenance	0.3	0	2.1	1	1.8	1.8	4	1.5	3.4	3
Standard work	2.4	4	2.8	0.5	1.5	3	4	2.3	4	3.5
Teamwork and total employee involvement	2.6	2.3	2.3	2.4	1.1	2.3	4	1.9	4	2.8

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM
	WBM02 L	WNM01 L	WPM0 1L	WFM01 L	WPM02 L	WTM01 L	WJN01L WD	WAM02 L	WHM01LWD	WCM01LS CR
Hoshin Kanri and strategic planning	2.5	3.8	2	0	3.4	3	2.7	3.2	3.5	1.5
Policy deployment	2.7	4	3.3	0	3.7	3.7	3	3.7	3.7	2.3

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Value defined from customer viewpoint	3	3.5	2.7	0	3	3.5	2.8	2.6	3.5	1.2
Seven Wastes identified for the total organisation	2.7	3.3	1.3	0	3	3	3	2.7	2	2
Problem-solving	1.7	3.7	3	0	3	3.7	2.7	2.3	4	1.7
Kaizen or continuous improvement	2.5	3.9	2.8	0	3	3.7	2.8	3.2	3.6	2.5
Five S or continuously neat organisation	3.6	3.6	3.7	0	3.4	4	2.4	3.7	3.7	3.9
Taguchi or design quality into the product	2.8	3.8	3.5	0	3	3.5	2.3	2.8	3.3	2.3
Cycle time reduction	2.4	3.8	3.4	0	3.2	3.6	2.8	3.4	3.8	2.6

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
SMED or one digit exchange of die	3.5	4	3.8	0	3	3.7	2.7	3	3.3	1.8
Value stream mapping	2.4	3.6	3.8	0	3	2.9	3	1.9	3.6	2.9
Cellular manufacturing	1.8	3.4	3.2	0	2.6	3	3	2	3	2.4
One-piece flow	2.6	4	3.8	0	2	4	2.6	2.8	3.6	0.8
Poka-yoke and Jidoka or mistake proofing and automatic inspection	1	4	3.3	0	3.3	3.8	3	0.7	2.7	2.5
Kanban or pull production control	1.6	3.6	2	0	2.8	4	1.8	1.6	3.2	1.6
Heijunka or level production scheduling	2.3	3.3	3.5	0	2.5	4	3.3	2	3.3	2

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Visual Management	2.8	3.4	3.8	0	3	4	3.6	1.4	3.8	3
Total productive maintenance	1.9	3.9	2	0	3	3.6	2	0.9	1.9	1.7
Standard work	3	3.8	2.7	0	3	4	3.5	3	3.7	3
Teamwork and total employee involvement	2.8	3.9	2.6	0	3	3.9	2.7	2.8	3.4	2.8

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	OM	OM	OM	OM	OM	OM	WS	WS	WS	WS
	WMN01 L	WMG01 LGS	WPM03 L	WJN02LS CR	WRS02 L	WPM04 L	WSB01 M	WRB01LD R	WAM01LBU YA	WRL01LS C
Hoshin Kanri and strategic planning	3.5	3.5	2	0.3	2.7	3.2	0.8	0.8	4	2.6

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Policy deployment	3.7	4	0.3	2.3	2.7	4	2	2.7	4	0.3
Value defined from customer viewpoint	3.3	4	0.3	1.7	3.2	3.3	2.7	1.5	4	2.5
Seven Wastes identified for the total organisation	2.3	3.3	0.7	2.3	2.7	2.7	2	0.7	4	0.7
Problem-solving	1.7	4	0	1.7	2.7	3	2	0.7	4	0.7
Kaizen or continuous improvement	3.4	4	0.9	2.1	2.7	3.8	2.4	1.6	4	2.2
Five S or continuously neat organisation	4	3.4	1.4	2.3	3.9	3.7	3.1	2.7	4	2.1

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Taguchi or design quality into the product	3.5	3.8	0.5	1.5	3.3	2.5	0	1.8	4	2
Cycle time reduction	2.8	4	0	1.4	3.4	3.4	2.4	0.8	4	0
SMED or one digit exchange of die	3.7	3.6	0.5	1	3.5	3.2	2.5	1.3	4	0
Value stream mapping	3	3.2	0	1.6	1.9	2.6	0.7	1.2	4	0
Cellular manufacturing	3.8	3.6	0	1.6	1.6	1.6	1.2	0.8	3.8	0
One-piece flow	3.4	3.5	0.2	1	2	3	0.6	1.8	4	0
Poka-yoke and Jidoka or mistake proofing and	3.5	4	0.2	1.5	3.3	2	2.2	1.7	4	0

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
automatic inspection										
Kanban or pull production control	4	3.2	0	1.6	2.8	2.4	2.6	1.5	4	0
Heijunka or level production scheduling	3	3.3	0	1.8	0.3	3	0.8	2.5	4	0
Visual Management	4	3.8	0.6	1.6	3.8	4	3.6	2.2	4	0
Total productive maintenance	4	4	0.1	1.7	1.4	0.7	1	1	4	0
Standard work	4	4	0.5	2.5	3.5	2.8	2	1.3	4	0
Teamwork and total	3	3.7	0.5	2.4	4	3.5	2.5	1.4	4	0

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
employee involvement										

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	WS	WS	WS	WS	WS	WS	WS	WS	WS	WS
	WWB01LSLS	WHB01LMNT	WAS01LMNT	WEN01LMNT	WLN01LQC	WNP01LDDES	WSN01LQC	WPDB01LDCOR	WTD01LLABTECH	WGN01LQC
Hoshin Kanri and strategic planning	0.5	3	3	3.8	2.4	4	4	0.2	2.7	2.7
Policy deployment	2.7	3	3	4	0.7	4	4	0	3	3
Value defined from customer viewpoint	0.2	2.8	2.7	3.7	1.2	0	3.8	0.3	0.8	3.2
Seven Wastes	0.3	2.3	2	4	2	4	4	0.7	1.3	3

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
identified for the total organisation										
Problem-solving	0.7	2.3	2.7	3.7	1	4	4	0	3.3	2.3
Kaizen or continuous improvement	2.3	3.4	2.7	3.6	3.3	3.9	3.7	0.8	1.9	2.5
Five S or continuously neat organisation	0.6	3.9	2.4	3.6	4	3.3	4	1.4	3.9	3.3
Taguchi or design quality into the product	1.3	2.8	3.5	4	3	3	4	0.5	3	3
Cycle time reduction	0.4	3.6	2.6	3.6	2.8	4	4	0	2.6	3
SMED or one digit	1	3.8	2.8	3.3	3.7	3.3	3.3	0.5	1.2	3.8

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
exchange of die										
Value stream mapping	0.4	3.2	2.9	3.8	2.6	3	3.7	0	2.6	3.7
Cellular manufacturing	0.4	2.8	2.6	3.6	4	3.4	3.8	0	1.4	3.4
One-piece flow	0.2	3.4	2.8	3.8	0	3.2	3.6	0.2	1.8	3.8
Poka-yoke and Jidoka or mistake proofing and automatic inspection	0.6	3.3	3	4	0.2	3.7	4	0.2	4	2.7
Kanban or pull production control	0.6	3	3.6	4	0	4	4	0	1.8	3.4
Heijunka or level	0.3	2.8	3	4	0	3.5	4	0	0	3

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
production scheduling										
Visual Management	2.8	0.3	3	3.6	0.6	4	4	0.6	3	3
Total productive maintenance	1.8	3.5	2.7	3.9	0.1	3.1	3.4	0.1	2.7	0.8
Standard work	2.5	3.2	2.2	3.8	0.8	4	4	0.5	4	2.7
Teamwork and total employee involvement	2.9	3.3	2.5	4	2.6	3.6	4	0.5	2.8	2.3

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
	WS	WS	WS	WS	WS	WS	WS			
	WAM03LDCOR	WNH01LOC	WEK01LMNT	WDR01MPROG	WHD01LMNT	WOV01LMNT				

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
Hoshin Kanri and strategic planning	0.7	4	2.3	3	2.3	1.1				
Policy deployment	2.7	4	1.7	3	3.3	1.3				
Value defined from customer viewpoint	0.8	4	2.8	3.3	1.3	2.5				
Seven Wastes identified for the total organisation	3.7	3.3	2	3.3	0.7	2				
Problem-solving	1.2	4	3.7	3	0.7	0.7				
Kaizen or continuous improvement	3.7	3.5	3	2.5	1.1	0.1				
Five S or continuously	2	3.9	3.1	3.7	3.6	1.3				

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
neat organisation										
Taguchi or design quality into the product	1	3.5	3.3	3	2	0.5				
Cycle time reduction	0	4	3	1	2	0				
SMED or one digit exchange of die	0.9	4	3	2.8	2	0				
Value stream mapping	2.8	4	2.3	2	1.8	0.44				
Cellular manufacturing	1.5	4	2.6	1.8	0.8	0				
One-piece flow	0.3	4	2.2	1.8	1.6	0				
Poka-yoke and Jidoka or mistake	2.8	3.8	2	2.5	2	0.1				

Description of independent variable	Management categories, name codes for individual participants and captured data from Appendix A									
proofing and automatic inspection										
Kanban or pull production control	0	3.6	2.8	2.8	1.6	0				
Heijunka or level production scheduling	4	3.5	2.8	2	0	0				
Visual Management	1.8	4	3.2	3.8	2.8	3				
Total productive maintenance	3.5	2.7	3.1	2	0	0.3				
Standard work	3.5	4	2.5	2.3	0	1				
Teamwork and total employee involvement	1.1	3.9	2.6	1.8	2.2	0.8				

APPENDIX M - GATHERED DATA FROM APPENDIX B

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	SM	SM	SM	SM	SM	SM	MM	MM	MM	MM
	DF01S	LV01L	BK01S	PC01L	RM01SE	CJ01SEN	SM01S	AS01M	MM01L	BD01SS
Locus of decision making (score in reverse)	3.5	3.5	3.5	4.5	4.3	4.5	3	3.25	3.8	3.8
Nature of formalisation	3.25	4	3.25	3.8	3.5	3	2.25	3	3.5	3.5
Number of layers in the organisation	5	5	5	5	5	5	5	5	5	5
Level of horizontal integration	2	2.5	4	2	2	2	4	3.25	2.5	2.3
Level of communication	3.6	2.6	3.8	4	3.8	2	4.2	2.8	2.4	3.8
Cellular format	1	1.25	1	1	1	2	1	1	1	1

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	MM	MM	OM	OM	OM	OM	OM	OM	OM	OM
	SR01LF	JH01L	PP01M	MM01S	JC01L	ZB01S	JL01S	MM01M	HM01S	TN01S
Locus of decision making (score in reverse)	4.8	3.5	3.8	3.25	2.5	3.25	3.25	3.8	3.8	3.8
Nature of formalisation	3.8	3.5	3.5	3.25	3	3	3.5	3.25	3	3.3
Number of layers in the organisation	5	5	5	5	5	5	5	5	5	5
Level of horizontal integration	2	2.5	3.5	3	3.25	1.25	3.5	3.5	2.5	3
Level of communication	2.4	3.4	3.2	3	4	2.2	3.8	3.4	2.6	3.2
Cellular format	1	1	1	1	1	1	1.25	1	2	1

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	OM	OM	OM	OM	OM	OM	WS	WS	WS	WS
	EV01S	ME01L	MT01M	BS01L	DT01SQ	AW01LP	SB01S	GM01S	MV01M	PM02S
Locus of decision-making score in reverse)	3.3	4.3	4	3.25	4	3.5	4.25	3.5	3.8	4
Nature of formalisation	2.5	4	3	3.5	4	3	3.25	2	3.8	3.5
Number of layers in the organisation	5	5	5	5	5	5	5	5	5	5
Level of horizontal integration	3.5	2.5	2	2.75	2	2.3	3.5	4.5	2.5	2.5
Level of communication	3.4	2.4	3.6	3	2	2.8	2.75	4	2	3.6
Cellular format	1	1	1	1	1	1	1	1	1	1

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	WS	WS	SM	SM	SM	MM	MM	MM	MM	MM
	CM01L	AS01LE	NF01LI	JC01LS	AJ01LA	RB01MF	PG01LF	DM01LF	JH01LS	RL01MEN
Locus of decision-making	3.8	4	3.5	3.3	3.3	4	3.5	3.5	4	5
Nature of formalisation	3.5	4	4	3.5	3.3	4	3.5	3.8	4	5
Number of layers in the organisation	5	5	5	5	5	5	5	5	5	5
Level of horizontal integration	2.3	2.3	2.5	3	2	2.5	2.5	2.3	2	4.3
Level of communication	2.4	2.4	3.6	3.4	3	3.4	4	4.2	3.6	1.8
Cellular format	1	1	1	1	1	1	1	1	1	3

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	MM	MM	MM	MM	OM	OM	OM	OM	OM	WS
	DK01SEN	PJ01SEN	JV01SEN	MV01MS	SB01LS	PN01LF	GS01SA	DB01SEN	GA01LS	AT01M
Locus of decision-making (score in reverse)	4.8	2.8	2.8	3.8	3.8	3.8	3.8	2.8	3.5	3.5
Nature of formalisation	4.5	3.8	4	3.3	3.3	3.5	4	4	3.5	3
Number of layers in the organisation	5	5	5	5	5	5	5	5	5	5
Level of horizontal integration	1	1.8	2	2.3	2.3	2.3	2.3	2	2	2.3
Level of communication	1.6	3.4	3.4	2.6	2.2	4.5	2.8	2.6	2.4	2.8
Cellular format	1	1	1	1	1	1	1	1	1	1

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	WS	WS	WS	WS	WS	WS	WS	WS	WS	WS
	SN01L	PM01L	MN01ST	MJ01M	AG01L	AM01MF	NG01SS	TR01S	CH01LS	PM01SS
Locus of decision-making (score in reverse)	3	4	2.8	4	4	3.5	3.5	3.5	2.8	3.5
Nature of formalisation	2.8	4.8	4.3	3.8	4	3	3.5	4.5	3	3.3
Number of layers in the organisation	5	5	5	5	5	5	5	5	5	5
Level of horizontal integration	3.8	3	3	2	2	2.5	2.5	2.5	2	2.5
Level of communication	3.4	2.2	3	3.2	3.4	3	4.2	3.4	3.8	3.2
Cellular format	1.5	1	1	1	1	1	1	1	1	1

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	WS	WS	SS	SS	SS	WS	TM	TM	TM	TM
	EM01L	AK01SE	BL01L	MM01L	DR01L	JM01SEN	WHR01LTM	WPP01LF	WHS01LSLS	WAV01M
Locus of decision making (score in reverse)	4	3.5	3.75	4	4	4	1.3	1.5	2.5	1.8
Nature of formalisation	4	3.75	3.24	4.25	4	4	2.3	3	3	2.8
Number of layers in the organisation	5	5	5	5	5	5	4	4	4	4
Level of horizontal integration	2	2	2.75	1.5	1.5	2.3	4.3	4.3	3.5	3
Level of communication	2	3.6	2.6	2.4	2.6	2.8	5	4.2	4.2	5
Cellular format	1	1	1	1	1	1	4.3	2.8	2.8	1.8

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	TM	TM	TM	MM	MM	MM	MM	MM	MM	MM
	WKW01L SY	WRK01 L	WCVDW01 L	WHM01 L	WAC01 L	WBS01 L	WAK01 L	WAL01 L	WYE01S F	WBM01 L
Locus of decision-making (score in reverse)	3.3	2	1.8	1	2.8	1.5	2	3	1	2
Nature of formalisation	2.5	2.7	4	1	3.3	2.3	2.3	3.5	1	2
Number of layers in the organisation	4	4	4	4	4	4	4	4	4	4
Level of horizontal integration	3.5	4	3.8	3.5	3	3.8	3.5	2	3.5	3
Level of communication	3.4	3.4	4.8	4.2	4.2	3.8	4	4.6	5	4
Cellular format	4	3.3	3	3.8	2	3.5	3	3.5	5	3.5

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM
	WW F01 LSY	WJM01 M	WPK01 MSTK	WJH01L WD	WAR01 SSC	WSR01LM NT	WAE01L DWG	WET01LS FTY	WES01SF CW	WKP01LS CRP
Locus of decision-making (score in reverse)	2.3	1.5	2.3	2.3	2.8	3.3	2	1.5	1.3	1.8
Nature of formalisation	3	2.5	1	3	1	3.3	3.8	1	1	1.5
Number of layers in the organisation	4	4	4	4	4	4	4	4.3	4	4
Level of horizontal integration	2.8	5	4	3.5	4	1.5	3.8	4	5	4
Level of communication	4	5	3.6	4.4	3.6	3.2	4	3	4.8	4
Cellular format	3.5	3.5	4	3.5	4	2.5	3.5	3	4	4

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	MM	MM	MM	MM	MM	OM	OM	OM	OM	OM
	WMW01S SHL	WAS0L F	WRM01 L	WGP01LFEXP P	WLT01SPR A	WJM01 L	WBK01 L	WBK01 S	WBS02 L	WDC01 L
Locus of decision-making (score in reverse)	1.3	1.5	2	1.5	3.3	2.5	1	2	1	2.3
Nature of formalisation	3	2	2.5	3	3	2.5	1	4.5	1	3
Number of layers in the organisation	4	4	4	4	4	4	4	6	4	4
Level of horizontal integration	4.3	4	4	3.5	3	3.3	5	3.3	5	3.5
Level of communication	4.8	4	4	5	3.8	3.2	5	3	5	3.8
Cellular format	3.5	4	3.3	3	3.5	2	5	2.8	4	4.25

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM
	WBM02 L	WNM01 L	WPM0 1L	WFM01 L	WPM02 L	WTM01 L	WJN01L WD	WAM02 L	WHM01LW D	WCM01LSC R
Locus of decision-making (score in reverse)	1.5	1.8	3	1.5	1	1.8	2	1.5	2	1
Nature of formalisation	2.8	2	3.5	1.5	1.3	1.3	1.8	2.5	2	1.8
Number of layers in the organisation	4	4	4	4	4	4	4	4	4	4
Level of horizontal integration	4	4	3.5	4	3.5	4.8	4.2	4	3.5	3.5
Level of communication	0.2	4	2.8	4.2	3.8	4.4	4.3	3.6	3.4	4
Cellular format	2.5	4	2.5	4.3	4	3.8	4.6	1.8	2.5	4

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	OM	OM	OM	OM	OM	OM	WS	WS	WS	WS
	WMN01 L	WMG01 LGS	WPM03 L	WJN02L SCR	WRS02L	WPM04 L	WSB01 M	WRB01LD R	WAM01LB UYA	WRL01L SC
Locus of decision-making (score in reverse)	1.3	2.5	2.5	2.3	2	1.8	1	2.3	1	2
Nature of formalisation	3	2	2.3	2	2	2	3	3.3	2	2
Number of layers in the organisation	4	4	4	4	4	4	4	4	4	4
Level of horizontal integration	4.3	4.3	1.3	4	4	3.8	3.8	3.8	5	2.8
Level of communication	4	2.6	3.2	3.4	4	3.6	4	4	4.4	2

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	3.3	3.5	2.3	3.3	3	4.3	3	3.5	4	3
Cellular format	3.3	3.5	2.3	3.3	3	4.3	3	3.5	4	3

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	WS	WS	WS	WS	WS	WS	WS	WS	WS	WS
	WW01L SLS	WHB01 LMNT	WAS01L MNT	WEN01 LMNT	WLN01L QC	WNP01L DDES	WSN01 LQC	WPDB01L DCOR	WTD01LLA BTECH	WGN01 LQC
Locus of decision making (score in reverse)	1.5	2	1.8	1.3	2	2.3	1.3	2.5	1.5	2.8
Nature of formalisation	5	3	2.8	2	2	2	1.8	2.3	1.5	2.8
Number of layers in the organisation	4	4	4	4	4	4	4	4	4	4

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
Level of horizontal integration	3.3	4	3	2	4	4	4.5	1.3	3.3	3.5
Level of communication	2.2	4	4	5	4	3	4.6	3.2	4	3.2
Cellular format	2	3	4	4.3	3.3	3.5	4.8	2.3	3.8	3.5

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B									
	WS	WS	WS	WS	WS	WS	WS			
	WAM03LDCOR	WNH01LOC	WEK01LMNT	WDR01MPROG	WHD01LMNT	WOV01LMNT				
Locus of decision making (score in reverse)	2	1.8	2.3	2.5	2	3.5				
Nature of formalisation	4	1	2	2.8	3.5	5				

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B										
Number of layers in the organisation	4	4	4	4	4	4					
Level of horizontal integration	4	5	3.8	2.8	3	1					
Level of communication	3	4	3.4	3.4	3.2	1					
Cellular format	2.5	3.3	3	3.5	3.8	2					

APPENDIX N - GATHERED DATA FROM APPENDIX C

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix C									
	SM	SM	SM	SM	SM	SM	MM	MM	MM	MM
	DF01S	LV01L	BK01S	PC01L	RM01SE	CJ01SEN	SM01S	AS01M	MM01L	BD01SS
Communications	4.4	2	4.75	3	3.6	2.8	3.8	4.25	2.4	3.4
Vision values mission and organisational goal awareness	5	3	5	4	5	2	4	4	2.7	3.3
Leadership	5	3.5	5	4	5	3	4	4.5	2	4
Participation and involvement	5	3	5	2	4	2	5	4.5	3	4
Roles and responsibilities	4.67	2.3	4.67	4	4.7	2.7	5	5	4.7	3.7
Knowledge	5	5	5	4	5	3.3	5	5	5	4
Commitment	5	4.5	5	3.5	4.5	4	5	5	3.5	4.5
Attitude	5	5	5	4.7	4.7	4	5	4.33	5	4
Respect	5	4.5	5	4	4.3	4	5	4.67	4	3.7

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix C									
	MM	MM	OM	OM	OM	OM	OM	OM	OM	OM
	SR01LF	JH01L	PP01M	MM01S	JC01L	ZB01S	JL01S	MM01M	HM01S	TN01S
Communications	2.8	3.4	2.8	2.8	3.6	2.60	3.8	4	3.6	3.4
Vision values mission and organisational goals awareness	3.7	4	3	4	3.33	2.67	3.67	2.7	3.3	3
Leadership	4	4	4	3	4	5	5	4	4	4
Participation and involvement	4	5	2	3	4	2.5	4	4	4	4
Roles and responsibilities	5	5	4	3.7	4	4	4.33	4	2.7	4
Knowledge	4	5	4	4.5	3.33	3.67	4.67	4	4.3	4
Commitment	5	5	4	5	3.5	3.5	5	4	4.5	4
Attitude	5	5	4.33	4.7	4	5	4.33	4	4.7	4.7
Respect	5	5	4	4	4	2.33	4	3	4	5

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix C									
	OM	OM	OM	OM	OM	OM	WS	WS	WS	WS
	EV01S	ME01L	MT01M	BS01L	DT01SQ	AW01LP	SB01S	GM01S	MV01M	PM02S
Communication	3.2	2	3.8	3.4	2	3.8	3.6	4	2.8	3.4
Vision values mission and organisational goal awareness	3.7	1.7	4	4	3.33	3.3	3.67	3.33	2.7	4
Leadership	4	2.5	2	4	2	4	3.5	4	3.5	4.5
Participation and involvement	3	2	4	4	4	4	4	4	3	4
Roles and	2.7	3	4	4	3.3	4	4	4.3	3.7	4
Knowledge	4	4	4	3.67	4	3.30	4.5	4	5	4.5
Commitment	4	2.5	4	4	4	4	4.5	4	5	5
Attitude	4	3	4.3	4	4	4.7	5	4	4.3	5
Respect	4	3	5	4	4	4.7	3.5	4	4	5

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix C									
	WS	WS	SM	SM	SM	MM	MM	MM	MM	MM
	CM01L	AS01LE	NF01LI	JC01LS	AJ01LA	RB01MF	PG01LF	DM01LF	JH01LS	RL01MEN
Communications	3	3.4	3.2	2.8	3.8	2.4	3.6	3.2	3.2	2
Vision values mission and organisational goal awareness	2.7	2.7	3.3	5	4	3	4	4	4	1
Leadership	3	4	4	3	4	4	3.5	3	4	2.5
Participation and involvement	2	4	4	1	4	1	3	4	2.5	1
Roles and responsibilities	3.3	4.7	3.7	3.7	4	3	4	4	4.3	2
Knowledge	4	4	5	5	4.7	4	5	5	4	3
Commitment	4	3.5	4	1	4	4	4	4	4.5	2.5
Attitude	4	4.7	4.3	4	4.7	4	5	4	5	3.3
Respect	4	4	4	5	5	3.7	5	4	4	4

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix C									
	MM	MM	MM	MM	OM	OM	OM	OM	OM	WS
	DK01SEN	PJ01SEN	JV01SEN	MV01MS	SB01LS	PN01LF	GS01SA	DB01SEN	GA01LS	AT01M
Communications	1.8	3	2.6	2.2	3	2.6	3.4	2.8	3.2	2.2
Vision values mission and organisational goal awareness	1	3	2.7	3.7	2.7	3.7	3.7	3.3	2.7	3
Leadership	2	4	4	3.5	1.7	3	4	4	2	2
Participation and involvement	1.5	3	4	2	2	4	3.5	4	2	2
Roles and responsibilities	1.7	3.7	3.7	3.3	4.3	3.3	4	3.3	3.3	3.3
Knowledge	3.3	3.3	4	4	4.3	5	4.7	4	4	4
Commitment	1.5	4	4	4	4	4	3.5	4	3	2
Attitude	3.3	4	3.3	4.3	5	4	4.3	2.3	3.7	3.3
Respect	4	3.3	4	4	5	4.3	4	1	3	4

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix C									
	WS	WS	WS	WS	WS	WS	WS	WS	WS	WS
	SN01L	PM01L	MN01ST	MJ01M	AG01L	AM01MF	NG01SS	TR01S	CH01LS	PM01SS
Communications	3	2.2	2.2	2.4	2.4	3.6	3.4	3.6	3.2	3.6
Vision values mission and organisational goal awareness	4	1	2	2.7	4	4	4	3.3	3.3	4
Leadership	3	3	3	3.5	4	4	2	4	3.5	4
Participation and involvement	2	1	1	2	2	3	4	4	3.5	3.5
Roles and responsibilities	4	3.3	3.7	4.3	1	3.7	4.3	4	3.7	5
Knowledge	4.7	4.7	2	3.3	4	5	4.7	3.3	4	4.3
Commitment	4.5	3.5	3	4	3	4	4	4	4	5
Attitude	4.7	2.3	4.7	3.7	3.33	5	4	4	4	4.7
Respect	3	4	3	3.7	4	5	4.3	4	2.7	4.3

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix C									
	WS	WS	SS	SS	SS	WS	TM	TM	TM	TM
	EM01L	AK01SE	BL01L	MM01L	DR01L	JM01SEN	WHR01LTM	WPP01LF	WHS01LSLS	WAV01M
Communication	3.2	3.4	2.6	1.6	2.6	3.4	4.6	3.4	3.8	4
Vision values mission and organisational goal awareness	4	4.67	1	1	1	3.3	4.7	3.7	4	4.3
Leadership	2	4.5	3	1.5	3	3.5	5	5	4	4
Participation and involvement	2	2	1	2.5	1	3	5	4	4	4
Roles and responsibilities	5	4.33	3.33	1	4	3.3	4.3	3.7	3.3	3.7
Knowledge	4	4.33	4.33	1	5	3.7	5	3.7	4	4.7
Commitment	2	5	5	1	3.5	4	4.5	4.5	4	4.7
Attitude	5	5	5	1	5	4	4.3	4.3	4.3	4
Respect	5	4.67	3	3	1.67	3.7	5	4	4	4.3

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix C									
	TM	TM	TM	MM	MM	MM	MM	MM	MM	MM
	WKW01LS Y	WRK01 L	WCVDW01 L	WHM01 L	WAC01 L	WBS01 L	WAK01 L	WAL01 L	WYE01S F	WBM01 L
Communicatio	3.6	4	3.4	5	3.6	3.8	4	4.2	5	4.4
Vision values mission and organisational goal awareness	5	4	4	5	4	4	3.7	5	5	5
Leadership	4.5	4	4	5	4	4	4	4.5	5	5
Participation and involvement	4	4	4	5	4	4	4	4	5	4
Roles and responsibilities	5	3.3	4.3	5	4.7	4	3	4	4.3	5
Knowledge	5	4	4.7	5	5	4	4	5	5	5
Commitment	5	4.5	4	5	5	4	4	5	5	5
Attitude	5	4.3	4	5	5	4.3	3.7	5	5	5
Respect	4	4	4	5	4	4	4	4.7	5	5

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix C									
	MM	MM	MM	MM	MM	MM	MM	MM	MM	MM
	WWF0 1LSY	WJM0 1M	WPK01 MSTK	WJH01L WD	WAR01S SC	WSR01L MNT	WAE01L DWG	WET01LS FTY	WES01SF CW	WKP01LS CRP
Communication	3.2	4.4	4.6	4.6	4	3.2	3.8	4.2	5	3.8
Vision values mission and organisational goal awareness	4	5	5	4	5	3.7	4	4.3	5	4
Leadership	4.5	5	4	5	3	3.5	4	4	5	4
Participation and involvement	4.5	4	4	4	3	3	4	4	5	4
Roles and responsibilities	3	4.7	4	5	4.7	3	3.3	4.3	5	4
Knowledge	3.7	5	3.6	5	5	4	4	4.7	5	4
Commitment	4	5	5	5	3	4	4	4	5	4
Attitude	5	4.7	5	5	4.3	4.3	3.7	4.7	5	4
Respect	4	4	5	5	5	3	4	4	5	4

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix C									
	MM	MM	MM	MM	MM	OM	OM	OM	OM	OM
	WMW01S SHL	WAS0L F	WRM01L	WGP01LFE XPP	WLT01SPR A	WJM01 L	WBK01 L	WBK01 S	WBS02 L	WDC01 L
Communication	4.2	4	4	4	2	4	5	2.8	4.6	3.8
Vision values mission and organisational goal awareness	4.3	4	4	4	2.7	3.3	5	4.3	4	4
Leadership	3	4	4	4	3	3	5	4	5	4
Participation and involvement	3	4	4	4	3	4	5	3	5	3
Roles and responsibilities	4.3	4	3	4	3.7	4	5	3.3	5	3.7
Knowledge	5	4	4	4.3	4	4.3	5	3.7	5	4
Commitment	3.5	4	4	4	2.5	3.5	5	4	5	4
Attitude	4.3	4.7	4	4	3.3	3.3	5	3.7	4.7	4.7
Respect	5	4	4	4	3	2	5	3	5	5

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix C									
	OM	OM	OM	OM	OM	OM	OM	OM	OM	OM
	WBM02 L	WNM0 1L	WPM01 L	WFM01 L	WPM02 L	WTM01 L	WJN01L WD	WAM02 L	WHM01L WD	WCM01LSC R
Communication	3.4	5	2.8	4.4	4	4.4	4.6	4.2	3	5
Vision values mission and organisational goal awareness	3	5	4	4.7	4	5	5	4.3	3.7	3.7
Leadership	3	5	2.5	5	4	5	5	5	3.5	3
Participation and involvement	3	5	3.5	4	4	4	5	4	3	3
Roles and responsibilities	3.7	4.3	3.7	4.7	4	4.3	4	4	4	4.3
Knowledge	4.3	5	4.7	4.3	4	4	4	5	5	5
Commitment	3.5	4	4	4.5	4	4.5	5	5	5	4
Attitude	4	5	3.7	4.3	4	4.7	5	5	3.7	4.7
Respect	4	4	4.3	5	4	4.7	4	4.3	3.7	4

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix C									
	OM	OM	OM	OM	OM	OM	WS	WS	WS	WS
	WMN01 L	WMG01 LGS	WPM03 L	WJN02LS CR	WRS02 L	WPM04 L	WSB0 1M	WRB01L DR	WAM01LB UYA	WRL01LS C
Communications	4.2	3.4	3.6	4.2	4	4.4	4.2	4	4	3.8
Vision values mission and organisational goal awareness	4.7	5	3	4.3	4	4.7	3.7	3.7	4	3
Leadership	4.5	4	3.5	4	4	4.5	4	4	4	3
Participation and involvement	4	3.5	2	4	4	5	4	4	4	3
Roles and responsibilities	4.7	5	2.7	2.7	4	4	4.3	4	4	4
Knowledge	4.7	4.7	4	4	4	4.7	5	4	4	5
Commitment	4	4.5	3	4.5	4	4.5	4	4	4	3.5
Attitude	4.7	5	3	4	4	4.7	5	4	4	4.7
Respect	5	3.3	3.3	4	4	4	4.3	4	4	5

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix C									
	WS	WS	WS	WS	WS	WS	WS	WS	WS	WS
	WW01LS LS	WHB01L MNT	WAS01L MNT	WEN01 LMNT	WLN01 LQC	WNP01 LDDES	WSN01 LQC	WPDB01L DCOR	WTD01LL ABTECH	WGN01 LQC
Communication	3	3.6	3.8	5	4	4	4.8	2.4	4.2	3.2
Vision values mission and organisational goal awareness	2.3	4.3	4	5	4	4	5	3	4	3.7
Leadership	4	4.5	4	5	4	4.5	5	3.5	4	4
Participation and involvement	2.5	4	4	5	4	4	5	2	4	3
Roles and responsibilities	3.3	4	4	5	4	4	5	2.7	3.7	4
Knowledge	5	5	3.3	4.7	4	5	5	4	5	3.3
Commitment	4	5	4	5	4	4.5	5	3	4	4
Attitude	4.7	4.3	4	5	4	5	5	3	4	4
Respect	4.3	5	3	5	4	4.7	5	3.3	4.3	4

Description of dependent variable	Management categories, name codes for individual participants and captured data from Appendix B								
	WS	WS	WS	WS	WS	WS			
	WAM03LDCOR	WNH01LOC	WEK01LMNT	WDR01MPROG	WHD01LMNT	WOV01LMNT			
Communications	3.2	4	3.2	3.2	4	1			
Vision values mission and organisational goal awareness	4	5	4	4	4	2.7			
Leadership	3.5	5	4	4	4	1			
Participation and involvement	4	5	4	4	4	2			
Roles and responsibilities	4	4.3	4	4	3	2.7			
Knowledge	4	4.7	4	4.7	4	4			
Commitment	4	5	4	4	3	3.5			
Attitude	4	4.7	4	3.7	4	3.5			
Respect	3	4	3	4	4	2			