Enablers for Lean Process Sustainability within South African Manufacturing Industries

By

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DECLARATION

I hereby declare that this dissertation submitted towards partial fulfilment of the requirements for the degree of Magister in Business Administration in the faculty of Business and Economic Sciences of the Nelson Mandela Metropolitan University is my own work and all sources used or quoted have been indicated and acknowledged by means of complete references. I have not previously submitted this dissertation / thesis for a degree at another University or Technikon.

B.K. ROTH

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ABSTRACT

James Womack and his colleagues Daniel Jones and Daniel Roos changed the way western civilization approached manufacturing. In 1990, they published a book called 'The Machine That Changed the World: The Story of Lean Production'. It was a concept that had slowly filtered from the east but had not made its mark on the manufacturing sector. The concept of lean, born out of the Japanese Toyota Manufacturing System, was first thought to be impossible to duplicate outside of Japan. Since Womack and company popularised this "new" way of producing goods and delivering services it spread across industries finding popularity in the medical, engineering, accounting and especially the manufacturing industries.

Over the last few decades lean practices has been synonymous with efficiency, cost reduction, supply chain optimisation and innovative problem solving (Anvari Norzima, Rosnah, Hojjati and Ismail, 2010; Pieterse et al., 2010; Womack et al., 1990). Lean process implementation has been researched in abundance, as has failed attempts at lean implementation.

The purpose of this study was to identify and assess enablers of lean sustainability in organisations where lean processes are already being implemented.

The literature study found Organisational Culture, Leadership, Employee Engagement and Trade Unions participation as factors that contributed to successful lean implementations. The author developed a model to test Organisational Culture, Leadership, Employee Engagement and Trade Unions as enablers to sustain lean practices in organisations in South Africa's manufacturing industries. The results proved that Organisational Culture, Leadership and Employee Engagement were considered enablers for lean sustainability. These three enablers have an interlinked relationship and together help sustainability. Lacking just one factor would surely result in unsustainable lean practices.

The study was conducted in the quantitative paradigm, as the hypothesised relationship was statistically tested. The data was collected from a homogenous group via an email sent with a link to the questionnaire. The data was statistically analysed with Statistica software and Microsoft Excel.

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CHAPTER 1

SCOPE OF THE STUDY

INTRODUCTION

Over the last few decades lean practices have been synonymous with efficiency, cost reduction, supply chain optimisation and innovative problem solving (Pieterse et al. 2010; Vermaak, 2008). Lean implementation has found popularity in a number of industries from medical, to engineering, to production, manufacturing and accounting. The implementation of lean processes has been researched in abundance, as has the failed attempts at lean implementation. Varying definitions and differed opinions on whether lean is a practice or a philosophy has further confused the issue, leading to more failed lean implementations than successful implementations. Few organisations can sustain their lean processes (Vermaak, 2008).

The value of successful lean practices and processes has made it relevant to find enablers to help sustain successful lean implementations in organisations. For the study the author decided to use South African manufacturing industries that implement lean practices to test enablers found in the literature. Once these enablers have been proven to contribute to sustainability of lean practices, other organisations will have a guideline on how to proceed and increase the success rate of sustainable lean organisations and industries.

1.1 PROBLEM STATEMENT

Gregory Howell (2001, p.15) said of lean: “Give customers what they want, deliver it instantly with no waste”. Over the last few decades lean practices have been synonymous with efficiency, cost reduction, supply chain optimisation and innovative problem solving with the goal of eliminating waste (Pieterse et al., 2010; Vermaak, 2008). Its implementation has become popular in a number of industries from medical (Yosuf, Kodambashi and Mokhtar, 2012; L’Hommedieu and Kappeler, 2010), to engineering (Oppenheim, Murman and Secor, 2009; Senaratne and Ekanayake, 2012), to production and manufacturing (Vinodh and Chinta, 2009; Vermaak, 2008) and accounting (Hostetler, 2010; Brosnahan, 2008). The implementation of lean processes has been researched in abundance (Karim and Arif-Uz-Zaman, 2013;

Anvari, et al., 2010), as has the failed attempts at lean implementation (Čiarnienė and Vienažindienė, 2013; Sim and Chaing, 2012; Slipka, 2012; Sarkar, 2011).

According to Slipka (2012), the philosophy of lean from a managerial perspective is to add value to a product or service from the vantage point of the customer by eliminating any non-value adding activities or waste. Anvari, et al. (2010) surmise that lean involves identifying and eradicating any non-value adding activities in the product or service design, in the production phase as well as in the supply-chain and customer interaction phase. All manufacturing and support processes should be simplified in the drive to eradicate waste so as to reduce cost as well as deliver better quality products and services in a shorter led time.

Womack et al. (1990) identified three principles of lean: (1) identifying customer value, (2) eliminating waste and (3) smooth the flow of material through the production process. Womack and Jones (2003) elaborated on these principles by adding the optimisation of the value stream, stimulating demand pull and perfecting all processes related to the products or services (Karim and Arif-Uz-Zaman, 2013; Found, 2007). All these principles mentioned by Womack et al. (1990) and Womack and Jones (2003) are possible by first recognising the need for change and subsequent buy-in from top management, and then assembling a multi-skilled team from different levels in the organisation. Information should be transparent and easily made available as departments collaborate throughout the implementation process. The importance of uninterrupted feedback must be understood as part of a drive for continuous improvement (Turesky and Connell, 2010; Found, 2007).

Many examples of failed lean implementation strategies can be quoted (Čiarnienė and Vienažindienė, 2013; Karim and Arif-Uz-Zaman, 2013; Sim and Chaing, 2012; Turesky and Connell, 2010; Schlichting, 2008; Vermaak, 2008; Ahrens, 2006), and few implementations have shown long term success as found in Toyota.

The failure of lean could, in part, be based on the varying definitions and understandings of the concept of lean (Shah and Ward, 2007), but unclear definitions of lean cannot be blamed for the lack of successful lean implementation. Other reasons for unsustainable lean practices are an *organisational culture* which is not ready for change, or willing to change; *leadership or top management support*; the *inability of management to convince and motivate employees* to partake in the lean

journey; employees' *attitude towards lean implementation*; *lack of employee engagement* out of fears of job losses and lastly *no clear understanding of lean*. All these seem to be common reasons for the lack of sustainability (Sim and Chaing, 2012; Slipka, 2012; Turesky and Connell, 2010).

When lean implementations fail or are not sustained, employees often slip back into old habits (Upton, 1996). It is not uncommon to find that companies are worse off after failed lean attempts (Karim and Arif-Uz-Zaman, 2013).

Based on the evidence in literature that focus on failed lean implementation and unsustainable lean journeys, it can easily be concluded that if lean practices are not sustained the organisational culture would be in a very poor state which in turn would jeopardise the future of the organisation.

Mistrust between employees at different levels and in different department within the organisation has the potential to create a toxic working environment, further decreasing open communication. This could hamper the flow of ideas, innovation or new products and services creation, and ultimately the competitiveness of the organisation in the market.

The author of this paper believes that if these topics are not addressed the continued implementation of lean cannot be sustained and the success of lean will be limited to pockets in industries where these problems have been resolved by chance or internal problem solving.

Through the study of literature on successful and unsuccessful lean journeys certain enablers to lean sustainability have been identified. These enablers will assist organisations in creating sustainable lean processes by being able to constantly monitor the state of the enablers as the organisation moves in an ever changing environment. Only through sustainable lean processes can the full benefit of lean be experienced.

1.2 RESEARCH OBJECTIVE

The purpose of this study was to identify and assess enablers of lean sustainability in organisations where lean processes are already being implemented.

1.3 RESEARCH METHODOLOGY

The study was conducted in the quantitative paradigm, as the hypothesised relationship was statistically tested. Organisations or companies that have implemented lean in the organisation or company for at least three years or more, in South Africa, were included in the study. A non-probability sample was taken and participants were recruited via a data base supplied by an expert in the field of lean.

Participant received a link via email to SurveyMonkey.com, a website that hosts the questionnaire which was designed by the researcher.

1.4 OUTLINE OF STUDY

The study comprise of the following chapters:

Chapter 1 provides the introduction and the outline of the study. This chapter includes the problem statement, research objectives, sample and measuring instruments.

Chapter 2 focuses on the literature study that underpins the research problem. The chapter is sub-divided into three sections.

- The first sub-section focuses on lean; its history, definition, tools and processes, implementation and failure, as well as defining sustainability of lean related to this study.
- The second sub-section focuses broadly on Organisation Culture, Leadership, Employee Engagement and Trade Unions in addition to its connection with lean.
- The third sub-section discusses the model that will be implemented in the study.

Chapter 3 discusses the methodology of the study. This includes the research paradigm, the sample, measuring instruments and data analysis procedures.

Chapter 4, the empirical results are reported and interpreted.

Chapter 5, the empirical results are discussed and conclusions are drawn. The chapter also includes recommendations to managers, limitations of the study and highlights areas for future research.

CONCLUSION

In Chapter 1 the problem statement describes the need for an approach to sustain lean implementation processes beyond initial implementation. The chapter described the objective of the research paper and gives a short description of the methodology implemented in the study as well as an outline of the study.

Chapter 2 is the literature study. This chapter is divided into three sections. The first section discussed current literature on lean manufacturing, the history, the processes, philosophies, tools, implementation as well as failure of lean processes. The second section elaborates on Organisational Culture, Leadership, Employee Engagement and Trade Union participation and how these concepts are connected to lean and its sustainability. The third and final section discusses the model created by the author and its connection to the literature of the previous two section of the chapter.

CHAPTER 2

LITERATURE STUDY

INTRODUCTION

The purpose of this chapter is to identify enablers for lean sustainability. Chapter two is divided in three sections. The first section will discuss the history of lean processes, from its earliest concept formulation in the 1800s to the modern understanding of lean manufacturing. The section will discuss the understanding of lean by examining the definitions in current literature on lean processes, the implementation of lean processes in an organisation as well as the tools used in lean implementation processes. Lastly the first section will examine possible reasons for failed lean processes and why these cases were not sustained. The author also defines Sustainability for the use in this paper.

The second section of chapter two discusses the four enablers identified from the previous section. The second section studies literature of the matters of Organisational Culture, Leadership, Employee Engagement and Trade Unions.

The third section of the chapter defines the parameters of the model developed by the author. Organisational Culture, Leadership, Employee Engagement and Trade Unions are discussed in terms of its contribution to lean process sustainability.

SECTION 1: LEAN

2.1.1 HISTORY OF LEAN

The processes of lean have their origins as far back as the 1800s. In 1800 Eli Whitney Jr. proposed the idea of interchangeable parts. Using this together with the invention of the conveyer belt, he and his business partners were able to produce muskets for the U.S. military more efficiently. This new form of producing goods cleared the way for mass production (Schlichting, 2009).

In 1913 Henry Ford was influenced by the concept of interchangeability when he started flow production to produce the T-model. This was the first real example of mass

production (Schlichting, 2009). Whitney's use of conveyer belts was integrated in Ford's flow production. Ford had workers on either side of the conveyer belt, doing the exact same process step on each vehicle as if came by (Schlichting, 2009).

The concept of lean operating systems have also been referred to in the same collection as lean manufacturing, lean production or Toyota Production Systems (TPS) (Shah and Ward, 2007; Kilpatrick, 2003). Much of what has been written about lean mentions Toyota Production Systems (TPS) because of its similarities and common principles. TPS is based on Sakichi Toyoda's work at Toyoda Spinning and Weaving, which has its origins as early as 1904 (Art of Lean, 2013).

Taiichi Ohno, an engineer from Toyoda Spinning and Weaving, was brought to Toyota Motor Corporation after the Second World War (WW2). Ohno and then Toyota president, Eiji Toyoda went to Detroit, U.S. to look towards the automotive production plants for insights on how to deal with the change in demand after WW2 (Schlichting, 2009). They soon realised that the market for new vehicles differed drastically in Japan to that of the United States (U.S.). In the U.S. there was a great demand for new vehicles while very few could afford one in war-torn Japan. They could therefore not use many of the ideas learnt and gain the advantage of economies of scale through mass production as the big automotive companies in the U.S. had (Schlichting, 2009). Together with other engineers at Toyota, Ohno used some of the ideas and tools gained from the U.S. to develop the Toyota Production Systems (Schlichting, 2009; Shah and Ward, 2007). The TPS is founded on the two systems of Jidoka (Build-in-Quality) and Just-in-Time (JIT) (Art of Lean, 2013).

Jidoka, or Build-in-Quality, is the oldest concept on TPS and was created by Sakichi Toyoda in 1902. This concept revolves around building in quality at the production process, and also separating the operator and the machine for multi-purpose handling (Art of Lean, 2013).

According to Pieterse et al., (2010) Just-in-time is a philosophy of manufacturing where parts arrive at the assembly line exactly when they are required, with the perfect quality and no waste, in other words, exact quantity. JIT is also the technique to achieving this.

After the success of TPS, at Toyota in Japan, other companies in the U.S. tried to copy and implement these systems but failed (Staats, Brunner and Upton, 2010;

Schlichting, 2009; Shah and Ward, 2007). Many believed the concept could not be duplicated outside of Japan because of the cultural differences. In 1982 Toyota and General Motors (GM) had a joint venture, the New United Motor Manufacturing Inc. (NUMMI) which produced vehicles at an unsuccessful GM plant. GM supplied the supply network but the production process was fully TPS implemented. This was a very successful operation and later won many awards and proved that TPS could be applied outside of Japan (Schlichting, 2009). The concept of lean is later coined by James Womack and his colleagues Daniel Jones and Daniel Roos, in 1990, in the book 'The Machine That Changed the World: The Story of Lean Production'.

2.1.2 DEFINITION OF LEAN

Lean has been defined in many different contexts. Lean has been referred to as lean thinking, lean production, and lean processes. Čiarnienė and Vienažindienė (2013), offers three deferent levels of lean rational. According to Čiarnienė and Vienažindienė (2013) and Shah and Ward (2007), lean can be defined as a philosophy, a set of principles and a grouping of practices. In actual fact, discussing what is defined as lean often differs between industry specialists and academics (Shah and Ward, 2007). The table below is comprised of different definitions of lean. Following the table will be a discussion on some of these definitions, as well as the formulation of a definition to be used in this study.

Table 2.1 Lean processes Defined in Literature

Author(s)	**Lean Definition**
Karim and Arif-Uz-Zaman (2013, p.171)	"The term "lean" means a series of activities or solutions to minimize waste and Non-Value Added operations, and improve the value added (VA) process."
Sim, and Chaing (2012, p.98)	"…it is often described as a relationship between the technical and the social organization of work. The technical system often includes items like standardized work, visual control, planned maintenance and the just-in-time inventory system. The social organization system has a direct impact on the quality of work life and typically includes screening and selection in human resource (HR) practices, quality training, suggestions, employee

	discretionary authority, management support and management commitment."
Murman et al. (2002), cited in Oppenheim, Murman, and Secor (2011, p.32)	"Lean Thinking: the dynamic, knowledge-driven, and customer-focused process through which all people in a defined enterprise continuously eliminate waste with the goal of creating value."
Anvari, Norzima, Rosnah, Hojjati, and Ismail (2010, p.77)	"…is a philosophy of production that emphasizes on the minimization of the amount of all the resources used in the various activities of the enterprise."
Turesky and Connell (2010, p.111)	"Lean is both a management philosophy and a practical operational perspective focused on systematically identifying and eliminating waste in human effort, inventory, time, and manufacturing space while producing excellent goods and remaining highly responsive to customers' needs and desires (Womack et al., 1990; Murman et al., 2002; Scherrer-Rathje et al., 2009)."
Pieterse, et al. (2010, p.2)	"The purpose of Lean is really to satisfy the customer through faster, cheaper, and better quality products or services. Lean is a systematic way of designing or improving a process or value stream that eliminates waste (muda); improves quality; reduces costs; delights customers; improves employee satisfaction and increases safety. Lean is achieved through the relentless reduction of waste or non-value added activities to create a smooth flow of product."
Rother and Shook (1999); Abdulmaleka and Rajgopal (2007), cited in Karim and Arif-Uz-Zaman (2013, p.171)	"…identification of all types of waste in the value stream of supply chain and implementation of necessary tools to eliminate them for minimizing lead time."
Shah and Ward (2007, p.10)	"Lean production is an integrated socio-technical system whose main objective is to eliminate waste by

	concurrently reducing or minimizing supplier, customer, and internal variability.”
Hopp and Spearman (2004, p.144)	“…the production of goods or services that minimizes buffering costs associated with excess lead times, inventories, or capacity.”

There are many similarities in the definitions. All authors referenced in the table agree with elimination of waste (elaborated later), or non-value adding activities, from the process. This finding is also offered in Petersen’s work on defining lean production in 2009. It is important to note that value, or non-value, is perceived by the client, not the organisation. The use of a variety of tools and practices are used to identify and eliminate waste, or non-value adding activities. Found (2007) referred to “muda”, Japanese for waste, and the elimination of anything that does not add value.

Sim and Chaing (2012), and Turesky and Connell (2010), follow the same line of thinking as Shah and Ward (2007) when defining lean. The authors divide lean into a practical side and a social or philosophical side. Vermaak (2008) divided his study on critical success factors for lean implementation in South African manufacturing into tools and techniques (practical), and people and leadership (social-philosophy).

Another similarity in most of the definitions of lean is that of improving the entire value stream from the suppliers to the end user (Sim, and Chaing, 2012; Pieterse, et al., 2010; Anvari et al., 2010; Shah and Ward, 2007; Hopp and Spearman, 2004).

Womack et al. (1996), cited in Čiarnienė and Vienažindienė (2013), and Womack et al. (1990), cited in Ahrens (2006) describe lean, as the other authors did, as a process and a philosophy of eliminating waste through customer and supplier relations. The authors go on to state that lean is a way to create more work rather than eliminate employees in the drive for efficiency.

For the purpose of this study the author will define lean as the use of people in the organisation to create value for the client through a constant improvement process in the drive for cheaper, faster and better quality products and services by eliminating non-value adding activities from the system through the use of tools and techniques.

2.1.3 LEAN IMPLEMENTATION

The purpose of lean is to create value for the client through a constant improvement process in the drive for cheaper, faster and better quality products and services by eliminating non-value adding activities from the system through the use of tools and techniques.

The Toyota Production System Basic Handbook identifies seven forms of waste which needs to be eliminated from organisations with the implementation of lean systems and processes (Schroeder, Goldstein and Rungtusanatham, 2013; Kilpatrick, 2003). Taiichi Ohno, who played the biggest role in developing the TPS, later known as lean, identifies overproduction, waiting, transport, inappropriate/over processing, inventory, motion and defective work as the seven wastes. The table below gives a short summary of the seven wastes.

Table 2.2 Seven Wastes of Lean

Waste	**Explanation**
Transport	Unnecessary movement of parts or people between processes due to inefficient layout or facility design.
Inventory	Raw material, work-in-progress, or finished goods that require storage, or further handling, which requires added labour and equipment.
Motion	Unnecessary movement of parts, people or machines within the processes.
Waiting	People or parts that are waiting due to breakdowns, changeovers, delays, poor layout or work sequence.
Over production	To produce more, sooner or faster than what is required from the market/client.
Over processing / inappropriate processing	Processing beyond the standard that is required from the market/client.
Defective work	Rework or correction of a process because of poor or defective part or service.

Source: Art of Lean, 2013

Two other forms of waste are often added to the list. These wastes are the underutilisation of people, or their talents, and environmental waste (Karim and Arif-Uz-Zaman, 2013; Kuriger, Huang, and Chen, 2011).

To eliminate these forms of waste an organisation uses certain tools for lean implementation. These include:

Pull System	Bottleneck Analysis
5S	Gemba
Value Stream Mapping	Hoshin Kanri
Kanban	Kaizen
Work Cells	Takt Time
Total Productive Maintenance	Standardised work
Total Quality Management	Key Performance Indicators
Quick Changeover	Heijunka
Batch Size Reduction	Jidoka
Visual Controls	Poka-Yoke

These will be elaborated on later.

Assuming that an organisation is made up of different progressions to deliver a product or service, Womack (2002), cited in Čiarnienė and Vienažindienė (2013), identifies five core concepts of lean:

- Specify what the customer perceives as value;
- The value stream of each product's activities which add value or not must be identified, while getting rid of muda;
- Strive for continuous flow of production;
- Where continuous flow is possible a pull system should be introduced; and
- Manage towards perfection, so that the number of steps and the amount of time and information needed to meet the customer's demands continually decrease.

Not every lean implementation requires the same tools. After a thorough investigation of the current state of production, the necessary tools required will become apparent (Čiarnienė and Vienažindienė, 2013; Karim and Arif-Uz-Zaman, 2013; Anvari et al., 2010; Lewis, 2000). Upton (1996) stated that each improvement strategy should be custom-made to suit the uniqueness of the organisation and its situation, in nature and

direction. The difficulty, according to Upton (1996), often lies in the systems, policies, routines and common values of understanding in the organisation, rather than implementing tools, machines, equipment or the plant.

Sarkar (2011) suggests that before any continuous improvement journey is started the business strategy must be aligned with a plan that includes what has to be achieved over time and what business outcomes are expected for the future.

In a study done by Karim and Arif-Uz-Zaman (2013) the following steps have been identified for effective lean implementation.

- After the company status, including production or service process types, have been evaluated, the company has to assemble a lean implementation team. This team will contribute to creating an organisational culture of lean. The team will define and evaluate the performance indicators based on quality, process time and cost.
- The next step is to identify wastes through Value Stream Mapping (VSM), visual control and time study methods by sketching the existing process status.
- The third step in the process is to measurement of the current state of the process. The team selects and implements new lean tools depending on the current scope of production and wastes present in the process.
- After implementation, the effectiveness and efficiency of the proposed process is again evaluated.

Through this whole process the culture of continuous improvement techniques needs to be developed within the environment of implementation and with personnel related to the area where lean is being implemented (Karim and Arif-Uz-Zaman, 2013).

Turesky and Connell (2010) offer a framework that they believe would contribute to sustainable lean implementation. The authors describe the first phase of the framework as the **Foundation Phase**, and consists of support and communication before, during and after implementation by top management, as well as train and development of all employees in the organisation.

The second phase is called the **Preparation Phase**. This phase focuses on correctly selecting the right project to implement lean on, employee engagement, goals for

improving processes and services, and manage resistance to change. Resistance to change can lead to failed lean implementation.

The **Implementation Phase** consists of selecting the lean implementation team members, and the implementation of the lean processes and tools.

The final stage is called the **Sustainability Phase**. In this phase the focus is on accountability and ownership of employees for the lean implementation processes, follow up from management in the drive for continuous improvements, and lastly, feedback loops for learning from the efforts of the employee and the reengaging of management to sustain a lean culture.

Upton (1996) identifies **Six Improvement Processes**. The first process is **training (1)** which includes educating groups and individuals. At first sight training seems to just provide skills to the employees who require them to do their job better but there is a secondary role to it. It builds confidence to execute new processes and systems; it establishes trustworthiness and opens channels for communication. Lastly, it builds a sense of commonality and experience.

The second process is focussed on **team initiatives (2).** These are temporary multidisciplinary teams assembled to address a particular problem. These teams are afforded the opportunity to rid themselves of the bureaucratic bonds that traditional structures might hold but also create a spring board for new approaches throughout the organisation. Ahrens (2006) also found that empowered teams in operations means that the organisation is less hierarchical than traditional organisation. Tiwari and Gil (2010) suggest that the teams should have representatives from each critical function in the organisation and must consist of talented individuals.

The third process for improvement initiatives in the organisation is new **processes and tools (3)**. These processes and tools include Statistical Process Control and Quality Function Deployment. Employees are more likely to commit to the improvements due to the “what” and “how” of the improvement path, which leads to unification of the group (Upton, 1996).

The fourth process focus on **knowledge development and preservation (4**). The knowledge development process is often used as an instrument through which improvements are carried out. Upton (1996) states that active experimentation

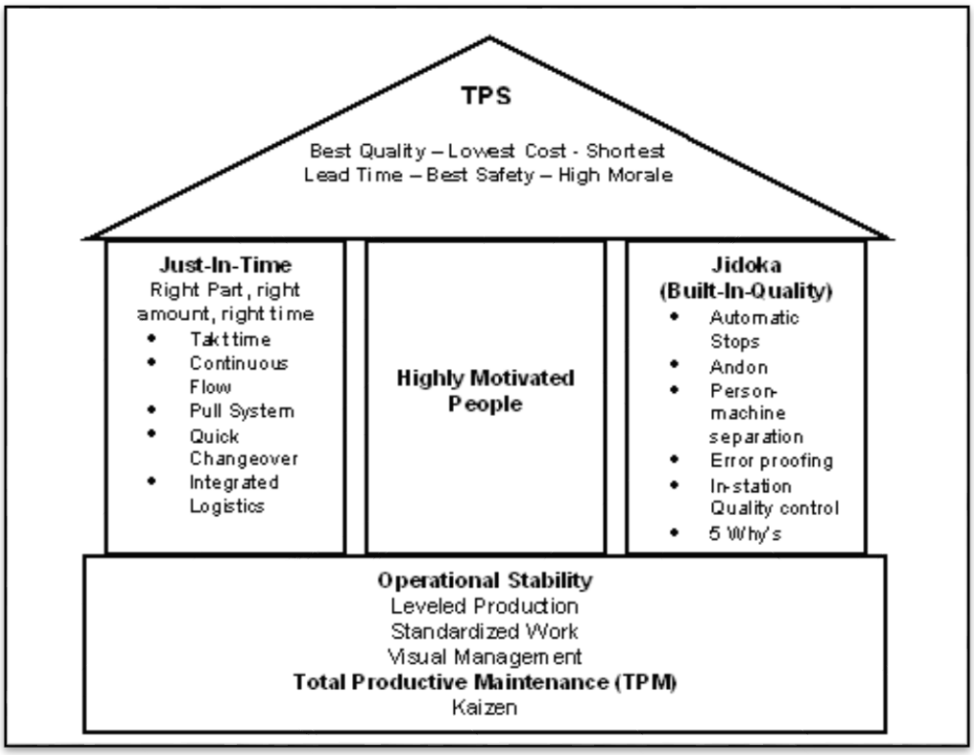
programs are valuable tools to initiate an improvement process. This relates to Martins and Terblanche (2003) and their work on an organisational culture that promotes innovation and creativity.

External comparison (5) is the fifth process. External comparison contributes to the improvement process in two ways. Firstly through benchmarking as it is used as a diagnostic tool and secondly, to stimulate improvement. This involves comparing one's own operations with the use of physical, clearly measurable information such as lead time, variable cost, defects and physical levels of inventory.

Lastly, **organisational change (6)** has resulted in tremendous improvement in performance by reorganising the existing managerial structures. More is discussed in the chapter on Organisational Culture.

The end result of a successful lean implementation would result in the "House of Lean" which is a graphical description of the Toyota Production System as described in the Toyota Production System Basic Handbook (Art of Lean, 2013), and work done by authors like Schlichting (2009).

Figure 2.1 House of Lean



Source: Schlichting (2009)

The idea behind the graphical representation of TPS (Figure 2.1) is to show the interdependence of elements in the system. The roof of the house is the driving force of lean, which is to eliminate waste through constantly improving the quality, productivity, safety, and workforce morale, as well as cost reduction. The idea is that continuous improvements will lead to a competitive advantage in the market. Continuous improvement drive should not be limited to the production floor but include all parts of the organisation.

The first pillar represents Jidoka (Build-in-Quality) which aims at improving the quality of products and services through the employees' ability and the machines' ability to identify any irregularities in materials, machines or methods, and in preventing any of the irregularities being passed on to the next step or process (Art of Lean, 2013).

The second pillar represents Just-in-Time (JIT). The JIT system implies that products, parts and materials are supplied only when required at the location, and in the amount and quality required, in the production process. The objective is to eliminate inventory and work-in-process.

At Toyota, employees are at the heart of the system and can be seen as the middle pillar of the house of lean (Schlichting, 2009). The company goals can only be achieved through the contribution of all employees in the organisation (Art of Lean, 2013; Anvari et al., 2010, Vermaak, 2009). The employees contribute to the culture of lean, and the constant improvement drive, by setting and maintaining standardisation of work, daily problem solving, continuous improvement participation, and effective teamwork in the organisation (Art of Lean, 2013).

The base represents operational stability and total productive maintenance (TPM). Operational stability is achieved through levelling production, standardising work and visual management, as well as TPM. TPM helps to optimise production instruments to prolong the equipment life, keep maintenance cost down and increase profitability through the contribution and expertise of the employees within the organisation (Pieterse et al., 2010).

2.1.4 LEAN TOOLS

Lean tools are processes and strategies used to identify the different forms of waste and implement solutions to eliminate the waste and increase efficiency of the process under evaluation. It must be noted that not all tools are required during lean

implementation (Anvari et al., 2010). The initial evaluation of the situation would determine which of the tools would be appropriate. Some of the most appropriate tools are discussed below.

2.1.4.1 Value Stream Mapping

Value Stream Mapping (VSM) is a planning tool that is used to map the flow of the current production process, or to put it another way, it is a diagram that indicates all the activities that bring a product or service to the customer. It can show the present state but also the future state of the production process once waste has been removed. The first value streams selected for analysis are usually those of high-volume products (Pieterse, et al. 2010) and services, or groups of products and services with similar processing.

Once the organisation has decided to implement lean, a multidimensional team is put together to analysis value streams, identify areas of concerns (waste) and set a plan in action of how to create a future state (Karim and Arif-Uz-Zaman, 2013).

2.1.4.2 Workplace Organisation (5S)

Workplace organisation and standardisation, also referred to as 5S, consist of the Japanese phrases Seiri, Seiton, Seiso, Seiketsu and Shitsuke. The table below translates these phrases practically:

Table 2.3 Workplace organisation (5S)

	Japanese	**Translation**
1.	Seiri	Sort, Clearing, Proper arrangement, Classify
2.	Seiton	Straighten, Configure, Orderliness, Simplify
3.	Seiso	Sweep, Clean and Check, Shine
4.	Seiketsu	Schedule, Conformity, Standardise, Stabilise
5.	Shitsuke	Sustain, Custom and Practice, Self-Discipline

Source: Pieterse et al. (2010)

The concept of 5S is usually the starting point for lean implementation into an organisation and can be implemented throughout the organisation. It is often referred to the cornerstone for successful lean implementation (Pieterse, et al., 2010).

The first step in the 5S process is to sort the clutter or materials according to its use or need. Everything that is not needed is removed to be sold off or discarded. If the team is unsure of an item, it can be moved to a holding area for a selected duration.

The second step is to arrange the items that have a need in the specific work area in an efficient manner through ergonomic principles. Every item must have its place and be easily accessible for when it is required (Pieterse, et al., 2010).

The third step is to clean the work area by sweeping, dusting, shining and even painting the machines and work areas. This includes not only the work area but all tools, machines and other equipment, to a state as close to new as possible.

The fourth step in 5S is to insure that what was done in the first three stages becomes standardised. Regular scheduling of 5S helps the process become a sustained habit.

The last step is to ensure discipline in practicing and repeating the first four steps until they become part of the culture of the organisation. This is the first step in creating a sustainable lean culture in the organisation (Lean Manufacturing Tools, 2014).

2.1.4.3 Pull system

Pull manufacturing refers to a system of Make-To-Order. This means that production is based on the actual customer or market demand. The Pull system was first introduced at Toyota, Japan. Automotive manufacturing had traditionally made use of a Push system, which means to Make-To-Stock. The Push system is not based on actual demand. Many production facilities still make use of this system to again the advantage of economies of scale.

Just-in-Time (JIT) is a representation of the pull system. Materials are pulled through the production process as it is required. Materials are only taken up when they are required from the preceding workstation. Preceding workstation cannot push its completed components or materials onto following workstation. A Kanban system is used to indicate when materials are required (Schroeder, Goldstein and Rungtusanatham, 2013).

2.1.4.4 Kanban

Kanban is a Japanese phrase to illustrate an orderly flow of materials. It works on a pull system, whereby parts are only supplied when required. This ensures constant flow of parts and avoids the previous stage in the production process overloading the

next stage. The system makes use of visual indicators informing the previous stage that it can now supply the following stage with parts, in other words, workflow. Applying the concept of Kanban will limit work in progress (Vorne Industries Inc., 2013a; Pieterse et al., 2010).

Figure 2.2 Kanban Card

Source: Ferdinand Gross GmbH and Co. (2014)

With kind permission of Ferdinand Gross GmbH & Co. KG

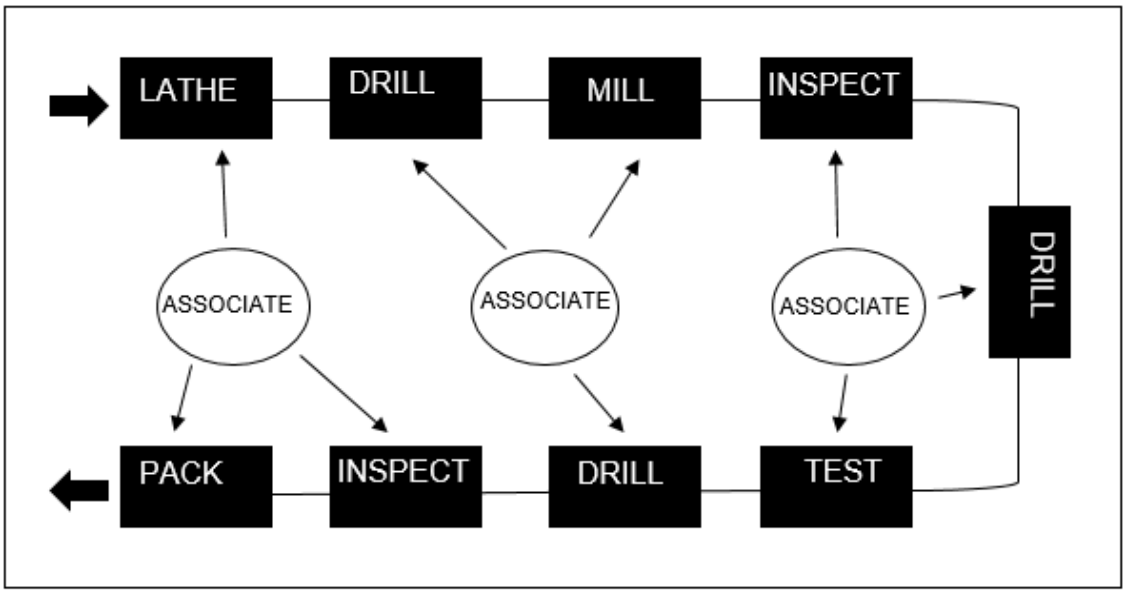
The Kanban system indicates to the previous station to deliver a standard quantity of parts, as well as the type and size of parts to deliver (Pieterse, et al., 2010). In other words, to deliver the exact part required for assembly in the next stage of the process.

There are different alternatives with the Kanban system: the two-card Kanban, the one-card Kanban, a container-based Kanban, shelf-space Kanban or emails and fax system (Pieterse et al., 2010).

2.1.4.5 Work Cells

Cellular layout is a technique of grouping the work force in a u-shape rather than straight-line production line style. With lean manufacturing or services the system becomes more streamline owing to lot size reduction. Inventory is held close to the point of use and work becomes standardised to avoid future problems re-emerging. Work Cells create more space on the production floor as store rooms are eradicated, inventory is delivered to the point of use and to promote streamline flow machines are grouped to follow that flow and reduce any waste in production time.

Figure 2.3 Example of a cellular work station



Source: Author's own Illustration

2.1.4.6 Total Productive Maintenance

Through the contribution and expertise of staff, Total Productive Maintenance helps to optimise production instruments to prolong equipment life, keep maintenance cost down and increase profitability.

Total Productive Maintenance is considered to be the hardest tool to implement (Pieterse, et al., 2010) because of the general neglect of maintenance in production. Every person who operates any piece of machinery is responsible for proper setup and maintenance, and not only the maintenance personnel, as is usually found in production.

TPM is characterised by three aspects, i.e. Total Approach, Productive Action and Maintenance. Total Approach refers to a philosophy which deals with all aspects of the organisation and the people who operate, set up and maintain equipment, or systems, within the organisation (Pieterse, et al., 2010). Productive Action aims to consistently improve productivity and systems within the organisation (Pieterse, et al., 2010).

The maintenance and improvement of the effectiveness of the facility and overall reliability of production operations is the third characteristic of TPM (Pieterse, et al., 2010).

2.1.4.7 Total Quality Management

Total Quality Management (TQM) is based on continuous improvement of all aspects of the organisation and recognises the strengths of employees. TQM is not a tool or system to be implemented as such but an entire way of doing business. This way of doing business, or philosophy, has the purpose of providing quality products or services to its clients, which in turn increases productivity and lower costs (Pieterse et al., 2010).

The principles of TQM align well with lean manufacturing. As with lean, meeting or exceeding customer satisfaction through improved quality is the number one priority. It must be led from the top as management must provide the leadership for quality. Each employee is involved and responsible for creating and ensuring that the products and services offer quality. Through continuous coaching and training, employees can improve quality at an ongoing basis. Through collaboration with management employees solve quality problems found in the production process. Statistical process quality control and other methods are used for solving problems and improving quality (Pieterse et al., 2010).

2.1.4.8 Gemba

Gemba is a philosophy that reminds management to spend time on the plant floor for first-hand observation and employee engagement. Observation takes place where customer value is being created and is not an aimless observation without purpose (Lean Enterprise Institute Inc., 2014).

2.1.4.9 Hoshin Kanri

Hoshin Kanri is the process of aligning the strategies, tactics and actions of the whole organisation from executive management all the way to the process floor to ensure that everybody in the organisation knows what to do and how to achieve it. This is done through four implementation steps. Firstly, top management or executive management develops a strategic plan for the long term goals of the organisation.

Secondly, tactics are developed through mid-level management to achieve the goals set out by the executive management. It is very important to have back and forth

communication to ensure that the strategy and goals are correctly understood. Strategies and tactics need to be aligned and Key Performance Indicators (KPIs) must be meaningful and appropriate. This can only be achieved through continuous communication.

The third step in Hoshin Kanri implementation is for supervisors and team leaders to determine the operational details to implement the tactics as given by mid-level management. Here again communication back and forth between the shop floor and middle management is very important to ensure alignment with the strategy and tactics. Gemba is implemented as this level and plays a very important role to stay closely connected with what is happening on the ground.

The last step is to review and adjust. This means that as information flows down through the organisation, it is equally important that information flows back up to top management which enables control and the ability to adjust the process (Vorne Industries Inc., 2013a).

2.1.4.10 Kaizen

Kaizen is the process of continuous improvement. This is done through constant incremental improvements with the collaboration of employees in the manufacturing process (Vorne Industries Inc., 2013a). The collaboration with employees is often done with Kaizen events, or Kaizen blitz, which last for a couple of days or even a week. The idea is to identify an area in operations that is experiencing increased problems in quality and focus on creating significant improvements in performance (Schroeder, Goldstein and Rungtusanatham, 2013). Kaizen and Kaizen blitz events will be discussed further in the sections on organisational culture and employee engagement.

2.1.4.11 Poka-Yoke

The philosophy of waste elimination requires minimizing defects or mistakes to zero. Therefore there needs to be error recognition and prevention developed and integrated into the production process to work towards waste elimination (Vorne Industries Inc., 2013a; Pieterse, et al., 2010).

There are six basic mistake-proofing principles or methods:

- Redesign the product or service so that it is no longer required and therefore eliminating the possibility of an error;

- Replace a process with a more reliable process to improve reliability;
- Designing the product or process to prevent the possibility of any mistakes;
- Facilitating the work through easier steps to perform the tasks with less chance of mistakes;
- Develop a detection method that identifies an error before any further steps in the process can happen and the user can correct them; and
- Diminishing the effects of the errors such as fuses that prevent circuit overload (Pieterse, et al., 2010).

2.1.4.12 Bottleneck Analysis

The Theory of Constraints (TOC) surmises that within each system there are certain constraints limiting the ability of the system to deliver value adding products and/or services, in other words, the throughput of the system (Institute of Management Accountants, 1999). These constraints are also referred to as bottlenecks. Bottleneck Analysis is to identify limitations on throughput and to improve performance of the manufacturing process (Vorne Industries Inc., 2013a).

The TOC offers five processes that contribute to bottleneck analysis:

- Firstly, identify the current constrain or bottleneck on the system under improvement.
- Secondly, once the constraint has been identified, make quick improvements to the constraint using what is available. The throughput of the constraint must be maximised.
- Thirdly, all other activities in the system must be aligned with the constraint. Regardless of the throughput of the other processes in the system, it must only supply what the constraint can handle but never less than it can handle.
- The fourth process is to elevate the constraint. If the previous three processes have not elevated the process, capital will need to be invested in the form of another machine or worker(s) or technology. This is done until the limitation is no more the constraint.
- The last step is to repeat the whole process. Once the constraint has been elevated, the process has to be evaluated to identify the new constraint on the system, where after the same five steps of TOC will be applied to the new

constraint (Schroeder, Goldstein and Rungtusanatham, 2013; Pieterse et al., 2010).

2.1.4.13 Visual Controls

Visual controls are used as a clear indication of the immediate situation or conditions on the factory floor or even in hospital waiting rooms. These can be colour cards, lights or lines clearly indicating sections, or areas, or the work spaces. The visual controls can display information on the current situation of a production line. It can highlight desired condition, current condition as well as the present shortfall. It could also indicate the status of the production line (Vorne Industries Inc., 2013a; Pieterse et al., 2010).

Figure 2.4 Visual controls in manufacturing

Source: Vorne Industries Inc. (2013b)

With kind permission of Vorne Industries Inc.

The visual controls can also be used to indicate a tool or machine's position in the factory. Another role is to also indicate the flow of material in the case of cards accompanying the Kanban boxes or trollies. This increases efficiency as well as the effectiveness of the process by providing the required information where it is needed.

2.1.4.14 Takt Time

Takt time is used to align the pace of the production process with that of the demand of the client (Vorne Industries Inc., 2013a). This can be calculated by dividing the available production time by the number of parts required. The Takt Time should be as close to equal to that of the demand rate of the customer. A Takt Time equal to the demand rate would minimise the required inventories and increase the efficiency of the production floor (Schroeder, Goldstein and Rungtusanatham, 2013; Pieterse, et al., 2010).

2.1.4.15 Standardised Work

Standardised work is documented as best-practice for a manufacturing process. It could include the time to complete a task or the level of deviation allowed. This Standardised work document is a living document, so that it could change as processes improve and standards are improved. By consistently applying standardised work, or best practices, waste is being eliminated. Standardised work provides a baseline for future process improvement (Vorne Industries Inc., 2013a).

According to Liker (2004), and referenced by Pieterse, et al. (2010) there are certain prerequisites for standardised work. Firstly, the most recent job description should be used. Secondly, the description on how to perform the job must be the fastest, safest and most effective way. Thirdly, the descriptions must be written in an uncomplicated language that is easy to understand, and if required should also have pictures or diagrams for better clarification. The fourth prerequisite is that the workers need to be trained in the manner needed to perform the job flawlessly. Fifth, the standard procedures must be easily visible from the area where the work is performed. And the last prerequisite is that the worker must contribute to the writing of the standards of work.

2.1.4.16 Key Performance Indicators (KPI)

Measurements and metrics, called Key Performance Indicators, are used to support and facilitate achieving the critical goals of the organisation (Alzatex, nd). The measurements and metrics need to be up to date, aimed at the future, and aligned with the strategic goals of the organisation. KPIs are important measurements of the improvements in waste elimination through lean process, as well as the organisational growth.

In lean manufacturing, KPIs can motivate the staff, positively contribute to organisational culture, and promote kaizen. This could be ascribed to KPIs uncovering of waste in the system and provide direction to possible solutions to eliminate the waste.

The negative effect that KPIs have is that it could limit continuous innovation and improvements, thus limiting the lean journey, or result in stagnation. These KPIs need to be re-evaluated on a constant basis to avoid stagnation.

2.1.4.17 Jidoka

Manufacturing processes has changed to become partially automated. This partially automated system was dubbed autonomation by Toyoda Sakichi, which can be described as automation with a human touch (Ahrens, 2006). Jidoka refers to the production line stopping automatically when defects are detected. The objective is to decrease the amount of defective work produced, reduce occurrence of injury to employees or damage to machinery when something does go wrong, and lastly to separate human work from machine work (Art of Lean, 2013).

With the change to automation fewer workers are required because each worker can monitor more than one workstation (Vorne Industries Inc., 2013a). See Figure 2.3 on page 29 for an example of workers operating more than one station.

2.1.4.18 Other tools

2.1.4.18.1 Quick Changeover

Quick Changeover refers to the ability to quickly change production processes more frequently from one to the other. This is also referred to as SMED or Single Minute Exchange of Die. The objective is to make the change over in less than ten minutes (Vorne Industries Inc., 2013a; Kuriger, Huang and Chen, 2011; Pieterse, et al., 2010).

2.1.4.18.2 Batch Size Reduction

For lean the ideal batch size is one but that is not practical and continuous improvements must be made to the processes to produce batches as small as possible. By reducing the size of each batch produced Work-in-Progress (WIP) is also reduced. (Kilpatrick, 2003).

2.1.4.18.3 Heijunka

Heijunka is a form of production scheduling to allow mixing product variants within the same process (Vision Lean, 2008). This will allow smaller batches to be produced but will accommodate for sudden fluctuations in demand. The lead time is reduced as each product is manufactured more frequently causing a reduction in inventory with only small batches of the particular item needed (Vorne Industries Inc., 2013a).

2.1.5 FAILED LEAN IMPLEMENTATION

Lean has become increasingly more popular as a valuable process to gain a competitive advantage, especially in the light of strong competition and discerning consumers. Its popularity has led to a plethora of research and “experts” in the field of

lean processes and tools, as well as implementation strategies for successful lean organisations. Regardless of all this information so many organisations, in different spheres of industry, still fail to gain the long term advantages associated with lean.

According to Vermaak (2008), the generally accepted lean success rate in literature is between 10 percent and 20 percent. According to his study it bodes even worse for South Africa, with only 4.3 percent reported success, 29.4 percent still on track towards successful lean implementation, 12.9 percent had failed and 53.5 percent were struggling with successful implementation.

Rubrich (2004), cited in Schlichting (2008), suggests that up to 75 percent of lean implementations fail because of unclear implementation strategies (Karim and Arif-Uz-Zaman, 2013). Karim and Arif-Uz-Zaman (2013) state that the implementation of an inappropriate lean strategy could actually create more waste and inefficiency.

Schlichting (2008) goes on to identify seven causes for failed lean implementation. These being:

- management support not being present;
- lack of involvement by employees;
- organisation lacking consumer focus;
- not enough funding to complete or properly implement lean;
- lack of operational stability like standardised work;
- the use of the wrong lean tools; and
- too hasty lean transformation.

Ahrens (2006) found another possible reason for failed lean implementation where misguided engineers in his study were under the impression that by implementing lean tools they had captured the essence of TPS, or lean thinking.

Čiarnienė and Vienažindienė (2013) found that the overemphasis of tools and techniques rather than people-related issues such as trust, motivation and commitment, within the organisation, was a key source for lean failure.

Further authors identified employees' fear of possible job losses as reasons for a lack of employee involvement in lean implementation drives (Fiume (2007), Pfeffer (1998), Adler (1995), and Locke (1995), all cited in Sim and Chaing, 2012; Turesky and

Connell, 2010; Ahrens, 2006; James, 2006). In the work by Sim and Chaing (2012) it is suggested that one of the reasons lean is not sustained is because over time the input from employees diminish to protect their jobs. The employees fear that by being more effective they are actually working themselves out of a job. Any improvement program or initiative needs management to reassure the employee of job security, which is at the forefront of most employees' concerns.

Research by Hines, Holweg and Rich (2004), Bruno and Jordon (1999), Bruno and Jordon (2002), Sim and Rogers (2009), all cited in Sim and Chaing (2012), identified a negative effect on the morale of employees in organisations implementing lean, which resulted in unhappy employees and employee withdrawal from the lean initiative. This was the result of employees feeling a sense of job insecurity and perceiving lean as a redundancy threat.

Sim and Chaing (2012) further found that employees alter their efforts or withdraw from their jobs which resulted in below average work behaviour. On the other side of the coin some employees felt that their ideas where not valued. Sim and Chaing (2012) also suggested that diminished morale, due to the frequent change in leadership in one of the companies being studied, led to its lean journey coming to an end.

Upton (1996) suggested that Western firms failed initially at implementing lean processes and practices because employees failed to change the way in which they viewed their work, or were not able to promote the philosophies of lean that encouraged identifying improvements in the systems and processes. A further reason for failure was that the new philosophies (JIT) described by key managers were philosophies and beliefs systems that were not transferable to others. This made it difficult for others who sought clear instruction for improvement processes and thus success seemed very limited (Upton, 1996).

In a case study by Sarkar (2011), the author identified the lack of buy-in by the leadership in the organisation to cause the project to fail. They did not see the value of the lean implementation, which ultimately led to a lack of enthusiasm on spending a second round on lean implementation projects. In a study by Slipka (2012) the lack of leadership buy-in and the absence of the executive management during the initial lean implementation and Kaizen events also lead to its failure. These cases strongly suggest that organisations cannot embark on a continuous improvement initiative

without an adequate mindshare of its leadership. Furthermore, if top management cannot create, embrace and communicate the strategic organisational plan, vision, purpose and goals about lean manufacturing in the organisation, it creates a communication gap between the employees and management (Turesky and Connell, 2010).

As mentioned earlier, Schlichting (2008) identified missing management support as a reason for failed lean implementation. This refers to one person in the organisation who is assigned to drive the lean initiative but does not receive any support from upper management, who has to provide him, or her, with resources such as people, money, machines and material. This person also has to demonstrate the effectiveness of the lean tools to be taken seriously by all employees with the hope of creating a culture change.

Another reason for lean failure, identified by Schlichting (2008), was lack of employee involvement. This is due to a lack of communication of ideas throughout the organisation as well as the failure to implement and improve lean processes. Not all employees are included in the problem solving process where top-down implementation involves problems to be solved by upper departments (like engineering) and then forced onto the operators.

Found (2007) also identified communication as a barrier for lean sustainability. The author stated that departments, beyond the production process, jealously guarded their own “empires, roles, ideas, information and direct reports”. This is supported by Čiarnienė and Vienažindienė (2013), who also found that over-used jargon and a lack of clear messages to staff hampered the success of lean.

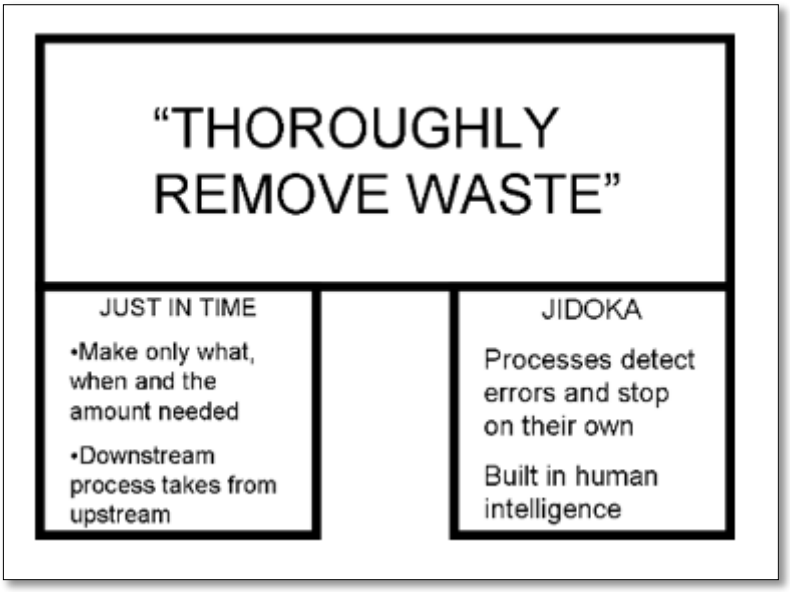
Kumar (2010), cited in Sim and Chaing (2012), argues that an unsupportive and uncommitted organisational culture is a big barrier for successful lean implementation. Čiarnienė and Vienažindienė (2013) stated that resistance to change in an organisation would make the path to lean almost impossible to walk, as lean requires a major change in the organisation’s culture. A new culture of continuous improvement techniques needs to be developed (Karim and Arif-Uz-Zaman, 2013). Sim and Chaing (2012) also argued that lean cannot succeed if the organisational culture is against lean implementation. Naysayers in an organisation have a lot of influence and can

derail any attempt to implement and sustain lean programs. They need to be converted or else disposed of.

In a study done by Slipka (2012) it is was stated that if the culture was totally different from that which is required for lean implementation, the implementation process will not succeed, as was the case in the study.

Another very damaging reason to lean sustainability is the “Reduced House of Lean” illustrated below in Figure 2.5.

Figure 2.5 Reduced House of Lean



Source: Schlichting (2008)

Schlichting (2008) states that most of the literature found today focus on a single goal of eliminating waste through JIT and Jidoka. Eliminating waste is a critical facet of lean but is not the only goal. At present the focus during lean is very much on the two pillars of JIT and Jidoka, whereas factors like levelled production, standardised work and visual management receiving less attention. The “middle pillar” of motivated employees contributing to the sustainability of lean also receives much less attention that JIT and Jidoka. Schlichting (2008) goes on to say that though employee involvement is often mentioned little guidance is presented, and since the employee is removed companies focus on the tools of lean and implementation without a second thought of what would be required to successfully implement and sustain such tools.

2.1.6 SUSTAINABILITY

To determine what is required to sustain a project or process, the term sustainability needs to be clarified in terms of this study. The current popular understanding in research is based on three pillars; economic, environmental and social also known as the triple bottom line (Deloitte, 2010; Taubitz, 2010). The concept of sustainability has mainly been based on the sustainability of the planet (Taubitz, 2010). As the 1987 Brundtland Commission report states: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (NGO Committee on Education, 1987; Deloitte, 2010).

In this paper, sustainability is defined as the ability of a process implemented in an organisation, to continue from now and into the future. Few studies have looked at sustainability of lean manufacturing processes, specifically in a South African context. This is very relevant as few companies seem to be able to continue with implementation of lean processes over a long period of time (Čiarnienė and Vienažindienė, 2013; Karim and Arif-Uz-Zaman, 2013; Sim and Chaing, 2012; Turesky, and Connell, 2010; Schlichting, 2008; Vermaak, 2008; Ahrens, 2006).

SECTION 2: ORGANISATIONAL CULTURE, LEADERSHIP, EMPLOYEE ENGAGEMENT AND TRADE UNIONS

2.2.1 ORGANISATIONAL CULTURE

The culture within a business is referred to as the organisational culture and can be defined as the shared beliefs and assumptions of the members of that organisation or business (Werner, et al., 2011). The culture adopted within a company creates a corporate identity that distinguishes itself from other organisations or businesses. It also forms part of the identity of the individuals within that organisation (Werner, et al., 2011). Van den Berg and Wilderom (2004, p.571) define the organisational culture as "shared perceptions of organisational work practices within organisational units what may differ from other organisational units". This definition agrees with that of Werner et al. (2011).

Pieterse et al. (2010) summarises the principles of lean culture as follows:

- a place for everything and where everything is in its place;
- teamwork;
- where lean family stretches beyond the organisation and includes the customer and the supplier;
- where workers are seen as associates that contribute to idea generation and implementation;
- where there is a shared responsibility for aspects such as quality, scheduling, maintenance, etc. by all employees in the organisation; and
- where worker or associates' jobs are safe.

The organisational culture is seen as a critical success factor for the success of any organisation (Martins and Terblanche, 2003). To successfully implement change in the organisation, as required for implementing lean, it necessitates a supportive organisational culture (Turesky and Connell, 2010).

Robbins (1996), cited in Martins and Terblanche (2003) states that for an organisation to continue its level of successful strategic implementation, it requires a strong culture that provides shared values among all employees. In lean literature Hoshin Kanri is a method of developing the entire organisation to pull in the same strategic direction. And because lean implementation is a never-ending process, it has to become part of

the DNA of the organisation, entrenched in the hearts and minds of all in the organisation (Pieterse et al., 2010).

Martins and Terblanche (2003) developed a model that describes the influence of the organisational culture on the degree of creativity and innovation within the organisation. The authors identified five determining factors of organisational culture that influence the creativity and innovation within the organisation. The five determining factors are strategy, structure, support mechanisms, behaviour that encourages innovation and communication.

According to Martins and Terblanche (2003) the **first** variable, as a determining factor of an organisation that influences creativity and innovation, is strategy. According to the model developed by Martins and Terblanche (2003) the organisational strategy must be in line with innovation. The strategy for innovation influences the amount in which creativity and innovation will take place. For lean to be sustainable in the organisation it also has to be a strategic driver (Vermaak, 2008).

Robbins (1996), cited in Martins and Terblanche (2003) states that an innovation strategy promotes the development and implementation of new products and services. A lean strategy is similar as the goal is to continuously improve processes and systems in the organisation.

Vermaak (2008) found that for lean sustainability there has to be a clear link between the lean organisational goal, key objectives and lean activities. Creating such a link explains the concept and implementation of Hoshin Kanri.

Lean has to be a strategic driver in the organisation. Lean will be seen from a long-term perspective once it has become part of the organisation's strategy. This will ensure that resources are allocated to lean implementation. To become a strategic driver in the organisation lean requires the commitment of executive leadership to the philosophy and principles of lean.

The **second** determining factor for the model by Martins and Terblanche (2003) is the structure of the organisation. It is accepted that the culture of the organisation has an influence on the structure and operations systems in that organisation. The structures within the organisation seem to restrict or promote creativity and innovation is based on the values these structures highlight (Martins and Terblanche, 2003). Jenner

(1998), cited in Turesky and Connell (2010), surmise that if an organisation hopes to sustain its lean implementation is must create flat structures, become flexible and highly adaptable, dynamic and change-oriented to striving towards increased efficiency and innovation.

Values like flexibility, freedom and cooperative teamwork that make part of the organisation's structural values, positively influence creativity and innovation. Implementing these values would allow employees the freedom to go about their work and adapt procedures within the guidelines of the organisation (Martins and Terblanche, 2003).

The **third** determining factor is support mechanisms within the organisation that promote creativity and innovation. This includes rewards and recognition, as well as the availability of resources such as time, information technology and creative employees. When the company rewards employees for risk taking, experimenting with potential solutions to problems and generating new ideas to solve problems in the system, it contributes to a culture that encourages creativity and innovation. Intrinsic rewards like independence promote innovation. Rewards will not be discussed in detail but groups and individual should be rewarded and sensitivity should be shown with regard to which reward is given to get the best out of the employees.

The groups or teams assembled for projects benefit from having members from diverse background as each member has a different perspective and can bring new and different or innovative ideas to the project (Martins and Terblanche, 2003). .

Denti and Hemlin (2012) found that leaders have to provide support to teams and individuals in order to facilitate them in turning their creative efforts into improvements to the processes, products or services. Leaders also have to manage the goals of the organisation, as well as managing activities aimed at innovation. It is important that knowledgeable and experienced team leaders participate closely in the evaluation of innovative activities.

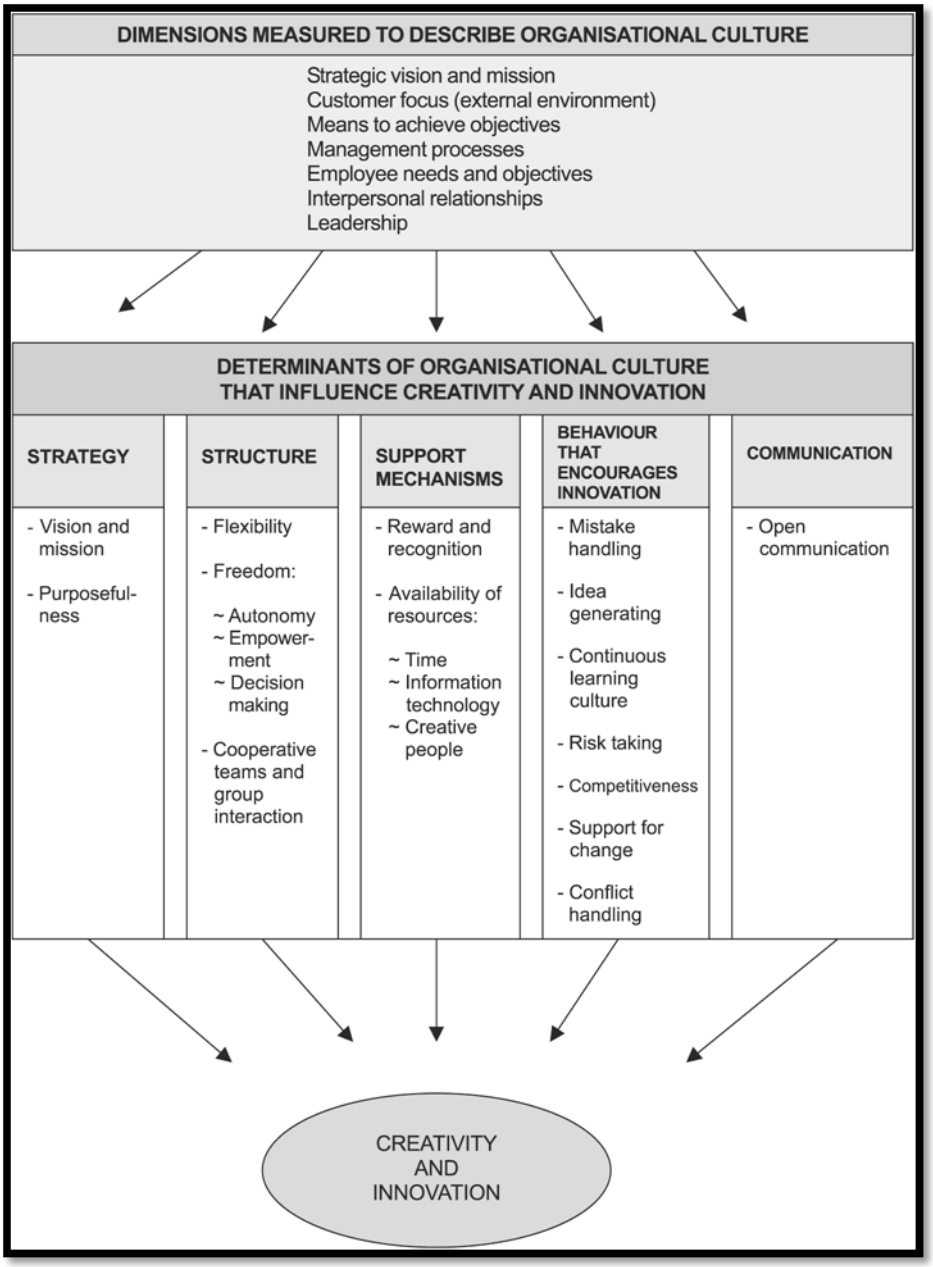
Behaviour that encourages innovation is the **fourth** factor that determines a culture for innovation and creativity. The values and norms will influence the behavioural mind-set towards creative and innovative thinking. The way in which the employees approach a problem situation is determined by how comfortable they are in being creative and innovative towards solving the problem (Martins and Terblanche, 2003).

The way in which mistakes are then handled is important. Employees should be allowed to make mistakes within given parameters. These mistakes should be discussed and employees can learn from them. Once this happens an organisational culture is developed that promotes creative and innovative thinking. The behaviour of allowing mistakes and learning from them is indicative of successful organisations with creative and innovative organisational cultures (Martins and Terblanche, 2003).

Denti and Hemlin (2008) suggest that for innovation or a creative knowledge environment to exist, it is essential for the team and individuals to have self-sufficiency and space for idea generation and creative problem solving.

The **fifth** and last determining factor according to Martins and Terblanche (2003) is communication. Barret (1997) and Robbins (1996), cited in Martins and Terblanche (2003), suggests promoting creativity and innovation to create an organisational culture that is transparent and allows for open communication.

Figure 2.6 Influence of organisational culture on creativity and innovation



Source: Martins and Terblanche (2003)

Denti and Hemlin (2012) have identified a few practical steps to facilitate innovation. Some of these steps include leadership implementing a policy for innovation that is promoted throughout the organisation, and management creating a climate that is emotionally safe, facilitates mutual respect and emotional support and collective problem solving.

Innovation can be defined as knowledge that has been used in a unique and/or different way to introduce new or improved products, services or processes (OECD, 2005 cited in Denti and Hemlin, 2012). In other words to do things better, faster and cheaper as described in the lean literature. This new or improved business practice(s) can either be small (incremental innovation), or more extreme (radical innovation) but the innovation must have implementation and commercial utilization (OECD, 2005 cited in Denti and Hemlin, 2012; Roberts, 1999 cited in Pellissier, 2012; Booyens, 2011; Van Zyl, 2011; Blankley and Moses, 2009; Rooks, et al., 2005; Rooks and Oerlemans, 2005).

Martins (2000), cited in Martins and Terblanche (2003), defines innovation as the implementation of a new idea, process or product that solve a potential problem or meet a need and that create change to the status quo. New plans or programmes by employees, including process restructuring and cost cutting, improved organisational structures, improved communication, and new technology for production processes, are all examples of innovation within an organisational environment (Martins and Terblanche, 2003).

Tushman and O'Reilly (1997), cited in Martins and Terblanche (2003), state that the culture of the organisation lies at the centre of organisational innovation. The authors continue to explain that through socialisation processes in the organisation, employees learn what behaviour is expected, which leads to employees' assumptions about creative and innovative behaviour within the organisation. They continue that the structures within the organisation reflect the basic values and beliefs which lead to behaviour and activities directly impacting on creativity in the workplace.

A lean culture in an organisation is a critical factor for lean sustainability within that organisation. Upton (1996) considers the installation of equipment, plant and machines during lean implementation less of a challenge than creating systems, policies, routines and common values of understanding. It is in this infrastructure that Upton (1996) considers the biggest opportunity for continual improvement while engaging and empowering employees.

In a study by Aiqiang (2010) it was found that to achieve successful lean implementation it is as important, if not more important, to establish a lean culture as implementing the tools associated with lean. The author found that a change in

employees' work behaviour, and industrial models (the organisation culture), occurs parallel with lean implantation. It is essential that employees' skills are developed to guide and manage change (Aiqiang, 2010).

Within a truly lean organisation there are two key features. The first is for the workers, who are doing the work to be assigned specific lean process tasks and second is to have lean responsibilities transferred to these workers (Womack, Jones and Roos, 1990). Tiwari and Gil (2010) argue that a lean culture takes time and a lot of effort to create. The employees need to be self-motivated to continuously improve the work they do.

Upton (1996) identified Organisational Change a process for continuous improvement. For a successful reorganisation the strategy needs to address why the change must take place, what is needed to improve, how the improvements will take place and how the changes will affects each individual's job (Upton, 1996). This has to take place as soon as possible to ease employees concerns. Top management are often already on board with the implementation but middle managers, who fear a loss of power, often create problems. These managers have a wealth of experience and knowledge and all attempts must be made not to lose them. These individuals need to be retrained to become trainers and provide technical support (Upton, 1996).

Lean has to become the culture of the organisation and its sustainability requires the top management be fully committed and become involved in the process (Tiwari and Gil, 2010).

2.2.2 LEADERSHIP

Leadership in the organisation can be defined as an individual that has a powerful influence on other individuals and groups within the organisation. This person motivates the employees to achieve common goals and defines the values and the norms of the organisation. The leader sets the tone as well as maintaining the persona of what the organisation is all about (Kamisan and King, 2013).

Good leadership characteristics are beneficial to the organisation because employees look towards these leaders as strong role models and icons for their teams (Kamisan and King, 2013). The situation wherein the leader and his followers find themselves would determine which qualities would be required by the leader. He/she needs to diagnose the situation and be able to adapt his/her style as a result (Kamisan and

King, 2013; Found, 2007). Greenleaf (1977), cited in Stone, Russell and Patterson (2004), believes that the primary goal of leadership is to meet the needs of others.

2.2.2.1 LEADERSHIP FOR ORGANISATIONAL CHANGE

To create an organisational culture the leadership and employee engagement must be examined. Miller, (2004) as cited in Werner (2011), suggests that senior leadership, or top management, maintains the organisational culture and is responsible for creating a culture that would help achieve the organisational goals (Kamisan and King, 2013; Tiwari and Gil, 2010).

The responsibility of the leader in the organisation is considerable as the leader needs to give direction to the organisation and create a good organisational culture (Kamisan and King, 2013).

Turesky and Connell (2010) found that lean conversion requires a change in the organisational culture and not just changing the technical “ins and outs” of the production system. In their study, Turesky and Connell (2010) identified three crucial components for sustainable organisational change:

- Clear and compelling vision to be communicated throughout the organisation;
- Employees’ need to become aligned with the vision of the organisation; and
- Top management need to exhibit steadfast support to the new vision.

The authors further found that team’s independence, visible commitment and participation by senior management, open communication in the organisation, transparency relating to lean goals, initial improvement through to continual evaluation and feedback, as well as bottom-up implementation were all major causes contributing to lean sustainability. This is supported by the work done by Schlichting in 2008.

Lok, Westwood and Crawford (2005) suggest that the main culture of the organisation does not impact heavily on the commitment of the individual, especially in large organisations. The authors surmise that to create employee commitment the leaders need to adapt their leadership style to attend to the subcultures and in turn interconnect the subculture with that of the organisational culture. The authors go on to say that the organisation, through its leadership, need to develop subcultures that are aligned with the main organisational culture.

2.2.2.2 LEAN MANAGEMENT

Research by Achanga et al. (2005), cited in Turesky and Connell (2010), found that leadership, management, organisational culture, skills and expertise were critical factors associated with the success of lean implementation.

Passionate and knowledgeable leaders of lean systems need to drive the initiative, involving all members of the organisation and guiding them in the new behaviours required by the new vision. These leaders have to continue following up on ensuring accountability for sustaining project gains, giving and receiving feedback, recognising and celebrating successes and making sure open communication persists (Turesky and Connell, 2010).

In Vermaak's (2008) study, respondents indicated that leadership or management had the most impacts on lean success, with executive leadership scoring the highest. The author suggested that this made sense as it was the executive leadership that was responsible for establishing and implementing the strategy of the organisation. Vermaak (2008) continues that it is the responsibility of the leadership in the organisation to adjust the employee's mentality by ensuring that the aspects of mentality and behaviour receive the same attention as that of the technical aspects.

Turesky and Connell (2010) ascertain training to be critical for lean sustainability. The authors suggest that training creates an environment where middle management is less controlling and demonstrate a more collaborative behaviours that should support lean changes.

The executive leadership, responsible for strategic business planning, must make the initial implementation to lean. Hoshin Kanri is a lean tool used to align the company goals, in other words, its strategy, with the tactics employed by management, and the work performed within the organisation. The strategic goals of the organisation need to be in line with lean practices. Vermaak (2008) found that lean should need to be implemented as one of the organisation's strategic drivers to be successful, and thus be sustainable. This requires commitment from the executive leadership.

Sarkar (2010) stated that for continuous improvement processes like lean to be sustainable, the implementation team needs to report directly to the Chief Executive Officer (CEO) or at least someone who directly reports to the CEO and sits on the

board. This is to ensure that board intervention is possible when it might be required (Sarkar, 2011).

All too often the focus is too narrow during lean implementation. It is often only focused on the improvement of work done inside the production cells. According to Schlichting (2008) leaders should introduce processes-focussed, through standard work, on their daily activities. Therefore, the line manager or team leader's expectations are clearly stated and can be monitored to ensure that operations run smoothly at all levels. This form of standard work differs from that of the production cells and becomes less structured the further up the hierarchy the leader moves.

However, by introducing standards to daily responsibilities it is possible to continuously improve the daily routine. The leader should collect data on common problems to initiate improvement actions. This is also a good measure to identify which leaders are not able or willing to buy into the lean journey and should thus be removed (Schlichting, 2008).

Mann (2005), cited in Schlichting (2008), give some examples of standard work of supervisors' routines:

- Gemba-walk with team leaders (weekly)
- Shift change coordination (daily)
- Morning meeting attendance (daily)
- Standard Work spot checks (many times daily)
- Signing off quality checks (many times daily)
- Time spent on the floor (many times daily)

If top management's presence and availability on the shop floor is critical to the success during the roll out phase then it stands to reason that for lean sustainability this behaviour will have to continue (Ahrens, 2006; James, 2006).

In Aiqiang's (2010) work it was found that the involvement of top management, in combination with human resources (HR) as mediator, helped create a sense of urgency for lean implementation. It also assisted in compiling teams to guide the lean journey and develop the vision and strategy for change towards a lean organisation.

Aiqiang (2010) stated that HR should help guide teams during the change to lean because they have the ability to clarify the roles and responsibilities of team members. Human Resource experts can assist in communicating across organisational barriers, mediate conflicts and encourage teamwork within the organisation.

Research by the Cardiff University's Innovative Manufacturing Research Centre found that there is a subtle difference between factors that enable successful change and sustainable change. Successful change requires leaders to communicate clear and with unmistakable reasons for change but sustainable change requires leaders to not only 'talk the talk' but also 'walk the walk' and apply key performance indicators (KPIs) to measure and monitor progress (Sarkar, 2011; Found, 2007). This meant that top management needs to live the vision and been seen demonstrating the values on the shop floor. It is important to note that the KPIs are not simply to measure the performance or financial gains but have to be related to the improvement process implemented (Found, 2007). Turesky and Connell (2010) add that lean success requires hands-on persistence as part of leadership's commitment.

Sarkar (2011) suggests that the mindshare of all leaders throughout all levels of the organisation needs to be engaged in the improvement journey. This would include the voluntary commitment of leaders to continuous improvement initiatives, selecting the right teams and simultaneously review the progress and removal of obstacles to the implementation process. The mindshare referred to by Sarkar (2011) should be initiated through alignment workshops for leaders of all levels. The role of these workshops is to stimulate debate and discuss what has to change and how the strategic priorities of the organisation are affected by continuous improvements (Sarkar, 2011).

When implementing lean it is important for management to have a long-term focus and to look at long-term successes of cost reduction and improved use of resources, instead of short-term crisis management (Turesky and Connell, 2010). To ease the pressure associated with overextension of workers often associated with lean enterprises additional nurturing from management is required (Sim and Chaing, 2012).

Vermaak (2008) adds that management's commitment to the lean strategy is also a commitment for resource allocation, upskilling of employees, a lean culture and promoting continuous improvements. The quickest way to kill a lean implementation

campaign, according to Vermaak (2008) is for management not to follow through on its commitment for lean transformation.

Often improvement process implementation leads to job losses. Management needs to work on avoiding this. Regan (2000), cited in Schlichting (2008) suggest layoffs should be made before lean conversion by evaluating how many employees would be required once lean conversion takes place. This is contrary with the lean philosophy that lean does not eliminate jobs but disperse employees to other areas of the organisation once their current role is no longer necessary (Ahrens, 2006). It could be argued that job cuts are the easiest and therefore the first change to make with lean conversion.

2.2.2.3 LEADERSHIP FOR INNOVATION AND CREATIVITY

It has been established that lean requires creative and innovative thinking for identifying and resolving the problems within the system, or to put it another way, to identify and eliminate waste and increase value. Denti and Hemlin (2012) believe that an integral part of innovative performance in an organisation is leadership.

The Denti and Hemlin (2012) found that leaders create an environment that is favourable for creativity and innovation. Furthermore leaders have the capability to boost intrinsic motivation and help create a team climate that is of a positive nature. Leaders facilitate problem solving, and create as well as ensure that the work relationship between team members is of a high quality. Teams and individuals receive support from leaders acting as facilitators which help to turn their creative work into innovations. Activities and goals of the organisation that are aimed at innovation are managed by those in leadership positions (Denti and Hemlin, 2012).

Denti and Hemlin (2012) found that the leadership in the organisation have the most influence on innovation when the culture in the organisation is supportive and have teams that are diverse in nature and work on complex assignments. These teams require participation in the decision making from the leadership and require leadership that is supportive.

Denti and Hemlin (2012) went on to comment on how leaders stimulate innovation. Leaders can instil the belief in team members' ability to think innovative. Through the introduction of norms which encourage team reflection processes, leaders also stimulate innovation within the group.

In the study done by Denti and Hemlin (2012) the authors found a number of steps that leaders could take to create a creative knowledge environment. The **first** step is the institution of a policy for innovation. This requires upper management and its teams to promote this policy throughout the organisation by communicating that innovative behaviour would be rewarded. The **second** step is to assemble teams that are from diverse backgrounds in the organisation, in other words from different department and levels. If is found that the more diverse the group is, the better the ability for innovative behaviour (Denti and Hemlin, 2012; Turesky and Connell, 2010). The **third** step is to create a climate where members in the group feel safe and respected, as well as experiencing enjoyment because of emotional support and shared decision-making. The **fourth** step is to create a space where individuals and team members can generate ideas and solve problems creatively, as well as team independence to be creative and innovative. The **fifth** and final step involves the team leaders. They need to be experts in the field or topic under examination and closely participate in the evaluation of the innovative activities (Sarkar, 2011, Vermaak, 2008).

2.2.2.4 LEADERSHIP STYLES

Below listed are some of the current leadership styles that have found popularity in literature and industry in the last few decades and that relates to lean.

2.2.2.4.1 Change management

Moran and Brightman (2000, p.66) define change management as “the process of continually renewing an organization’s direction, structure, and capabilities to serve the ever-changing needs of external and internal customers”.

The authors surmise that change management is about people management and the impact of the environmental or organisational changes. Purpose, identity and mastery are three core activators of people’s work behaviour during change (Moran and Brightman, 2000). The role of change management is to “create an environment where people involved in the change process can open themselves up to new ideas and concepts, challenge old assumptions, and overcome their hostility and resistance to change” (Moran and Brightman, 2000, p.69). While the organisation needs to be able to adapt to conditions changing, employees seek stability and order, therefore the change leader needs to finely balance stability and change (Moran and Brightman, 2000).

Change management should be the front runner to any lean implementation process (Aiqiang, 2010). It provides the reasons, background and necessities for lean transformation. This is from both a management level to front-line operators during the early stages of lean transformation. Change management shows respect for employees at different levels of the organisation (Aiqiang, 2010).

A model was developed to explain change management. The Awareness, Desire, Knowledge, Ability and Reinforcement (ADKAR) change model was developed by Prosci, a change management learning centre (Almas and Manzoor, 2014; Prosci, 2014). This model was first brought to text in *ADKAR: A Model for Change in Business, Government and our Community,* a book by Jeff Hiatt, released 2006. The model describes the five competency factors of the ADKAR model:

- Awareness of the need for change;
- Desire to support and participate in the change;
- Knowledge of how to change;
- Ability to launch required skills and behaviours; and
- Reinforcement to sustain the change.

The model should assist in identifying possible barriers and competencies for planning and implementing change to an organisation.

2.2.2.4.2 Transformational leadership

A transformational leader is someone who is highly ethical, value focused and can express a vision of the future for the organisation that can be shared by employees, stimulate them intellectually and be able to pay attention to the differences between employees. The transformational leader is someone who would sacrifice their own interests over that of the employees (Burns, 1978 cited in Du, Swaen, Lindgreen and Sen, 2012). Stone, Russell, and Patterson (2004) argue that although that it true, the focus of the transformational leader is directed towards the organisation. Yukl (1998), cited in Stone et al. (2004), argues that the commitment gained from followers are directed at empowering the followers to accomplishing the objectives of the organisation.

Kamisan and King (2013) found that transformational leaders creates an inspirational vision through displaying a charismatic personality with high moral values and ethical

behaviour. The transformational leader motivates and inspires followers in the direction towards the vision the leader has of the organisation. The leader encourages individuals and teams to achieve the organisational goals by intellectually stimulating innovation and creativity within the group.

Followers of transformational leaders express high levels of personal identification with the leaders and go beyond self-interest owing to a shared vision with leaders. They are highly motivated and are inspired on a constant bases to achieve more than what is expected of them (Clinebell, Skudiene, Trijonyte, and Reardon, 2013).

Fulwiler (2013) surmises that listening with the purpose of understanding, communicating at the level of the listeners, having genuine concern of those he/she leads, demonstrating a sense of equality among members and subordinates in the organisation, and demonstrating engaging behaviour with subordinates, are characteristics of transformational leadership.

Lowney (2005), cited in Fulwiler (2013), stated in his book *Heroic Leadership*, that employees perform best when they are treated with respect, valued and trusted by someone who cares for their wellbeing. This forms part of transformational leadership, which also motivates and encourage employees to achieve the goals of the organisation. Such employees are also more committed to the organisation.

Found (2007) defines transformational leaders as charismatics who create a new vision and enable change in an organisation (lean organisational culture change), and can inspire and motivate others to perform tasks they normally would not have.

A more strategic, transformational leadership style is requires to ensure that the common goals and the organisational strategy are aligned, as well as to ensure that the required resources are available for when a significant change might occur that would affect the whole organisation. (Found, 2007).

2.2.2.4.3 Transactional leadership

Transactional leadership is often found in organisations that are highly structured, where employees are rewards motivated and have a high tendency for requiring guidance and monitoring (Kamisan and King, 2013). According to the Kamisan and King (2013) this type of leadership negotiates with subordinates on the organisational

objectives that need to be met in order to be rewarded as well as what the punishment would be for poor performance.

In Stone, Russell and Patterson's (2004) study the authors defined transactional leadership as leadership based on bureaucratic authority, where the promise of rewards and benefits, or threat of punishment are the driving factors for followers to meet the task requirements of the leader.

2.2.2.4.4 Servant leadership

In 1977 Robert Greenleaf is credited with formulating the concept of servant leadership amongst modern organisational theorists. According to Stone, Russell and Patterson (2004) the primary objective of the servant leader is to serve and meet the needs of others. The servant leader values the employees who form part of the organisation above that of the organisation, to which the servant leader has no real affinity.

Harvey (2001), cited in Stone, Russell and Patterson (2004), states that servant leaders place profit maximisation on its peripheral. This type of leader believes that the real point of business is to serve as a vehicle through which society is developed.

Stone, Russell and Patterson (2004) observed that the first responsibility of the servant leader is that of the relationships and people, and this takes precedence over the tasks and products of the organisation. The leader trusts that the actions taken by their followers to be in the best interest of the organisation, even if that is not the primary focus of the leader.

Finally, the authors surmised that servant leaders believe that by first facilitating the growth, development, and general well-being of the individuals in the organisation, the goals of the organisation will be achieved on a long-term basis.

2.2.2.4.5 Similarities and differences between leadership styles

Stone, Russell and Patterson (2004) found that transactional and transformational leadership is often seen at the opposite end of the leadership continuum. While transformational leadership is more concerned with progress and development, transactional leadership is more goal driven. Transactional leaders are more focused on exchange relations with employees, while transformational leaders inspire employees to perform at a higher level for the sake of the organisation.

Transformational leadership and servant leadership both emphasize how important it is to value and appreciate people, listening, mentoring or teaching as well as to empower followers. Both hold many similarities and are complementary theories (Stone, Russell and Patterson, 2004). The main difference between the two theories is the focus of the leader. The servant leader places much more emphasis on the service to its followers, while the transformational leader's main concern is getting its followers engaged and supporting the objectives of the organisation (Stone, Russell and Patterson, 2004).

2.2.2.5 LEADERSHIP AND EMPLOYEE ENGAGEMENT

Schlichting (2008) suggests that management does not involve employees in the implementation process of lean and therefore are not brought into the fray ever. Some of the reasons why manager do not want to involve their floor-staff are:

- Different opinions need to be heard and consensus reached which thus take a long time to solve any problems;
- Operators might find solutions that will alter those proposed by management which would be difficult for management to accept;
- Operators might be perceived as lacking in intelligence to solve technical and organisational problems; and
- Managers perceive that operators are not interested in improving the processes.

This attitude by management is sure to condemn the lean journey from the start. If individuals are not engaged in whatever process they are involved in, in this instance lean implementation, it cannot be sustained (Fulwiler, 2013).

To bridge the gap between leaders and followers in the lean implementation, top management needs to create, embrace and communicate a lean strategic organisational plan, as well as a vision that is convincing, a shared purpose and achievable goals for lean processes implementation (Turesky and Connell, 2010).

Furthermore, Vermaak (2008) suggest that leadership need to engage with their employees if they want the employees engaged in the lean processes. This would require them to work alongside the employees on the floor to understand and solve

concerns and difficulties in the current process. This philosophy of Gemba demonstrates management's commitment and keeping on top of improvements sustainability.

2.2.3 EMPLOYEE ENGAGEMENT

As discussed before, the purpose of lean implementation is to satisfy the customer's needs through faster, cheaper, and better quality products and services (Pieterse, 2010). This can only be achieved through the individuals involved in the business. In Vermaak's (2008) study he surmised that lean is more than a combination of lean tools, methods and principles but that it is the quality of the workforce, the leadership of the organisation, and the mentality or attitude of the people operating the system that is essential to the success of lean. In the literature it is found that only through the efforts of people, can the lean objectives and goals be achieved, because it is "lean people that make a lean organisation" (Turesky and Connell, 2010; Vermaak, 2008).

Schlichting (2008) also found that the involvement of all employees in the lean implementation process was critical to its success. Vermaak (2008) continues on the importance of workforce for successful implementation of lean by stating that it is vital that the mentality, attitude and behaviour of the employees be given the same attention of that of the operating system.

Rashid, Sambasivan and Johari (2013) ascertain that organisational commitment influences profitability of the organisation, and that there is a relationship between the corporate culture and the level of commitment to the organisation. Committed employees are also more engaged and outperform groups that are not engaged. It is thus the workforce that creates a return on investment (ROI) and further influence the values of the company and its long-term strength, which results in a sustainable competitive advantage (Dale Carnegie and Associates, 2012).

Rashid, Sambasivan, and Johari (2003) also found that employee commitment to the organisation had a significant influence on profitability indicators such as ROI and return on assets (ROA).

Employee engagement is defined by Pieterse et al. (2010) as employee's normal participation in making decisions for completing tasks, proposed improvements, setting goals, preparing for implanting tasks, and performance management.

Dale Carnegie and Associates' white paper (2012) identifies three factors that influence employee engagement:

- The employee's relationship with his/her immediate supervisor or manager.
- The employee's belief in senior management; and
- The pride the employee has in working for the organisation.

Lok and Crawford, (1999, 2004) cited in Clinebell, et al. (2013), established that organisational commitment is a major factor that determines the effectiveness and performance of the organisation.

One of the key factors identified by Dale Carnegie and Associates (2012) that contributed to employee engagement was the employee's relationship with his/her immediate supervisor. This meant that the actions of the supervisor or manager would determine the level of commitment by the employee. Manager and supervisors have to be aware of the climate they create in the work groups. Furthermore, the employees in the study believed in the ability of their leader as a vital driving force for engagement. This ability included taking the input of the employee, guiding the company in the right direction and communicating openly about the state of the organisation (Dale Carnegie and Associates, 2012).

Dale Carnegie and Associates (2012) found that management who care about their employees, beyond just workers, and are interested in employees' health, well-being and personal lives, are able to build strong team cohesion which creates an engaging environment for the workforce. This allows employees to perform at their very best. Employees whose needs are satisfied at work are more willing to contribute to the success of the organisation. It is the manager's responsibility to ensure that the needs of the employees are met and has to adapt his/her behaviour to enhance employees' commitment (Clinebell, Skudiene, Trijonyte, and Reardon, 2013).

In a study done by James (2006) the leadership of the company under study, went beyond involving employees through strong leadership, understanding the vision and motivating the employees. The management of the company made the employees part of the lean conversion process. They made teams who worked on creating plans and implementing those plans in the conversion process. Turesky and Connell (2010)

found that without exception, work teams must participate in the lean execution process to achieve support and ultimately active ownership of the lean journey.

Sim and Chaing (2012) surmised that job performance, employee turnover, employee retention and absenteeism were influenced by employees' job satisfaction. The authors found that through upskilling, employees' job satisfaction was increased.

Organisations that develop the skills and competencies of its employees, and allow independence in their daily jobs, create employees who are cooperative, creative and effective problem solvers. It is thus, imperative that organisations provide its employees with managerial support, empowerment, coaching and training which will result in an improved work life quality. Employees will feel their jobs are more secure; they will be more satisfied with their jobs and feel a fairer reward-work compromise (Sim and Chaing, 2012). Sim and Chaing (2012) found that for successful lean implementation, job satisfaction was required from employees.

Meyer and Allen (1997), cited in Lok, Westwood and Crawford (2005), state that the employee's perceived relationship with its employer is a psychological state that determines the employee's commitment to that organisation.

Meyer and Allen (1997), cited in Rashid, Sambasivan and Johari (2003, p.6), defines a committed employee as someone "who stays with the organisation through thick and thin", who is seldom absent and works a full day's hours and sometimes more, is protective of company assets and shares the goals of the company with others. Therefore, it is advantageous to have a committed workforce, especially with an improvement drive such as lean process execution. Rashid, Sambasivan and Johari (2003) found that employee commitment to an organisation benefits the society as a whole as it lowers job movement and increases national productivity.

Internal motivation and job satisfaction are the products of employees who identify tasks as contributing to something beyond themselves. Therefore, the overall vision of a waste free workplace is indoctrinated in the employees. This indoctrination emphasises that each employee's efforts in improving the process is beneficial for the employees, the organisation and society. When employees are recognised for their effort it results in a sense of meaningfulness in performing effectively (Turesky and Connell, 2010).

According to Upton (1996) organisations consist of two levels. At the lowest level new value is created by investing in machinery, materials and labour. This is the operations side of the organisation. At the next level the competitive capabilities are forged from a collection of intellectual knowledge, systems and routines. At an undefined level, is a community of people which are distributed through each of the other levels but should they lack a common sense of purpose, it is bound to fail (Schlichting, 2008). Vermaak (2008) resolves that a lean thinking attitude, an attitude of continuous improvement and a problem solving attitude are the most important aspects of a lean mentality or mind-set.

With regards to employee engagement, certain cognitive models of participation suggests that productivity is increased through participation because of the high-quality information and increased knowledge brought to the implementation process (Turesky and Connell, 2010). This is because employees who do the work have more complete knowledge of the job than management and if they participate in the decision making process they will know more about the implementation process after decisions have been made (Turesky and Connell, 2010). It is noted that participation is certain areas of decision making is limited by lean processes such as work procedures, quality, improvement teams, etc. (Niepce and Mooleman, 1998, cited in Turesky and Connell, 2010).

2.2.4 TRADE UNIONS

The labour relations system is at its core a trade-off between the employers, the unions, the workers and the government. It is accepted that trade unions are the legitimate representation of the workforce by both the employers and the employees. The employer agrees to recognise the unions as workplace watchdog with the purpose of eliminating exploitation of the workforce. The employer also accepts the rights of the unions to collectively negotiate and to strike on defined matters of interest such as wage negotiations (Anstey, 2013).

The unions agree to only exercise their power within a free system wherein they have achieved legitimacy, for example the National Union of Metalworkers of South Africa (NUMSA) represents all metalworkers of South Africa and the leadership of the unions has been elected by its members. The unions have also agreed to use its capacity for industrial actions according to the informal rules of accepted behaviour set by all

parties (Anstey, 2013). The government recognises the legitimacy of the unions and its right to negotiate on behalf of the employees and provides services for resolving disputes. It also provides support to the labour market through training and social security grants (Anstey, 2013).

Vermaak (2008) argues that if people play a critical role in lean implementation it can be reasoned that they can also become a critical barrier to lean implementation. This is especially relevant in South Africa which has a unionised environment in its manufacturing sector.

After South Africa's transition into a democracy a labour-friendly legislation was negotiated between the new government, the business sector, and the labour force. This led to the employees' right to join a union, for the unions to negotiate as collective representation of the workers, and that workers would be protected from job losses during strikes on defined matters of interest, such as wage negotiations (Anstey, 2013).

In recent time the power of the strikes and the influence it has on the economy has changed. The heritage of worker exploitation is still maintained by the trade unions (Pieterse et al., 2010; Vermaak, 2008). The leading trade union in South Africa, the Congress of South African Trade Unions (COSATU), is of such a size and strength that until recently it had not needed to fight for its existence. COSATU is in alliance with the country's ruling parting, and has the ability to influence political policies and reforms such as the National Economic Development and Labour Council (NEDLAC).

COSATU is a partner of the Commission for Conciliation Mediation and Arbitration (CCMA) which resolves discrimination in the work place. It therefore brings a lot of influence and power to the negotiating table. Industrial action has seen an increase in the loss of working days from around a million days per year during the late-90s. In 2007 this figure rose to 9.2 million lost days and 20 million in 2010 (NDP, 2011, and Jones, 2013, cited in Anstey, 2013). It is easy to see the important role trade unions play in the successful implementation process of change initiatives such as lean. To involve the unions and have their support seems like an obvious choice.

Trade unions have the ability to play an important role in justifying the organisational change or aggravating the negative effects. This is because unions negotiate on behalf of the worker on the nature of the reorganisation. They have the ability to block any

changes that they find disadvantageous for their members based on their strong bargaining power. Unions also have the ability to assist the organisational change process if they can secure job security guarantees. The job security guarantees seeks to escape redundancies (Bryson, Barth and Dale-Olsen, 2013).

Trade unions also negotiate a trade-off between the organisational change and employee well-being by bargaining for higher wages in return for productivity-enhancing organisational change (Bryson, Barth and Dale-Olsen, 2013).

Shah and Ward (2003) found from their literature studies that though unionisation it seemed to be an important factor for lean implementation, it has not been thoroughly investigated. Shah and Ward (2003) found some researchers like Katz (1985) and, Cappelli and Scherer (1989) state that unions where cooperative and helpful in the implementation process. While other such as Machin (1995) and, Meador together with Walters (1994) found that the organisational performance was negatively affected by unionisation (Shah and Ward, 2003). Involving trade unions in the implementation process is often mentioned (Bednarek, 2013; Forrester, 1995) but first-hand evidence linking lean implementation and unionisation is insufficient to draw a conclusion.

The involvement of trade unions in such a radical change process such as lean does have a double-edged-sword-feel to it. If the trade union is included from the planning phase it can negatively influence the employees' perspective of the impending change (Bryson, Barth and Dale-Olsen, 2013; Vermaak, 2008). On the other hand, if the union is left out of the implementation process, the workers' discontent owing to perceived procedural unfairness which could result in less involvement from the workforce because of union absence (Bryson, Barth and Dale-Olsen, 2013, Vermaak, 2008).

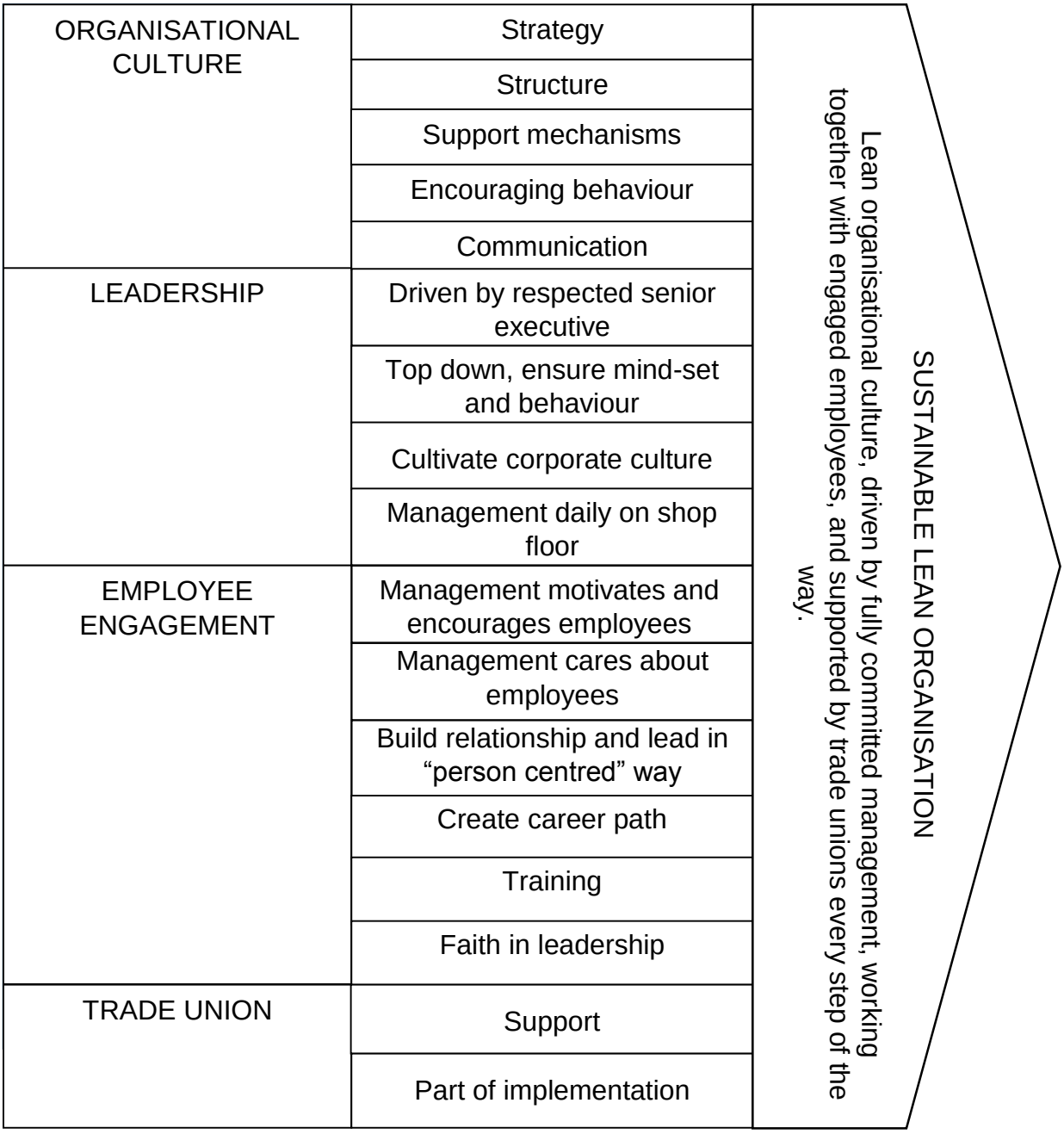
If trade unions are brought into the implementation process open, honest and clear communication is required (Pieterse et al., 2010; Vermaak, 2008; Forrester, 1995). The trade unions' fears of exploitation, job losses and over-worked workers needs to be removed. The benefits of the lean process implementation and worker training to become multi-skilled need to be explained to the union representing the workers. Further explanation should be provided, ensuring no job losses for an agreed period of 18 months for example, or that workers who had their positions made redundant be redeployed elsewhere in the factory/organisation (Pieterse et al., 2010).

In Vermaak's (2008) study found that trade unions in South Africa had a positive impact on the success of respondents' organisations with regards to lean implementation. Vermaak (2008) suggests that based on the respondents in the study that the trade unions should be made part of the implementation process from the beginning to assure success. He continues that, as with employee engagement, the organisation has to ensure clear and open communication and mutual respect to building a good relationship with the trade unions (Bednarek, 2013; Forrester, 1995).

2.3 SECTION 3: HYPOTHESISED MODEL

The model proposed to test the sustainability of lean programs implemented in South African organisations consists of four variables: Organisational Culture, Leadership, and Employee Engagement and Trade Unions. These are considered as soft skills to the hard skills of tools and techniques that have received its fair share of attention.

Figure 2.7 Proposed model for lean sustainability



Source: Author's own Illustration

The model (Figure 2.7) that was developed by the author describes the enablers for lean sustainablility. Each enabler and the statements identified to test the enabler in the model are discussed below. These statements are in table form at the end of each enabler's section.

2.3.1 ORGANISATIONAL CULTURE

The model to test organisational culture and the influences of organisational culture on creativity and innovation is derived from Martins and Terblanche's (2003) model. Within this model five determinants of organisational culture that influence creativity and innovation are tested. These determinants are strategy, structure, support mechanisms, behaviour that encourages innovation and communication. The determinants have already been discussed in the previous chapter but will be elaborated on to provide more detail of what was be tested in this study.

In Martins and Terblanche's (2003) model the first variable is **strategy**. According to the model, the organisational strategy must be in line with a philosophy of innovation. West and Farr (1990), cited in Martins and Terblanche (2003), defines innovations as "the intentional introduction and application within a role, group or organisation of ideas, processes, products or procedures, new to the relevant unit of adoption, designed to significantly benefit the individual, the group, organisation or wider society".

Parallels could be drawn between West and Farr (1990) and the definition of lean by Pieterse et al. (2010): "The purpose of Lean is really to satisfy the customer through faster, cheaper, and better quality products or services. Lean is a systematic way of designing or improving a process or value stream that eliminates waste (muda); improves quality; reduces costs; delights customers; improves employee satisfaction and increases safety. Lean is achieved through the relentless reduction of waste or non-value added activities to create a smooth flow of product." Sarkar (2011) suggests that before any continuous improvement journey is started the business strategy is aligned with a plan that includes what has to be achieved over time and what business outcomes are expected for the future. It stands to reason that organisations' strategies should promote developing new processes to fulfil the objectives of lean.

Vermaak (2008) found that for lean sustainability there has to be a clear link between the lean organisational goals, key objectives and lean activities.

Lean has to be a strategic driver in the organisation. When lean has become part of the strategy of the organisation, it ensures that it is considered with a long-term viewpoint and that resources will be allocated to lean implementation. This requires the commitment of executive leadership to the philosophy and principles of lean (Bateman and Rich, 2003).

The **structure** of the organisation is the second determining factor of Martins and Terblanche's (2003) model. In the model the structure of the organisation is influenced by its culture and has an influence on its operations of the organisation. Jenner (1998), cited in Turesky and Connell (2010), surmise that if an organisation hopes to sustain its lean implementation it must create flat structures, become flexible and highly adaptable, dynamic and change-oriented to strive towards increased efficiency and innovation.

Values like flexibility, freedom and cooperative teamwork that make part of the organisation's structural values, positively influence creativity and innovation. Structural values as mentioned allow employees the freedom to go about their work and adapt procedures within the guidelines of the organisation (Martins and Terblanche, 2003).

The third determining factor is **support mechanisms** within the organisation that promote creativity and innovation. This includes rewards and recognition, as well as the availability of resources such as time, information technology and creative employees. To think creatively and develop innovative processes and procedures, especially when incremental improvement could make the difference, holds a certain amount of risk taking. Organisations need to allow enough freedom for employees to take risks to develop new processes and reward them rather than punish them for their effort.

The groups or teams assembled for projects benefit from having members from diverse background as each member has a different perspective and can bring new and different or innovative ideas to the project (Martins and Terblanche, 2003).

Organisational goals are managed by the organisation's leadership structure as well as activities aimed at innovation. It is important that knowledgeable and experienced team leaders participate closely in the evaluation of innovative activities (Denti and

Hemlin (2012). For lean sustainability, management requires visible commitment and participation in the implementation process (Turesky and Connell 2010).

The fourth factor that contributes to determining a culture for innovation and creativity is **behaviour**. In Martins and Terblanche's (2003) model the behaviour that encourages innovation and creativity is related to handling mistakes, generating ideas, creating a continuous culture of learning, risk taking, competitiveness as well as support for change and conflict handling.

In the model implemented for this study, behaviour related to the handling of mistakes, risk taking, idea generation and learning culture is analysed. As stated before, organisations need to allow their employees to take risks to solve problems relating to waste elimination or process improvement of systems and processes. To keep employees engaged they need to feel valued and rewarding successful employees for their success is important. This is also true to handling failed attempts at process improvements. A process of continued improvement will have failed attempts. Discussing those failures and learning from them is vital to avoid the same mistakes in the future.

Denti and Hemlin (2008) suggest that teams and individuals are given space and independence to generate ideas and solve problems in creative and innovative ways. This refers to autocratic control over teams and individuals. In other words "leaving your heart and your head at the door", is not what organisations need from their employees in the dynamic ever-changing environment.

The fifth and final determining factor according to Martins and Terblanche (2003) is **communication**. Barret (1997) and Robbins (1996), cited in Martins and Terblanche (2003), suggest that to promote creativity and innovation, an organisational culture that is transparent and has open communication is required. This is also true for successful lean implementation (Aiqiang, 2010; Turesky and Connell, 2010; James, 2006, Upton, 1996).

Table 2.4 Statements to Test Organisational Culture

No.	Statement
OC1.1	The Company's strategy is to promote development and implementation of new processes.
OC1.2	There is a clear link between strategy formulation and strategy execution within the company.
OC1.3	Within the company lean implementation is being driven as a high priority strategic business initiative.
OC2.1	Values like flexibility, freedom and cooperative teamwork are part of the company's structural values.
OC2.2	Staff have the freedom to do their work and adapt procedures within the guidelines of the organisation.
OC3.1	Personnel are rewarded for risk taking, experimenting and generating ideas.
OC3.2	The Company looks to employ people from diverse backgrounds.
OC3.3	Team leaders, who have the expertise, participate closely in the evaluation of innovative activities.
OC4.1	The Company rewards success and acknowledges failure to be openly discussed and learnt from it.
OC4.2	Individuals and teams have independence and are allowed space for idea generation and creative problem solving.
OC5.1	The Company promotes open-door communication where teams, groups and departments can gain new perspectives by openly communicating with one another.

2.3.2 LEADERSHIP

Lean systems need to be driven by passionate and knowledgeable leaders. These leaders need to involve all members of the organisation and guide them in the new behaviours required by the new vision. These leaders have to continue following up to ensure accountability to sustain project gains. They have to give feedback on the lean progress and improvement plans and receive feedback regarding the success of new implementations and suggested improvements. The leaders need to recognise

individuals and teams for contributions and successful implementation, as well as celebrating the successes achieved. Leaders need to ensure open communication persists through the lean journey (Turesky and Connell, 2010). Lean needs to be driven by senior leadership as they drive the strategy in the organisation (Vermaak, 2008).

Vermaak (2008) continues that it is the responsibility of the leadership in the organisation to adjust the employee's mentality by ensuring that the mentality and behaviours receive the same attention as do the technical aspects. Čiarnienė and Vienažindienė (2013) found that the overemphasis of tools and techniques rather than people-related issues such as trust, motivation and commitment, within the organisation, was a key source for lean failure.

To create an organisational culture the leadership and employee engagement, must be examined. Miller, (2004) as cited in Werner (2011), suggests that senior leadership, or top management, maintains the organisational culture and is responsible for creating a culture that would help achieve the organisational goals (Tiwari and Gil, 2010).

Vermaak (2008) suggest that leadership need to engage with their employees if they want the employees engaged in the lean processes. This would require them to work alongside the employees on the floor to understand and solve concerns and difficulties in the current process. This philosophy of Gemba demonstrates management commitment and keeping on top of improvement sustainability. There is a substantial responsibility on the executive management, as leaders in the organisation, to provide the organisation with direction and create a good organisational culture. (Kamisan and King, 2013).

Managers need to introduce standards into their daily responsibilities to strive for continuous improvement in their routine. The leader should collect data on common problems to activate improvement actions. This is also a good measure to identify which leaders are not able or willing to buy into the lean journey and should thus be removed (Schlichting, 2008).

Gemba, which is the process of spending time on the plant floor, has a dual role. In the first place, it gives the manager first-hand insight in what is happening on the plant floor and how successful the implementation of tools and processes are. In the second

place, it allows for engagement with the floor staff. This is another source of information because these employees are at the forefront of implementation. Engaging with the floor staff shows commitment from management and is a gauge of the commitment of the floor staff, as well as identifying any attitude problems. This makes it able to adjust the mind-set before it negatively influences the rest of the organisation or team.

Table 2.5 Statements to Test Leadership

No.	Statement
L1.1	In the company there is a highly respected senior executive that drives lean implementation.
L1.2	Management, from the top down, ensure that the mentality and behaviour towards lean implementation, is given the same attention as the operational side. (Vermaak, 2008)
L1.3	Top management works on cultivating a corporate culture that is accomplished in lean thinking. (Vermaak, 2008)
L1.4	Management spends time daily on the shop floor.

2.3.3 EMPLOYEE ENGAGEMENT

As discussed before, lean can only be achieved through the effort of people (Turesky and Connell, 2010; Schlichting, 2008, Vermaak, 2008). Dale Carnegie and Associates (2012) found that the employees in the study believed in the ability of their leader as a vital driving force for engagement. This ability included taking the input of the employee, guiding the company in the right direction and communicating openly about the state of the organisation (Dale Carnegie and Associates, 2012). The leadership of the organisation has to inspire with vision, and give direction by motivating and encouraging employee to achieve organisational goals (Kamisan and King, 2013).

Employees are able to perform at their very best if there is an engaging environment created by strong team cohesion. The strong team cohesion is built through managers that care about their employees, beyond just as a worker, but are interested in the employees' health, well-being and personal lives (Dale Carnegie and Associates, 2012). Employees whose needs are satisfied at work are more willing to contribute to the success of the organisation. It is the manager's responsibility to ensure that the

needs of the employees are met and has to adapt his/her behaviour to enhance employees' commitment (Clinebell, Skudiene, Trijonyte, and Reardon, 2013). Dale Carnegie and Associates (2012) found that managers had to lead in a “person-centred” way and be able to build a strong relationship with employees as well as build a strong team interaction to create an environment that would result in better performing and more engaging employees.

To create an “involved employee”, managers need to show employees that they are valued, recognised and rewarded for a job well done. To add to this, managers need to create a clear career path for the employee and help them set goals to achieve potential growth in the organisation. This creates a sense of pride and eagerness in the organisation (Dale Carnegie and Associates, 2012).

Turesky and Connell (2010) ascertain training to be critical for lean sustainability. Organisations that develop the skills and competencies of its employees, and allow independence in their daily jobs, create employees who are cooperative, creative and effective as problem solvers (Turesky and Connell, 2010).

It is imperative that organisations provide employees with managerial support, empowerment, coaching and training which will result in improved work-life quality. Employees who feel that their jobs are more secure, will be more satisfied with their jobs and feel a fairer reward-work compromise (Sim and Chaing, 2012).

Sim and Chaing (2012) found that for successful lean implementation, job satisfaction was required from employees. Lucey, Bateman and Hines (2005) also found that employee engagement was critical to successful and sustainable change to take place in and organisation. The authors found a strong correlation between employee engagement and lean sustainability.

Dale Carnegie and Associates’ white paper (2012) identifies three factors that influence employee engagement:

- Firstly, the employee’s relationship with his/her immediate supervisor or manager;
- Secondly, the employee’s belief in senior management; and
- Lastly, the pride the employee has in working for the organisation. Lok and Crawford, (1999, 2004) cited in Clinebell, et al. (2013), established that

organisational commitment is a major factor that determines the effectiveness and performance of the organisation.

Table 2.6 Statements to Test Employee Engagement

No.	Statement
EE1.1	Management motivates and encourages employees to strive towards achieving a lean organisation.
EE1.2	Management cares about employees, beyond just workers, and is interested in employees' health, well-being and personal lives.
EE1.3	Managers at the company work to build strong relationships with employees, build strong team interaction and lead in a "person-centred" way.
EE1.4	Managers work with employees to create a clear career path and set goals with a potential for growth.
EE1.5	Lean training is implemented through workshops for shop floor staff.
EE1.6	I have faith in management and am proud to be associated with the company.

2.3.4 TRADE UNIONS

Following the increased strikes by union workers during the last three years (Department of Labour, 2013) the importance of collaboration between industry and unions has become paramount for survival. After the global recession in 2008/2009 the perception and attitude between industry and unions have changed, especially considering the economic growth pre-2008, the current economic growth and increased unemployment. The author of this paper wanted to compare a South African study on lean implementation by Vermaak (2008) and his own findings on trade union relationships.

In his study, Vermaak (2008) found that trade unions in South Africa had a positive impact on the success of respondents' organisations with regards to lean implementation. Vermaak (2008) suggested that based on the respondents in the study that the trade unions should be made part of the implementation process from the beginning to assure success.

Table 2.7 Statements to Test Trade Union participation

No.	Statement
TU1.1	Trade unions support the lean implementation within our company.
TU1.2	The trade unions have been part of the lean process from implementation.

The objective of the proposed model in 2.3 Section 3 of this study, is to determine the appropriateness of the enablers identified out of the literature study and to set the groundwork for a framework to build a sustainable lean organisation.

The subsections of the enablers (Figure 6) were tested in the study through a questionnaire to determine the validity of the enablers and their importance in organisations that successfully implement lean. The questionnaire was made up from the statement in Tables 4 – 7.

CONCLUSION

In the literature study a lean was defined as the use of people in the organisation to create value for the client through a constant improvement process in the drive for cheaper, faster and better quality products and services by eliminating non-value adding activities from the system through the use of tools and techniques.

People were found to be a critical factor to lean process sustainability. In the literature study Organisational Culture, Leadership, Employee Engagement and Trade Unions were identified as enablers for lean process sustainability. The author created a model from the literature which was tested in the study.

In the next chapter the methodology of the study will be discussed. This will include the objective of the study, the hypothesis to be tested, the research methods used in the study, the data collection methods and instruments as well as the statistical considerations of the study.

CHAPTER 3

METHODOLOGY OF THE STUDY

INTRODUCTION

The purpose of this chapter is to discuss the methodology of the study. The chapter defines the scope and limitations within the study. The chapter starts by defining the objective of the study, followed by the hypothesis to prove or reject, the methods used in the research project, and the methods used to collect data as well as the statistical consideration of the study.

The section on research methods defines the study design, the subjects in the study, the sampling methods used and the recruitment plan used to recruit the sample. The section of data collection defines the measuring instruments used in the survey used to obtain data from the sample. The final section describes the statistical consideration based on the data collected sample and the data analysis possible from the type of questionnaire used in the study.

3.1 STUDY OBJECTIVE

The purpose of this study was to assess identified enablers of lean sustainability in organisations where lean processes are already being implemented.

3.2 HYPOTHESIS

The purpose of the hypotheses is to answer the research question. The following null hypotheses are formulated:

H01. Organisational Culture does not contribute to lean sustainability.

H02. Leadership does not contribute to lean sustainability.

H03. Employee engagement does not contribute to lean sustainability.

H04. Trade union participation does not contribute to lean sustainability.

3.3 RESEARCH METHODS

3.3.1 STUDY DESIGN

The study was conducted in the quantitative paradigm, as the hypothesised relationship was statistically tested. Johnson and Christensen (2014, p.31) define the research paradigm as “a perspective held by a community of researchers that is based on a set of shared assumptions, concepts, values, and practices”. The research project was quantitative which relies on collecting numerical data that test a specific hypotheses (Johnson and Christensen, 2014; Collins and Hussey, 2009). The descriptive statistics (means, percentages and standard deviations) of the participants’ responses were also analysed, reported and interpreted. Further analysis performed included the correlation coefficient, data reliability and t-test analysis.

3.3.2 SUBJECTS

3.3.2.1 Inclusion

Subjects included in the study are companies, in South Africa, that have successfully implemented lean processes in the company for a minimum period of three (3) years. The respondents to the questionnaires include managers from executive, middle and line management levels, who have been involved in the lean movement within the company under study for at least three (3) years.

3.3.2.2 Exclusion

Any company that has not successfully implemented lean in its organisation for at least three (3) years is excluded from the study.

The questionnaires cannot be completed by managers who have not been part of the lean implementation in the company under study, even if the company has been implementing lean successfully for at least three (3) years.

3.3.3 SAMPLING

A sample is defined as a “subset of a population”, whereas the population refers to a “precisely defined body of people or objects under consideration for statistical purpose” (Collins and Hussey, 2009, p.62). The study population for this study is defined as all companies or organisations that implement lean practices or processes within the company or organisation, in South Africa.

A non-probability sample was taken for this study. This implies that not all parts of the population had an equal opportunity to be represented in this study. For practical reasons a convenience sample was used for this study based on the availability and the respondent's expertise of the field under study (Trochim, 2006).

The study population was contacted via email with the link to the online survey which was hosted on SurveyMonkey.com. Participants followed the link and completed the survey online. Anonymity was thus ensured as no name or contact details are linked to completed questionnaires.

Results were gathered from the website. The sample size was four hundred and sixty five (465) employees, fitting the inclusion criteria, in one hundred and sixty six (166) companies.

3.3.4 RECRUITMENT PLANS

Participants in the study were emailed a linked to a website which provided the questionnaire, which was completed anonymously. Participants were recruited via a data bases supplied through experts in the field. The data based was used four time over a period of three weeks to increase the likelihood for participation.

3.4 DATA COLLECTION

3.4.1 THE MEASURING INSTRUMENTS

The data collected was from an interval-scaled type. Wegner (2007, p.22) defines interval-scaled data is a "sub-classification of numerical data and is mainly generated from rating scales". Statements were rated on a scale from strongly disagree, which was numerically represented by one, to strongly agree, which was numerically represented by five. Between these two extremes were disagree (2), neither agree or disagree (3), and agree (4). Based on the nature of the questionnaire the mean and standard deviation cannot be used for analysis.

The following instruments were used to measure the variables in the conceptual model of this study:

Lean Organisation: a self-constructed instrument consisting of one item measuring the length of successful lean implementation in the organisation understudy, and four items that test true lean as defined in Chapter 2.

Organisational Culture: five existing instruments from Martins and Terblanche's (2003) model for influences of organisational culture on creativity and innovation, consisting of seven items, as well as two items from Denti and Hemlin (2012) and two items from Vermaak (2008).

Leadership: a self-constructed instrument consisting of three items from Vermaak (2008) and one from Schlichting (2008).

Employee Engagement: a self-constructed instrument consisting of four items from Dale Carnegie and associates (2012), one item from Kamisan and King (2012), and one item from Turesky and Connell (2010).

Trade Unions: a self-constructed instrument consisting of two items from Vermaak (2008).

3.4.1.1 Lean

- How many years has your company been implementing lean?
- Does the company implement lean tools?
- Does the company work on minimising the non-value adding activities, or waste in the production process?
- Does the company work towards creating a streamlined high-quality system that produces products at the pace required, i.e. improve flow?
- Does the company continuously strive to improve on current standards of operations?

3.4.1.2 Organisational Culture

3.4.1.2.1 Strategy

- The company's strategy is to promote development and implementation of new processes (Martins and Terblanche, 2003).
- There is a clear link between strategy formulation and strategy execution within the company (Vermaak, 2008).
- Within the company lean implementation is driven as a high priority strategic business initiative (Vermaak, 2008).

3.4.1.2.2 Structure

- Values like flexibility, freedom and cooperative teamwork are part of the company's structural values (Martins and Terblanche, 2003).
- Staff have the freedom to do their work and adapt procedures within the guidelines of the organisation (Martins and Terblanche, 2003).

3.4.1.2.3 Support mechanisms

- Personnel are rewarded for risk taking, experimenting and generating ideas (Martins and Terblanche, 2003).
- The company looks to employee people from diverse backgrounds (Martins and Terblanche, 2003).
- Team leaders, who have the expertise, participate closely in the evaluation of innovative activities (Denti and Hemlin, 2012).

3.4.1.2.4 Encouraging behaviour

- The company rewards success and acknowledges failure to openly discuss and learn from it (Martins and Terblanche, 2003).
- Individuals and teams have independence and space for idea generation and creative problem solving (Denti and Hemlin, 2012).

3.4.1.2.5 Communication

- The company promotes open-door communication where teams, groups and departments can gain new perspectives by openly communicating with one another (Martins and Terblanche, 2003).

3.4.1.3 Trade unions

- Trade unions support the lean implementation within our company (Vermaak, 2008).
- The trade unions have been part of the lean process from implementation (Vermaak, 2008).

3.4.1.4 Leadership

- In the company there is a highly respected senior executive that drives lean implementation (Vermaak, 2008).
- Management, from the top down, ensure that the mind-set and behaviour towards lean implementation, is given the same attention as the operational side (Vermaak, 2008).

- Top management works on cultivating a corporate culture that is accomplished in lean thinking (Vermaak, 2008).
- Management spends time daily on the shop floor (Schlichting, 2008).

3.4.1.5 Employee engagement

- Management motivates and encourages employees to strive towards achieving a lean organisation (Kamisan and King, 2013).
- Management cares about employees, beyond just workers, and is interested in employees' health, well-being and personal lives (Dale Carnegie and Associates, 2012).
- Managers at the company work to build strong relationships with employees, build strong team interaction and lead in a "person-centred" way (Dale Carnegie and Associates, 2012, p.5).
- Managers work with employees to create a clear career path and set goals with a potential for growth (Dale Carnegie and Associates, 2012).
- Lean training is implemented through workshops for shop floor staff (Turesky, and Connell, 2010).
- I have faith in management and am proud to be associated with the company (Dale Carnegie and Associates, 2012).

All the measuring instruments (see Annexure A) were anchored to a five point Likert-scale ranging from (1) strongly disagree to (5) strongly agree.

3.5 STATISTICAL CONSIDERATIONS

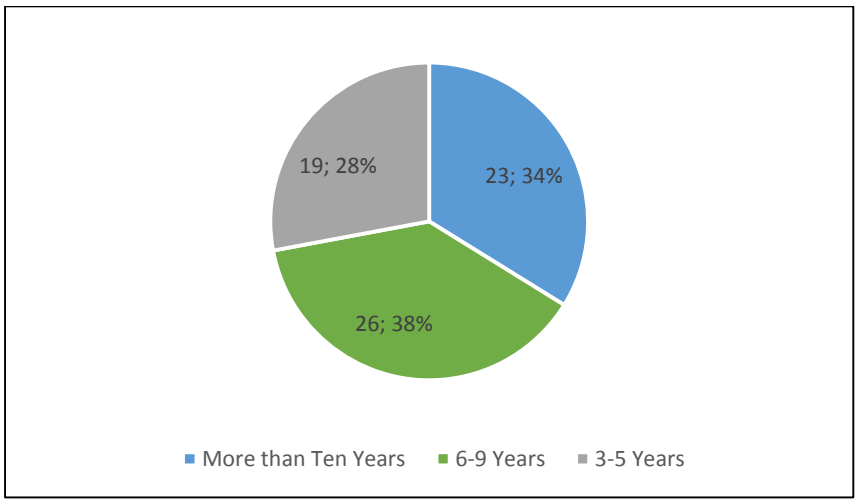
3.5.1 SAMPLE

The study sample is a homogenous group as all individuals who partook in the study, implement lean in their organisations. A homogenous group describes a group that is of a similar nature. The sample is thus not representative of all companies or organisations that have implemented lean in the past or present.

Four hundred and sixty five (465) emails were sent to employee, fitting the inclusion criteria, in one hundred and sixty six (166) companies. One hundred and seven (107) individuals partook in the study of which thirty nine (39) did not meet the criteria or

complete the questionnaire. Therefore, the sixty eight (68) who completed questionnaires and met the criteria were used for statistical analysis.

Figure 3.1 Amount of Years Implementing Lean in the Organisation



Source: Author's own Illustration

The sample was made up of sixty eight (68) participants of which nineteen (19) participants who are involved in organisations that have implemented lean for more than three years but less than six. The sample further included twenty six (26) participants are involved in organisations that have been implementing lean for between six and nine years and twenty three (23) participants involved in organisations that have been implementing lean for more than ten years. The group of twenty three (23) are part of organisations that have sustainable lean organisations.

3.5.2 DATA ANALYSIS

The data was statistically analysed with Statistica software and Microsoft Excel. The first five questions measure the population in terms of lean implementation. The following twenty three (23) questions uses Likert scale questions to test the model developed by the author described in Chapter 2.

The Likert scale data were analysed at the interval measurement scale. The interval-scaled data is a sub-classification of numeric data and is generated from rating scales measuring respondents' perceptions, preferences, attitudes and motivations (Wegner, 2008). Descriptive statistics used for interval scale items are the mode, mean, median, standard deviation and skewness.

The **mean**, also called the average, is the value that lies at the centre of a set of data (Wegner, 2007). The **standard deviation** is the measure of dispersion which indicates the spread of data around the mean (Gratton and Jones, 2004). A large standard deviation relative to the mean suggests the mean does not represent the data well (Collins and Hussey, 2009). Standard deviation was calculated but not used in this study because Likert-scaled questionnaire was used to collect data and the mode and median was rather used to determine the measure of dispersion.

The **mode** is the value that indicates which number occurs most frequently in a data sample. The mode value of a data set can be found in categorical data and numerical data. The **median** is the value that is the middle number of an ordered set of data (Wegner, 2007).

The **skewness** of a uni-modal (single peak) graph indicates the measure to which the frequency distribution is asymmetric. The normal distribution has a skewness of zero (Collins and Hussey, 2009; Wegner, 2007). A positively skewed peak of the graph would be skewed to the right of where the symmetrical peak would be. A negatively sked peak would be skewed to the left (Wegner, 2007).

Reliability of data is tested to determine that if the test would be repeated the same results would be found, or the absence of differences in results between tests (Collins and Hussey, 2009; Gratton and Jones, 2004). To measure the reliability of the data, **Cronbach's alpha** was used as it is a measure of internal consistency of the enablers (UC Regents, 2014).

An independent **t-test** was used on the interval scaled data by dividing the sample into two groups to establish if there is a difference between the two samples. In this study the two samples were organisations that had implemented lean for three to nine years successfully and organisations that had implemented lean successfully for more than ten year.

Organisational Culture, Leadership, Employee Engagement and Trade Unions and their relationship to each other were correlated. The level of sustainability, as measured by the questionnaire, was measured by comparing organisations that have implemented lean for three to nine years, with organisations that have been implementing lean for more than ten years. The objective is to see if the model correlates with organisations that are considered sustainable.

CONCLUSION

The purpose of Chapter 3 was to defining the objective of the study, identify the hypothesis to test in the study, discuss the methods used in the research project, and the methods used to collect data as well as the statistical consideration of the study.

Chapter 4 will discuss the empirical results of the data collected from the questionnaires completed by the sample. The sample will be discussed, as well as the statistical procedures used to analysis and the results from those analysis performed.

CHAPTER 4

EMPIRICAL RESULTS

INTRODUCTION

The previous chapter discussed the methodology implemented in the study. This chapter will discuss the results of the questionnaire used to gather data for the study. The first part of the chapter discusses the sample of respondents in the study and how it was ensured that the participating sample represented “true” lean organisations.

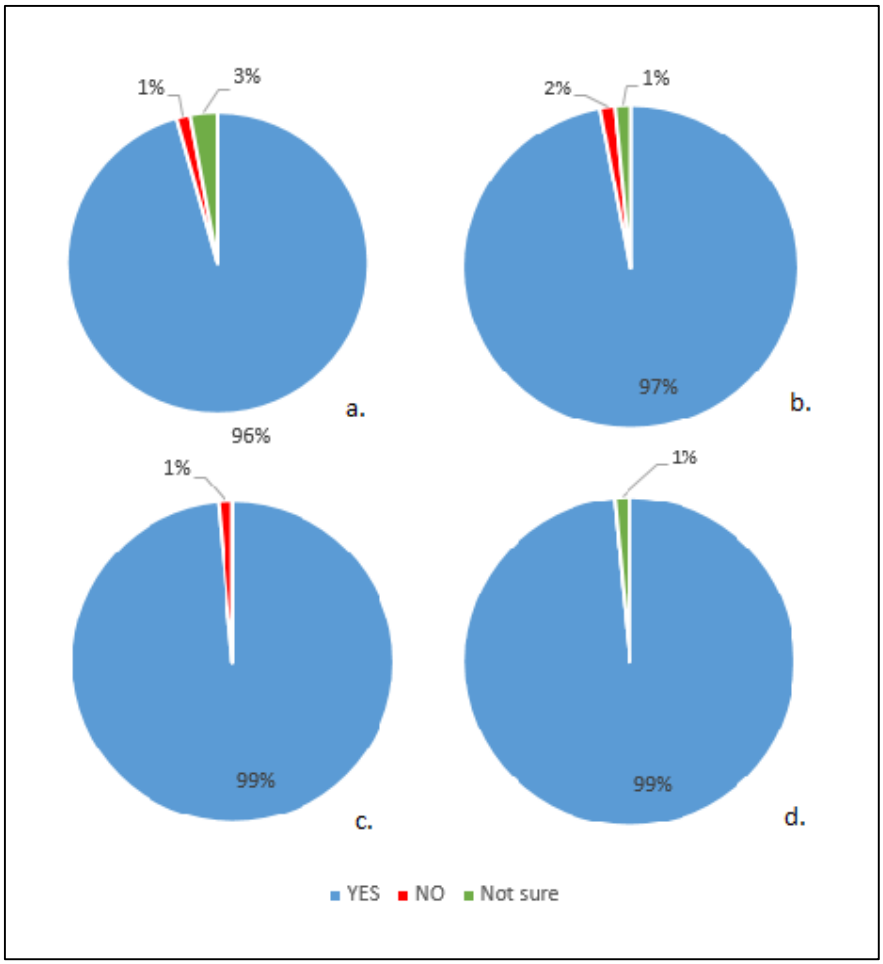
The chapter further discusses the results of the statistical analysis that was used to answer the hypotheses of the study. In this chapter the descriptive statistics, such as the mean, the median, mode and standard deviation as well as the reliability of the data, the correlation analysis and the t-test analysis will be discussed.

4.1 SAMPLE

To ensure that the sample represented “true” lean organisations, participants were asked about lean practices within their respected organisations. Participants were asked:

a.) if lean tools are used in the organisation;
b.) if companies work towards minimizing and removing the non-value adding activities from the production process;
c.) if companies worked on improving flow;
d.) if organisations strive to improve the current standards.

Figure 4.1 Test of lean organisation



Source: Author's own Illustration

Figure 4.1 depicts four pie-charts that represent the results of the four questions mentioned above.

Chart a. indicates that 96 percent of all respondents use lean tools in their organisations. The one percent and three percent that did not answer "Yes", are involved in organisations that have implementing lean for between three and nine years.

Chart b. indicates that 97 percent of companies work on minimizing the non-value adding activities, or waste in the production process. The two percent and one percent that do not work on minimizing the non-value adding activities, or waste are found in the groups three to five years and six to nine years.

In **Chart c**. the perception of participant with regards to improving flow within the respected companies is illustrated. In Chart c one percent indicated that the company they are involved with do not work on improving flow, while 99 percent indicated that their companies did.

Chart d. represents participant's perception about whether their companies strive to continuously improve the current standards of operations. Of the sixty eight respondents sixty seven (99 percent) felt their organisations strive to improve the current standards, while one individual was not sure.

The charts clearly indicates that the sample in the study represent lean organisations.

4.2 DESCRIPTIVE STATISTICS

Descriptive statistics are numerical and graphical representations that summarize and describe the data collected from the study sample. The large amount of data is simplified in a sensible way. The table below gives a summary of the data collected.

Table 4.1 Descriptive Results

	Valid N	Mean	Mode	Median	Minimum	Maximum	Std. Dev.	Skp
Organisational Culture	68	3,88	4.00	4,00	2,00	5,00	0,55	-0,88
Trade Unions	68	3,09	3.00	3,00	1,00	5,00	0,85	-0,08
Leadership	68	3,75	4.00	4,00	1,00	5,00	0,77	-1,01
Employee Engagement	68	3,81	4.00	3,83	1,50	5,00	0,62	-1,30

(N – Sample size, Std.Dev. – Standard Deviation, Skp – Skewness)

Figure 4.2 below is a graphical representation of the distribution of data collected. As summarized in the table and indicated in the figure, the *organisational culture*, *leadership* and *employee engagement* all show negatively skewed shapes.

As discussed previously, a Likert scale questionnaire was used to study a model for lean sustainability. The data collected was from an interval-scaled type. Statements were rated on a scale from strongly disagree, which was numerically represented by one, to strongly agree, which was numerically represented by five. Between these two extremes were disagree (2), neither agree or disagree (3), and agree (4). Based on the nature of the questionnaire the mean and standard deviation cannot be used for analysis.

The **Organisational Culture Graph** is negatively skewed with a measure of skewness of $Sk_p = -0.88$, indicating moderate to excessive skewness in the data. The median is the middle number in the data set and divides the data into two equal halves (Wegner, 2008). The mode indicates that most respondents agreed with the statements. Therefore the mode or median better describe the perception of the sample. Both the mode and the median are the same, showing a measurement of four. This indicates that the respondents agreed with the statement.

It can therefore be concluded that organisations that have implemented lean successfully and have sustained lean practices agree with the statements pertaining to the importance of Organisational Culture for lean sustainability.

The **Leadership Graph** is negatively skewed. The measure of skewness is $Sk_p = -1.01$, indicating excessive skewness in the data. The median and the mode are both four, and the mean has a value of 3.75. The mode and median are again used for analysis. The mode of four indicates that most respondents agreed with the statements on leadership. It can be concluded that the organisations that have implemented lean successfully and have sustained lean practices agree with the statements pertaining to the importance of leadership for lean sustainability.

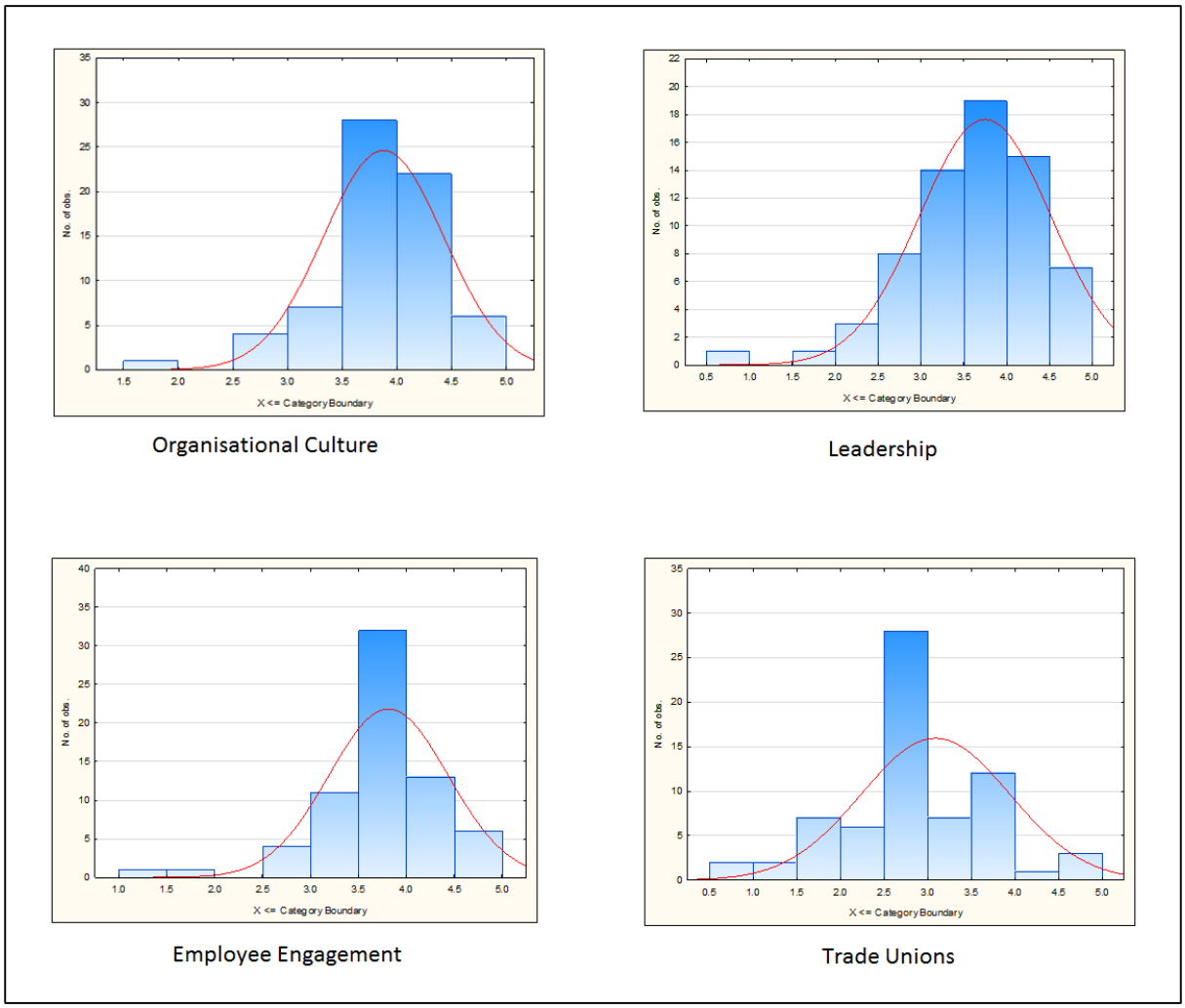
The **Employee Engagement Graph** is negatively skewed. Its measure of skewness is $Sk_p = -1.30$, indicating excessive skewness in the data. The mean, with a value of 3.81 is less than the mode and the median, both with a value of four. The mode indicates that the respondents agreed with the statements regarding employee engagement.

From the data it can be concluded that organisations that implement lean successfully and have sustained lean practices agree with the statements pertaining to the importance of employee engagement for lean sustainability.

The **Trade Unions Graph** show a symmetrical shape in its results. The skewness is close to zero, at a value of -0.09. The mean, mode and median are the almost the same with only the mean differing by 0.09.

The effect is an inconclusive result for determining the value of trade unions in sustaining lean implementation in organisations.

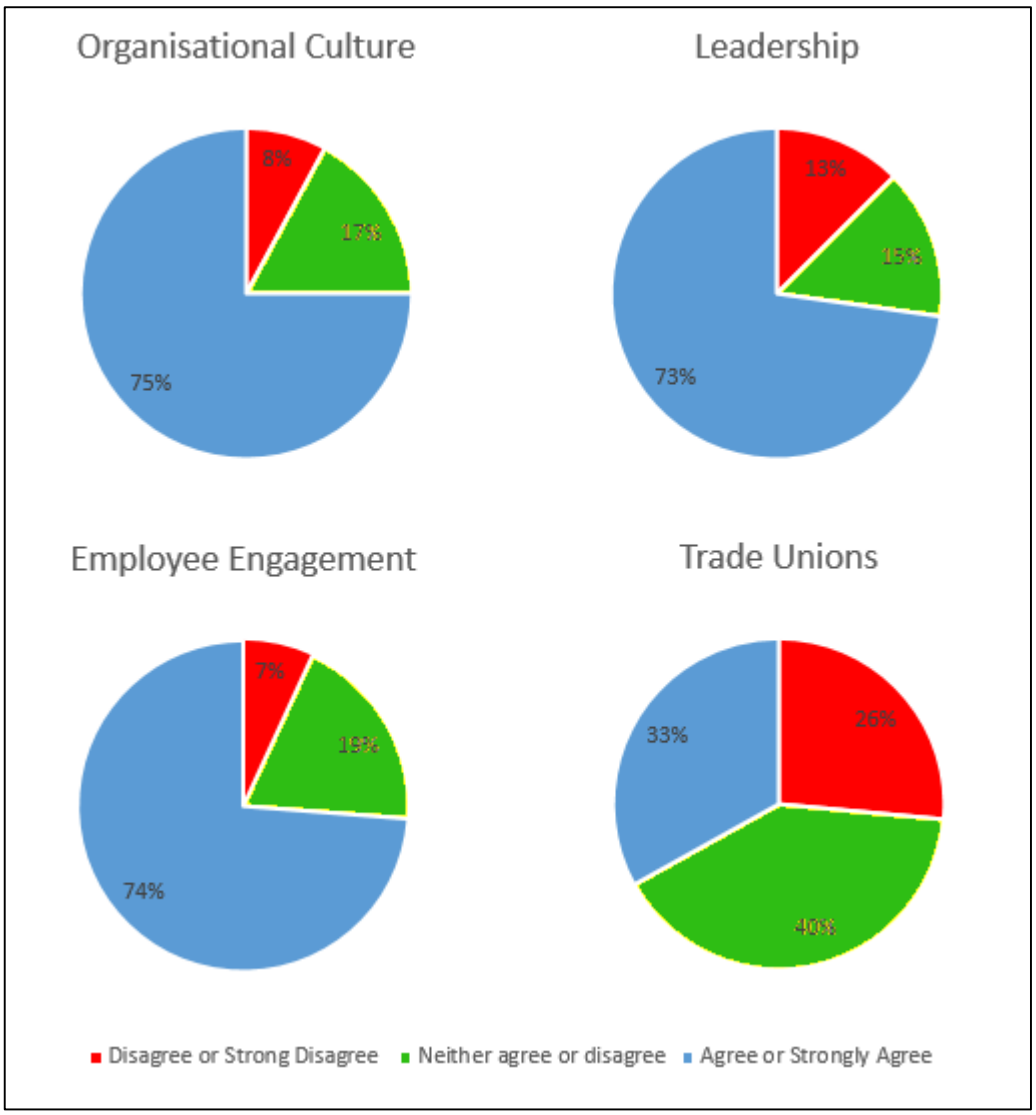
Figure 4.2 Distribution graphs for Organisational Culture, Leadership, and Employee Engagement and Trade Union results



Source: Statistica

To further indicated the strength of the preference towards statements the author grouped the five interval scaled options into three groups agree to strongly agree, neither agree or disagree, and disagree to strongly disagree. These groupings are illustrated in the pie charts in the figure below.

Figure 4.3 Distribution of Organisational Culture, Leadership, Employee Engagement and Trade Unions



Source: Author's own Illustration

As can be seen from the above in Figure 4.3, 75 present of the participants agreed with the statements pertaining to organisational culture. The statements relating to leadership had an agreement percentage of 73 percent and on statements relating to

employee engagement 74 percent of participants agreed. With regards to statements pertaining trade union participation there was no clear agreement by participants.

4.3 RELIABILITY OF DATA

To measure the reliability of the data in the study, Cronbach's alpha was used to measure the internal consistency of the variables. The alpha coefficient for the eleven items used to measure **Organizational Culture** is 0.88, meaning that the variables have a high consistency.

The alpha coefficient for the four items used to measure **Leadership** is 0.84, meaning a high level of consistency.

The alpha coefficient of the six items used to measure **Employee Engagement** is 0.85, indicating that also the variables have a high consistency.

Trade Unions' alpha coefficient for the two items is 0.65, which indicates a reasonable level of consistency but lower than 0.70 that is ideal level of internal consistency. This could be because of too few questions to test Trade Unions as enablers for lean sustainability.

4.4 CORRELATION ANALYSIS

Correlation analysis measures the strength of the linear association between variables (Wegner, 2008).

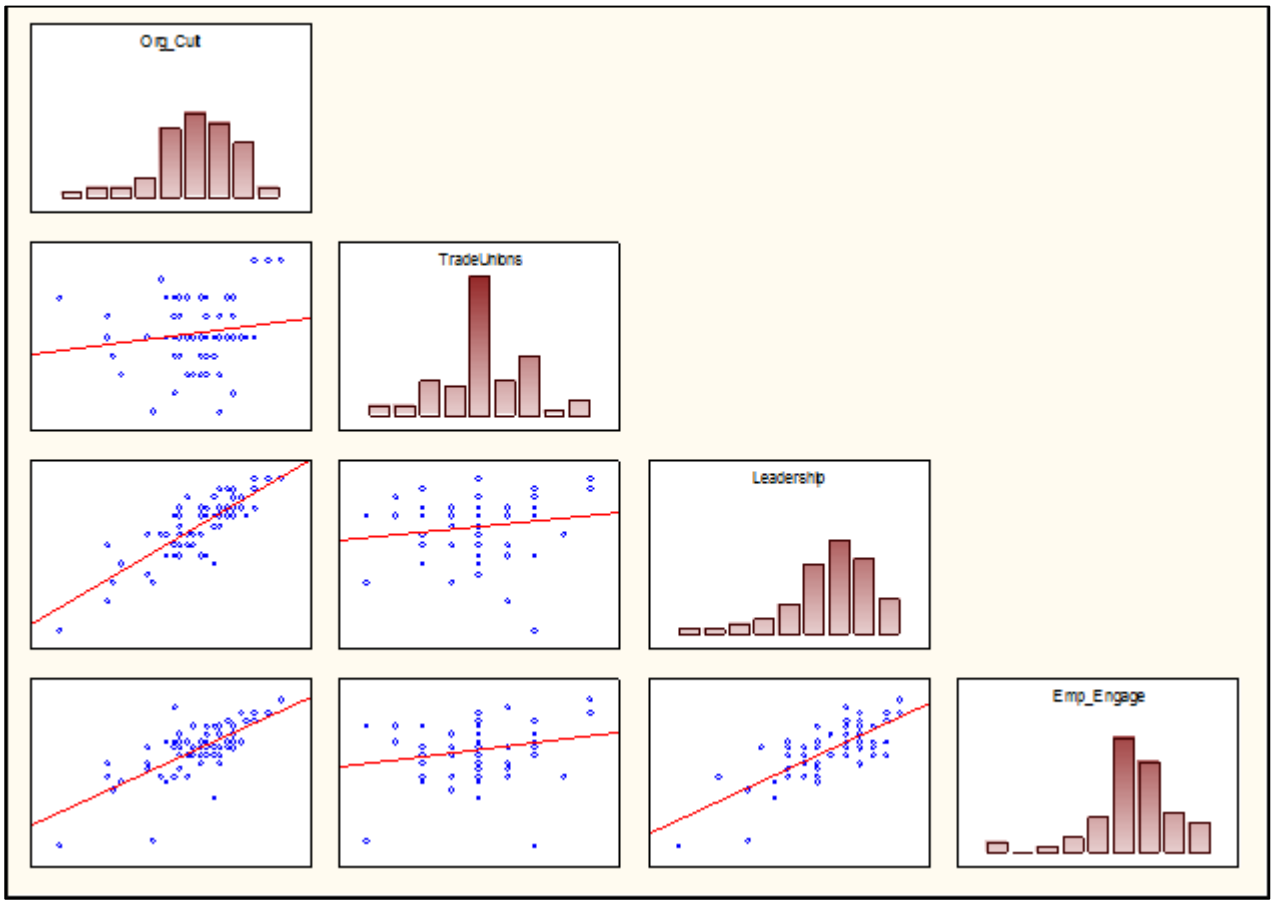
The correlation coefficient between **Organisational Culture** and **Leadership** had the r-value = 0.83, which is relatively close to +1. This indicates that there was a statistically significant correlation ($p<0.05$) between Organisational Culture and Leadership.

The correlation coefficient between **Employee Engagement** and **Leadership** had the r-value = 0.77, which is relatively close to +1. This indicates that there was a statistically significant correlation ($p<0.05$) between Leadership and Employee Engagement.

The same was found with the correlation coefficient between **Organisational Culture** and **Employee Engagement** which had the r-value = 0.71, also relatively close to +1. This indicates that there was a statistically significant correlation ($p<0.05$) between Organisational Culture and Employee Engagement.

There was no statistically significant correlation between **Trade Unions** participation and **Employee Engagement**, with the r-value = 0.23, which is relatively close to zero. There was also no statistically significant correlation between Trade Unions participation and **Organisational Culture**, and **Trade Unions** participation and **Leadership**, which both had r-values = 0.16 which is relatively close to zero.

Figure 4.4 Correlation Scatterplots and Graphs



(Org_Cut = Organisational Culture, Emp_Engage = Employee Engagement)

Source: Statistica

4.5 T-TEST RESULTS

Table 4.2 T-tests Results

	Mean	Mean	t-value	df	p	Valid N	Valid N	Std.Dev.	Std.Dev.
	3-9 years	10+ years				3-9 years	10+ years	3-9 years	10+ years
Organisational Cult	3,82	3,99	-1,19	66	0,2370	45	23	0,58	0,48
Trade Unions	3,03	3,20	-0,74	66	0,4607	45	23	0,82	0,91
Leadership	3,66	3,92	-1,34	66	0,1838	45	23	0,81	0,67
Employee Engage	3,83	3,79	0,22	66	0,8228	45	23	0,63	0,62

No significant differences (all p-values > 0.05)

The t-test were performed to determine if there was any statistical difference between organisations who had implemented lean for more than ten years, and organisations that have implemented lean for between three and nine years. There was no significant difference (all p-values > 0.05) between the two groups. Due to the size of the study sample it would be difficult to prove a significant difference.

CONCLUSION

As mentioned in Chapter 3, the study sample was homogenous. Each of the organisations approached was already implementing lean successfully for at least three years. The first five questions of the questionnaire confirmed the level of lean in the organisations.

In the questions referring to lean in the organisations, the one to four percent that either answered ‘no’ or ‘not sure’ could be the result of varying definitions on lean, lean tools and processes, as well as lack of knowledge. This shows that even in

organisations that have successfully implemented lean over a relatively long period of time there is still room for improvement and up-skilling. It would require further analysis to determine the exact reason for participant perceptions.

In the Chapter 4 it was established that the enablers identified in the literature and the statements regarding Organisational Culture, Leadership and Employee Engagement were agreed upon by the sample. Trade Unions as enablers for lean sustainability were not supported in the results.

The correlation between Organisational Culture, Leadership and Employee Engagement was also proven. There was no correlation found between Trade Union participation and the other three enablers. It was further established that there was no significant difference between organisations that have implemented and sustained lean for more than ten years and those what have implemented lean successfully and sustained it for three to nine years ($p>0.05$) with regards to Organisational Culture, Leadership, Employee Engagement and Trade Union participation.

CHAPTER 5

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

INTRODUCTION

The purpose of this study stems from the popularity of lean processes in a wide variety of industries but also the high rate of failed lean journeys. Only through the ability to sustain lean processes in organisation is it possible to truly reap the rewards gained from lean processes. The purpose of the study was to identify enabler for lean sustainability in the literature and test those enablers in organisations that have proven to successfully implement lean within the organisation and sustain it for a prolonged period of time.

The author developed a model to test Organisational Culture, Leadership, Employee Engagement and Trade Union participation. The model was tested through a questionnaire and the data collected provided evidence that proved the validity of Organisation Culture, Leadership and Employee Engagement. Trade Union participation could not be proven to contribute to lean process sustainability. The result with regards to the hypotheses, a conclusion and recommendations, as well as recommendation for future studies will be discussed in this chapter.

5.1 DISCUSSION OF RESULTS

The purpose of the hypotheses is to answer the research question. In Chapter 3 the four null hypotheses were formulated from Chapter 2, the literature study. Through the use of inferential statistics the hypotheses was tested against the data collected. Here follow the discussion of the null hypotheses (HO):

H01. Organisational Culture does not contribute to lean sustainability.

Through the descriptive statistics, three of the four enablers identified in the literature were proven as vital contributors to lean sustainability. The descriptive statistics on **Organisational Culture** indicates that respondents felt that the statements in the questionnaire relating to the type of Organisational Culture required for lean sustainability, play an important role in lean sustainability. It can therefore be said that

Organisational Culture does contribute to lean sustainability and thus, reject the first null hypothesis.

H02. Leadership does not contribute to lean sustainability.

The descriptive statistics of the data collected on **Leadership** indicated that respondents felt that the statements in the questionnaire regarding Leadership play an important role in lean sustainability. Therefore, the second hypothesis is also rejected. Leadership does contribute to lean sustainability.

The correlation analysis also shows that the relationship between Organisational Culture and Leadership is strong. These two enablers together play an important role in lean sustainability.

H03. Employee Engagement does not contribute to lean sustainability.

The statistics describing **Employee Engagement** indicate that respondents felt that the statements pertaining to Employee Engagement play an important role in lean sustainability. It can therefore be said that employee engagement does contribute to lean sustainability, and thus rejecting the third hypothesis.

The correlation analysis also shows that the relationship between Employee Engagement and Organisational Culture is strong, and so too is the correlation between Employee Engagement and Leadership. This indicates the importance of the interaction of Employee Engagement with both Leadership and Organisational Culture and the role these three enablers have together in creating a sustainable lean organisation.

H04. Trade Union participation does not contribute to lean sustainability.

Trade Union participation in creating a sustainable lean organisation was not confirmed through the descriptive statistics. No correlation could be found between Trade Unions participation and Organisational Culture or Leadership and Employee Engagement. However, the fourth hypothesis cannot be rejected because the data does not support or contradict the fourth null hypothesis. Therefore Trade Unions have not been found contribute to lean sustainability in organisations.

5.2 CONCLUSION

In Chapter Two, the literature study focused on the implementation of lean and the tools related to lean and this study, as well as the reasons for failed lean implementation. Together with an understanding of the varied definitions of lean, certain factors became apparent that lead to the success of lean implementations and enables sustainability of lean practices. Organisational Culture, Leadership, Employee Engagement and Trade Union participation were noteworthy enablers identified in the literature. These were further elaborated on and then tested in a model developed by the author of the study.

The results of the study showed that Organisational Culture, Leadership and Employee Engagement are seen as vital factors for sustaining a lean journey. These three enablers have an interlinked relationship and together help sustainability of the lean processes and practices. The Organisational Culture has to been fully committed to lean and the philosophy of lean. Employees must eat, speak and breathe lean, from the top to the bottom. Every employee must be committed to making the organisation lean. The Leadership are the front runners to lean and also the watch dogs, ensuring that everybody is pulling in the same direction. Employees are engaged if they are committed to lean, if they trust the leadership of the organisation and have a feeling of being part as well as having an input in the processes they work with. Lacking just one factor would surely result in unsustainable lean practices.

Trade Union participation was not found to act as an enabler for lean sustainability. Counter to what Vermaak (2008) found, companies that partook in the study did not feel Trade Unions contributed to sustaining lean implementation. A possible reason for this could be the strained relationship between the unions on one hand and service and industry on the other that has become more stressed since the global financial crisis of 2009. Companies have had to cut margins to stay afloat and remain competitive. Combined with the lower growth rates in the market employment opportunities are stressed and disposable income previously destined to increase wages and salaries are reduced. Added to this trade unions have gone out of their way to get the maximum wage increases for their members and cause as much disruption to operations in order to almost bring industry to its knees and to get what

it wants. Trade Union participation might not be seen as an enabler but could act as an inhibiter to sustainability. It is important for companies to be aware of this.

5.3 RECOMMENDATIONS

Three of the four enablers have been proven in a homogenous group. The next step would be to test the model in a case study of an organisation that has failed in sustaining its lean initiative. The organisational culture, leadership and employee engagement measures used in the model could help organisations identify where it had gone wrong.

The organisational culture of an organisation is so diverse in nature but the model proposed by Martins and Terblanche (2003) and adapted for this study, provides a guide to lean sustainability. The proposed model in the study should be investigated further and the enablers better defined.

5.4 FUTURE RESEARCH

Further research is needed to identify leadership traits specific to different industries. For example, the required leadership traits required in a medical facility will differ from that required in an automotive plant. As leadership is such an important link between establishing an organisational culture and getting employees engaged in their work, the field of lean management requires more clarification.

Though several tools have been identified in the study and the link with the enablers made obvious (gemba and management participation), a guide to which tools would strengthen the enablers would proof to be invaluable for practical application.

CONCLUDING COMMENTS

This study has proven the value of soft skills (Organisational Culture, Leadership and Employee Engagement) in the practical and philosophical initiative called lean. The value of successful lean implementation and sustaining lean practices has already been elaborated on. With a clear guide to the enablers of lean sustainability more

companies can sustain its lean journey and reap the rewards. The belief in the people that make up organisations as the foundation of that organisation sets a path for an organisational culture driven by passionate leaders and engaged employees able to sustain processes and principles such as lean.

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ANNEXURES

ANNEXURE A - ETHICS APPROVAL FORM E

Nelson Mandela Metropolitan University
for tomorrow

FORM E

ETHICS CLEARANCE FOR TREATISES/DISSERTATIONS/THESES

Please type or complete in black ink

FACULTY: Business and Economic Sciences

SCHOOL/DEPARTMENT: Business Management

I, **Pieterse, J.J.,** the supervisor for **Roth, B.K.**, student number **212377728,** a candidate for the degree of **Masters in Business Administration**, with a treatise/dissertation/thesis entitled **Lean Sustainability: Enablers for Lean Process Sustainability within South African Manufacturing Industries**, considered the following ethics criteria *(please tick the appropriate block)*:

	YES	NO
1. Is there any risk of harm, embarrassment of offence, however slight or temporary, to the participant, third parties or to the communities at large?		x
2. Is the study based on a research population defined as 'vulnerable' in terms of age, physical characteristics and/or disease status?		x
2.1 Are subjects/participants/respondents of your study:		
(a) Children under the age of 18?		x
(b) NMMU staff?		x
(c) NMMU students?		x
(d) The elderly/persons over the age of 60?		x
(e) A sample from an institution (e.g. hospital/school)?		x
(f) Handicapped (e.g. mentally or physically)?		x
3. Does the data that will be collected require consent of an institutional authority for this study? (An institutional authority refers to an organisation that is established by government to protect vulnerable people)		x
3.1 Are you intending to access participant data from an existing, stored repository (e.g. school, institutional or university records)?		x
4. Will the participant's privacy, anonymity or confidentiality be compromised?		x
4.1 Are you administering a questionnaire/survey that:		
(a) Collects sensitive/identifiable data from participants?		x
(b) Does not guarantee the anonymity of the participant?		x
(c) Does not guarantee the confidentiality of the participant and the data?		x

(d) Will offer an incentive to respondents to participate, i.e. a lucky draw or any other prize?		x
(e) Will create doubt whether sample control measures are in place?		x
(f) Will be distributed electronically via email (and requesting an email response)? Note: • If your questionnaire **DOES NOT** request respondents' identification, is distributed electronically and you request respondents to return it *manually* (print out and deliver/mail); **AND** respondent anonymity can be guaranteed, your answer will be NO. • If your questionnaire **DOES NOT** request respondents' identification, is *distributed via an email link and works through a web response system (e.g. the university survey system);* ***AND*** respondent anonymity can be guaranteed, your answer will be NO.		x

*Please note that if **ANY** of the questions above have been answered in the affirmative **(YES)** the student will need to complete the full ethics clearance form (REC-H application) and submit it with the relevant documentation to the Faculty RECH (Ethics) representative.*

and hereby certify that the student has given his/her research ethical consideration and full ethics approval is not required.

9 July 2014

SUPERVISOR(S) **DATE**

29/10/2014

HEAD OF DEPARTMENT **DATE**

30 June 2014

STUDENT(S) **DATE**

Please ensure that the research methodology section from the proposal is attached to this form.

ANNEXURE B – LETTER TO RESPONDENTS

Dear Respondent

I am studying towards my MBA (Masters in Business Administration) degree at the Nelson Mandela Metropolitan University Business School. I am conducting research on how to improve Lean Processes Sustainability. I believe that my study will make an important contribution to the improvement of sustaining the implementation of Lean processes within industry implementing Lean now and in the future in South Africa.

You are part of our selected sample of respondents whose views we seek on the above-mentioned matter. We would therefore appreciate it if you could answer a few questions. It should not take more than fifteen minutes of your time and we want to thank you in advance for your co-operation.

There are no correct or incorrect answers. Please answer the questions as accurately as possible. For each statement, tick the number which best describes your experience or perception. For example, if you strongly agree with the statement, tick the number 5. If you strongly disagree with the statement, tick the number 1. **Tick only one answer for each statement and answer all questions please. Please note also that the word "organisation" refers to the organization or business you work at.**

Please note also that your participation in this study is entirely voluntary and that you have the right to withdraw from the study at any stage.

Thank you very much.

Contact details:

To verify the authenticity of the study, please contact Prof. J.J Pieterse, at +27 (0)41 504 3774 and JJ.Pieterse@nmmu.ac.za.

ANNEXURE C – QUESTIONNAIRE

Level of lean organisation

		0	1-2	3-5	6-9	10+
1	How many year has your company been implementing lean?					

		Yes	No	Not Sure
2	Does the company implementing lean tools?			
3	Does the company work on minimising the non-value adding activities, or waste in the production process?			
4	Does the company work towards creating a streamlined high-quality system that produces products at the pace required, i.e. improve flow?			
5	Does the company continuously strive to improve on current standards of operations?			

Model for lean sustainability

		Strongly Agree	Agree	Unsure	Disagree	Strongly Disagree
6	The company's strategy is to promote development and implementation of new processes.					
7	There is clear link between strategy formulation and strategy execution within the company.					
8	Within the company lean implementation is be driven as a high priority strategic business initiative.					
9	Values like flexibility, freedom and cooperative teamwork are part of the company's structural values.					
10	Staff have the freedom to do their work and adapt procedures within the guidelines of the organisation.					
11	Personnel are rewarded for risk taking, experimenting and generating ideas.					
12	The company looks to employee people from diverse backgrounds.					
13	Team leaders, who have the expertise, participate closely in the evaluation of innovative activities.					
14	The company rewards success and acknowledges failure to openly discuss and learn from it.					
15	Individuals and teams have independence and space for idea generation and creative problem solving.					
16	The company promotes open-door communication where teams, groups and departments can gain new perspectives by openly communicating with one another.					
17	Trade unions support the lean implementation within our company.					
18	The trade unions have been part of the lean process from implementation.					
19	In the company there is a highly respected senior executive that drives lean implementation.					
20	Management, from the top down, ensure that the mind-set and behaviour towards lean implementation, is given the same attention as the operational side.					
21	Top management works on cultivating a corporate culture that is accomplished in lean thinking.					
22	Management spends time on a daily bases on the shop floor.					

23	Management motivates and encourages employees to strive towards achieving a lean organisation.					
24	Management cares about employees, beyond just workers, and is interested in employees' health, well-being and personal lives.					
25	Managers at the company work to build strong relationships with employees, build strong team interaction and lead in a "person-centred" way.					
26	Managers work with employees to create a clear career path and set goals with a potential for growth.					
27	Lean training is implemented through workshops for shop floor staff.					
28	I have faith in management and am proud to be associated with the company.					