

KEY SUCCESS FACTORS FOR LEAN IMPLEMENTATION IN THE  
EASTERN CAPE AUTOMOTIVE INDUSTRY

By

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## **DECLARATION**

I, Louis Coetzer hereby declare that:

- This treatise is submitted in partial fulfilment of the requirements for the degree of Master's in Business Administration, in the Faculty of Business and Economic Sciences at the Nelson Mandela Metropolitan University.
- The work has not been previously accepted in substance for any degree and is not being concurrently submitted in candidature for any other degree.
- In accordance with Rule G5.6.3, I hereby declare that the above-mentioned treatise is my own work and that it has not previously been submitted for assessment to another University or for another qualification.

**SIGNATURE:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

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## **LIST OF ABBREVIATIONS**

LPS – Lean Production System

KSF – Key Success Factors

SAAI – South African Automotive Industry

TPS – Toyota Production System

JIT – Just In Time

OEM – Original Equipment Manufacturer

KPI – Key Performance Indicator

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## **CHAPTER 1 : INTRODUCTION TO RESEARCH STUDY**

### **INTRODUCTION**

Lean manufacturing has become an integral part of the global automotive industry where manufacturers strive to improve quality, reduce costs while providing customers with more variety. Organisations are implementing the Lean Production System (LPS) as a process improvement methodology to deliver their products faster, better quality and at a lower cost (Laureani & Antony, 2012). This is accomplished through the elimination of waste and continuous improvement (Kaizen). Through the effective implementation of lean principles, an organisation can realise cost competitiveness, process improvement and ultimately gain a competitive advantage.

Although the theory of lean manufacturing is based on the implementation of tools, techniques and operational methods, many organisations that have implemented Lean have not reaped its full benefit. Thus, the realisation that lean manufacturing must consist of more than the summation of its operational based principles, tools and techniques. It has to be approached as a philosophy, which encompasses the entire organisation (Womack & Jones, 1996).

Lean is a way of thinking and not merely the implementation of thoughts (Bhasin & Burcher, 2006). Laureani & Antony (2012) added that the fundamentals behind Lean are continuous improvement, waste elimination and employee empowerment. Lean introduction is more than the redesign of processes; the most important change must be in the knowledge of the employees (Dombrowski, Mielke & Engel, 2012).

The literature clearly states that the successful implementation of a lean production system depends on more than the application of lean tools and techniques. Many authors and researchers hint that another critical factor associated with its implementation is the human aspect of the organisation. Hence, this study will examine the human related Key Success Factors (KSF's) required for the successful implementation of a lean system.

Dombrowski, et al. (2012) noted that two KSF's for lean implementation are organisational culture and leadership commitment. This creates the paradigm that lean implementation relies on much more than the technical aspects of operational implementation, and clearly integrates other human aspects of the organisation. In general, the success of lean implementation is more people related than technology related (Mehta, et al., 2012).

Hence, one can deduce that the implementation of such a LPS needs to encompass more than the technical aspects, and requires the attention to shift to the human attributes as well.

### **1.1 Research problem**

The South African Automotive Industry (SAAI) is increasingly being pressurised by the effects of globalisation and on-going cost competitiveness with Eastern countries. Hence, it is imperative for the SAAI to benefit from any and all sustainable process improvements.

Lean manufacturing principles have been introduced in many organisations throughout South Africa and have seen extensive introduction in the automotive sector. Although Lean principles have been introduced, many organisations still do not gain the full benefit Lean has to offer.

Failure is due to the focus being placed only on the technical and superficial aspects of the LPS. The biggest mistake companies make and a reason for the unsuccessful implementation of Lean is focusing on the tools and techniques and not sufficiently considering the people related issues (Vienazindiene & Ciarniene, 2013).

The introduction of any lean principle directly influences the employees within an organisation and those employees are mostly excluded from the decisions and change management process. Lean strives for perfection in the production process as well as the continuous long term development in the knowledge of the employees and management team (Dombrowski & Mielke, 2013).

If the summation of all the principles and methods of Lean is not a guarantee for success, then the only missing link can be the living, breathing, and always developing aspects of an organisation, its people. This does not only apply to the employees who witness and work with the changes, but to the management and leadership of the organisation as a whole.

## **1.2 Background to the research problem**

Lean manufacturing has become the benchmark for manufacturing processes, and many organisations strive to achieve the successes of the Toyota Production System (TPS). Organisations often succeed in the implementation of the tools and techniques of Lean, but fail to create the sustainable production system it offers. No single tool or technique can represent Lean as a concept; rather, tools, techniques and methods are only part of the LPS toolbox. The tools cannot do the work themselves (Dombrowski & Mielke, 2013).

The conclusion by many authors is that Lean implementation often fails as a result of focusing on the tools and methods and not including the human aspect of the organisation. Few organisations succeed in the implementation of such a vast and complex production system because of focusing on the superficial elements and not placing enough emphasis on the human elements (Dombrowski & Mielke, 2013).

Liker (2004) proposed the 4P model to explain the focal points for Lean implementation namely, the Philosophy of long-term thinking, the elimination of waste within the Process, People and partners, and finally the Problem Solving culture (continuous improvement and learning). Womack and Jones (2003) also revised their initial approach to include the human element which was absent from their previous workings. They included the role that the people play in the success of lean implementation and created the three-step approach, which includes Purpose, Process and People.

Although the value added by employees have become more apparent in the recent past, the pertinent question still remains as to which human factors contribute to the success of Lean? Numerous researchers have identified factors



deemed important for successful implementation of Lean. These factors range from effective communication, inclusion in company strategy as well as training of the employees within the organisation.

Management must work with the employees to educate and train them in order to align their thinking and behaviours to the Lean objectives to achieve a positive outcome (Mehta, et al., 2012). A sustainable adoption of Lean can only be achieved if all employees have an in-depth understanding of its principles and concepts (Dombrowski, et al., 2012). Liker (2004) also noted that the implementation of techniques and methods of a LPS is by far the easier part; the biggest challenge is to change the mindset and behaviour of the employees and leaders.

This proves that Lean implementation success is not only reliant on the visible changes to the process but changes relating to the employees, creation of a lean culture, as well as the management of the organisation. Lean implementation thus requires various KSF's critical to its success, which will create the framework to which the operations and indeed the strategy of implementation will be formed.

### **1.3 Conceptual model**

Literature proposes several KSF's for the implementation of a LPS; however, these are mostly concerned with the operational activities of the implementation. Four KSF's for successful Lean implementation has been sourced from literature and used as a framework for this study, namely:

- Management commitment
- Employee Engagement
- Development of a Lean Culture
- Union Support and involvement

These KSF's will serve as the basis for this study and will formulate the empirical study by means of a questionnaire. The researcher will investigate the relationship between the dependent variable and the independent variables as laid out above.

Successful Lean implementation must include all the variables within an organisation and not only the superficial aspects thereof. These KSF's provided a view of not only the operational aspects of the organisation but also includes the most valuable asset, human capital.

#### **1.4 Delimitations of Research**

The research study will be conducted at an automotive Original Equipment Manufacturer (OEM) within the Eastern Cape Province.

The study will only include the OEM and none of the automotive component manufacturers or other organisations within the OEM's supply chain.

Various levels of the OEM staff will be included in the study; however it will be limited to management, Lean experts and Continuous Improvement Team leaders. This provides the study with data from all levels within the organisational structure involved in LPS activities.

Due to the limited number of employees involved with the strategic aspects of Lean implementation, the questionnaire will be aimed at employees and management with extensive knowledge and experience in the implementation tactics at the specific OEM.

#### **1.5 Research Objective**

The objective of this study is to test if the key success factors for lean implementation found in literature are comparable to the factors found during implementation of a specific automotive manufacturing plant in the Eastern Cape automotive industry.

To achieve the above research objective, the following design objectives will be pursued:

- A secondary literature review will be conducted on:
  - Methods/techniques used for implementation of Lean Production Systems.

- Key Success Factors based on previous implementations within the automotive industry.
- Implementation barriers to Lean Manufacturing in general.
- An empirical study will be conducted by means of a questionnaire, which will be distributed electronically to the selected population.
- The collected data will be statistically tested and results used to examine and conclude the findings.

## **1.6 Delimitation and Limitation of the Research**

### **1.6.1 Geographical location**

The organisation under study is situated in the Eastern Cape of South Africa. This automotive OEM is responsible for manufacturing vehicles for local market consumption and export to various countries throughout the world. A geographical limitation was placed on the study due to the various external factor variations between automotive OEM's in the other parts of South Africa.

### **1.6.2 Industry**

This research study will be conducted solely at one organisation. Suppliers and customers to the OEM will be excluded from this study, as it aims to investigate whether the organisation under study has conducted the implementation in the correct manner according to literature.

### **1.6.3 The Organisation**

The OEM under study has been operating within South Africa for more than 60 years and is a well-respected player in the worldwide automotive industry. The organisation was selected due to the worldwide strategy of Lean implementation within the automotive brand, and the extensive implementation in the Eastern Cape plant.

### **1.6.4 The Sample**

Various levels of hierarchy and experience are involved in the implementation of a lean production system, and are therefore critical that most of these levels are

represented within the sample. Due to the specific experience required for lean implementation, the sample size of the population decreases dramatically. The population will be constructed of management within the organisation as well as employees with experience in the strategic aspects of Lean implementation.

### **1.7 Importance of study**

In order for any automotive manufacturing factory to be competitive in the current economic climate, the organisation needs to seek ways and means to continuously improve the operations within. Lean manufacturing has proven itself in various industries and there for is regarded as one of the most advantageous improvement initiatives any organisation can undertake.

South African organisations are under even more pressure to produce higher quality products at a lower cost due to the current economic downturn, labour disputes and weakening currency. In order for South African organisations to succeed in this harsh climate it requires them to find and implement sustainable improvements, which can benefit the organisation as a whole.

Lean manufacturing provides the required sustainable productivity improvements through the elimination of waste, decrease in logistical cost, multi-skilled workforce and a positive working culture. These improvements can however only be achieved through the commitment of the entire organisation to the Lean concept and its implementation.

Hence this study will deliberate on the critical focal areas that have been disregarded in the past, and bring forward the Key Success Factors required for successful Lean implementation based on the human aspects of the organisation.

## **CHAPTER 2 : LITERATURE REVIEW**

### **INTRODUCTION**

Lean manufacturing or the Toyota Production System (TPS) has become the worldwide benchmark for manufacturing processes and has been adopted by numerous industries with significant success. The basic idea behind Lean Manufacturing is to eliminate any waste in the manufacturing process through continuous improvement, employee empowerment and cost reduction (Mehta, et al., 2012).

A more technical description from Womack and Jones (1996) is that Lean is a production philosophy that decreases the time between order placement and product delivery by eliminating waste throughout the products' value stream. Plainly stated, it describes that any and all activities that contribute to the manufacturing of a product should be value adding, and that any process or activity, which is not needs to be eliminated.

Many organisations fail to implement Lean as a production system, and thus fail to reap the definitive benefits from it. Many authors agree that this is due to the focus on tools, techniques and principles of the operational aspects of Lean, and not enough focus on the human aspects of the organisation (Dombrowski & Mielke, 2013).

The literature review hereafter examines current literature on Lean manufacturing and the KSF's critical to the successful implementation thereof. The chapter outline will comprise of the main research objective of determining the KSF's relating to the human aspect of Lean implementation.

### **2.2 Background to Lean Manufacturing**

Lean manufacturing started when a young Japanese engineer, Eiji Toyoda set out to seek process improvement ideas from Ford's mass production plant in Detroit. Since the start of the model A Ford, the Detroit-based company had been the most successful mass production plant in the world.

In contrast, the Toyota factory was using craft production methods that were much slower and more costly. In hope that lessons learned in Detroit can improve operations in Japan, Eiji Toyoda spent three months meticulously studying every inch of the process at the Ford plant.

After conclusion of the visit, Eiji Toyoda returned home to discuss the findings and possible improvement solutions with his chief production engineer, Taiichi Ohno. Soon after, the pair concluded that the mass production method is not suited for the Japanese market and that a completely new approach needs to be found. This was the start of what the world now knows as the Toyota Production System and ultimately Lean production (Womack, et al., 1990).

Over the next 26 years, Taiichi Ohno tirelessly dedicated himself to develop a sustainable manufacturing process (Pieterse, et al., 2010). Following repeated visits to the Ford factory in Detroit, Ohno realised that the production system was plagued with *muda*, a Japanese term for the waste of effort, time and materials. Back in Japan, Ohno set out to find ways to eradicate these various types of waste throughout the production system.

### **2.2.1 Elimination of waste**

In essence Lean Manufacturing refers to manufacturing without waste (Rahman, et al., 2013). Womack and Jones (1990) described Lean as using less input to produce more output with maximum variety for the end customer.

Although the end goal of lean is to eliminate waste, a more apt description of its purpose will be that Lean aims to satisfy the end customer through faster, cheaper and better quality products and services (Pieterse, et al., 2010). Hence Lean is not merely a technique to reduce and eliminate waste, but to create a process where every activity adds value to the end product.

Value is created by eliminating waste in activities or processes through the use of appropriate tools and techniques. The seven different types of waste identified by Ohno include:

- Overproduction
- Waiting time

- Transport
- Non-Value adding Processing
- Inventory
- Motion
- Defective goods

### **Overproduction**

Producing more than what is currently required is the greatest source of waste according to Ohno. This overproduction requires storage, holding cost, as well as opportunity cost of raw materials used for production. Overproduction is due to an uneven flow throughout the process that requires a significant amount of WIP (Work-In-Progress) (Pieterse, et al., 2010).

### **Waiting Time**

Referring to the idle time of operations during the set-up of machinery, or when operators stand and watch equipment do the job without having a next task to perform. Overproduction is also a form of waiting time waste, as the parts manufactured during this time are not required for the current production volumes.

### **Transport**

Most of the parts required in Ford's Detroit plant had to be shipped over 6500 km to the factory instead of using local suppliers to eliminate the waiting time, cost, and transport. (Womack, et al., 1990). Moving materials from one place to another within the plant also refers to transport waste, as this adds no value to the product.

### **Non Value adding Processes**

In some instances processes are created due to bad quality parts, hence, rework is required to achieve the quality levels. This is an example of a non-value adding process, as the parts need to be corrected at the supplier, and supplied to the correct quality levels.

## Inventory

Every piece of inventory has a cost allocated to it, as the value is only realised once the product is sold. Inventory feeds additional types of waste, as the excessive inventory requires storage space, packaging to eliminate damage etc.

## Motion

Unnecessary motion refers to actions that operators or machines exert but not add value by doing so. Examples of this include travel between workstations, lifting parts or equipment from under waist level and double handling of parts (Early, 2015).

## Defective goods

Simply put, defective goods relate to the quality of products delivered to the production facilities that require additional rework. Defective goods relate to goods that require additional rework to achieve the desired quality level, or parts and assemblies not fit for use and regarded as scrap within the factory.

In his quest to eliminate these wastes, Ohno developed several Lean tools and principles. These tools included the three main sources of waste, namely man, machine and materials (Čiarnienė & Vienažindienė, 2012).

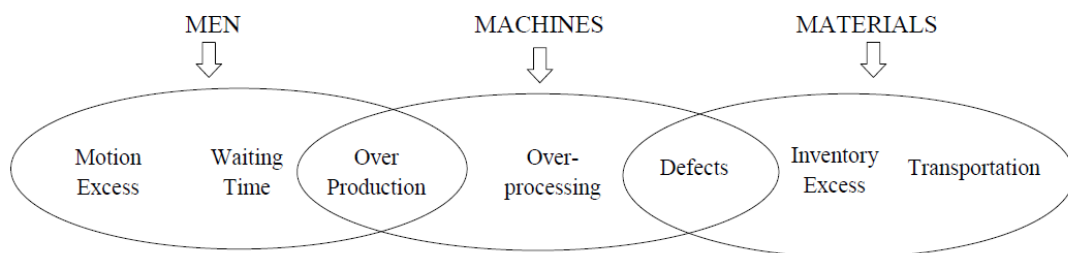


Figure 2-1: Sources of waste (Čiarnienė & Vienažindienė, 2012)

During the elimination of waste an important principle of Lean is created, flow. The aim of flow is to ensure that one piece of the product starts the process, and continues through all activities and processes without being held up in batches or buffers. This allows the production system to operate without material waste of



inventory, overproduction, waiting time and inappropriate processing by producing parts to fill the buffer stock.

Over the next years, Ohno implemented tools and techniques to combat waste in the production process. Some tools were simple requiring only the assistance of the person actively working on the production line, and some more intricate involving other departments.

### **2.2.2 Lean principles**

Womack and Jones (1996) introduced a five step approach to the introduction of Lean and those five steps are considered as the most important principles to successfully create a lean production system. These principles are:

- Specify Value
- Identify the value stream
- Create flow
- Pull
- Perfection

These five principles underpin the implementation of the tools and techniques developed by Ohno. The five principles are consciously placed in the specific order as one level builds on the next, growing the success and the capabilities from top to bottom.

#### **Specify Value**

The objective of any organisation is to create value for the customer by meeting their requirements and needs. Hence, the starting point for Lean is to precisely define the customer requirements and what they consider as value. The challenge for the manufacturer is to develop a product portfolio, which corresponds to those specific value propositions of the customer (Melton, 2005).

Womack and Jones identified value as the first principle of lean, where it constitutes more than just the elimination of waste. Value relates directly to what the customer pays for when purchasing an item, and which processes have added value to that specific product.

The change in mindset regarding the definition of value simplified the search for waste in the production system and sensitised the employees to the importance of waste elimination (Hines, et al., 2004).

### **Identify the value stream**

Value stream mapping is a tool used to identify all the activities within the manufacturing process. These activities include all processes, from transporting of raw materials to the manufacturing of certain subcomponents. This process provides the opportunity to immediately identify and eliminate obvious waste in the production process.

### **Create Flow**

Both previous steps are taken to reduce waste in the production system and to identify process improvement made from easy gain activities. Creating flow is the next, and possibly the most important step of implementing Lean. A lack of proper flow in a production system results in warehouses and manufacturing buffers (Melton, 2005).

### **Pull**

Pull refers to the products being manufactured to customer orders and needs instead of a traditional forecast (Pieterse, et al., 2010). Pull also refers to the production process where a station only produces parts as per the use of the following station (Kanban). This eliminates overproduction, and time can be used more effectively by performing preventative maintenance (Walters, 2012).

### **Perfection**

Now that all of the previous four steps have been identified and implemented, the manufacturing process is capable of producing a customer demanded product by a production system that ensures proper flow. By the introduction of various Lean principles and elimination of waste, the perfection principle can be achieved. Although the five principles have been handled, continuous improvement (Kaizen) is still required to ensure the sustainability of changes made to the production system.

## **2.3 Evolution of Lean implementation methods**

### **2.3.1 Operational based implementation**

Implementation of a Lean production system can be a daunting task, especially if it is the first attempt. Many organisations attempt Lean implementation and fail due to the focus being placed on the incorrect aspects and applications. Less than 10% of companies successfully introduce Lean as a concept (Bicheno & Holweg, 2009).

Much research has been conducted regarding the successful implementation of Lean and the Key Success Factors (KSF's) associated with it. KSF's provide the backbone of any implementation project, and specifies the requirements to ensure the success of the project. KSF's are the factors essential to the project and which, if not successfully achieved, will result in catastrophic failure (Rungasamy, et al., 2002).

Researchers have identified various KSF's integral to the success of implementing a LPS. This followed the process steps outlined in the book 'The Machine that changed the World' by Womack and Jones in 1996, where the focus was solely on the execution and implementation of the various tools and techniques of Lean. Hence, the KSF's were also related to the operational aspects of the organisation and excluded the living part of it, the people. Womack and Jones suggested a five-step process to successfully implement a LPS, namely to Specify value, Identify the value stream, Create flow, create a Pull production process and strive towards Perfection.

In so doing, Womack and Jones introduced Lean to the world in a way that was simple to understand, practical, and yielded immediate results.

### **2.3.2 Change in thinking about "The People"**

Although the steps of Womack and Jones were revolutionary to the manufacturing sector, the methodology became questionable in the late 1990's. The sustainability of this approach was questioned as the entire five-step process was formed on the superficial aspects of the production system (Liker, 2004).

This posed a question to the acceptance and engagement of the employees as well as the commitment for implementation from management and leadership.

As with any project within an organisation, the likelihood of its completion and sustainability is directly related to the involvement and commitment of management and leadership (Laureani & Antony, 2012). This is also true with respect to lean implementation, and even more so, the acceptance of the employees, as they play a significant part in the sustainability of a LPS.

### **2.3.3 Revised implementation method including people**

Liker (2004) noted that the true success of Lean implementation lies with a previously neglected element of the organisation. Liker developed the 4P framework to simulate the implementation steps of a Lean Production System.

- Philosophy
- Process
- People and Partners
- Problem Solving

Crucially, this approach included the 'People and Partners' element, which incorporates the missing element from previous studies. This includes training, development and continuous knowledge growth of the employees. The implementation of a LPS can only be classified as successful and sustainable when each employee deeply understands the tools methods and techniques (Dombrowski, et al., 2012). Employees require additional skills to enable them to conduct several process steps to contribute to the success in transforming to Lean (Deflorin & Scherrer-Rathje, 2012).

The other aspect the 'People and Partners' element includes the supplier base in an organisation's supply chain. To become truly lean, the implementation and understanding of the principles should extend beyond that of the core organisation, and should be passed on to its suppliers and customers (Scherrer-Rathje, et al., 2009).

An important consideration is that Lean application should be recognised across not only the internal organisation, but the entire value chain (Deflorin & Scherrer-

Rathje, 2012). Although extending knowledge to suppliers is important when attempting a LPS, one must accept that the knowledge transfer can only occur when the originating organisation has mastered the methodology (Laureani & Antony, 2012).

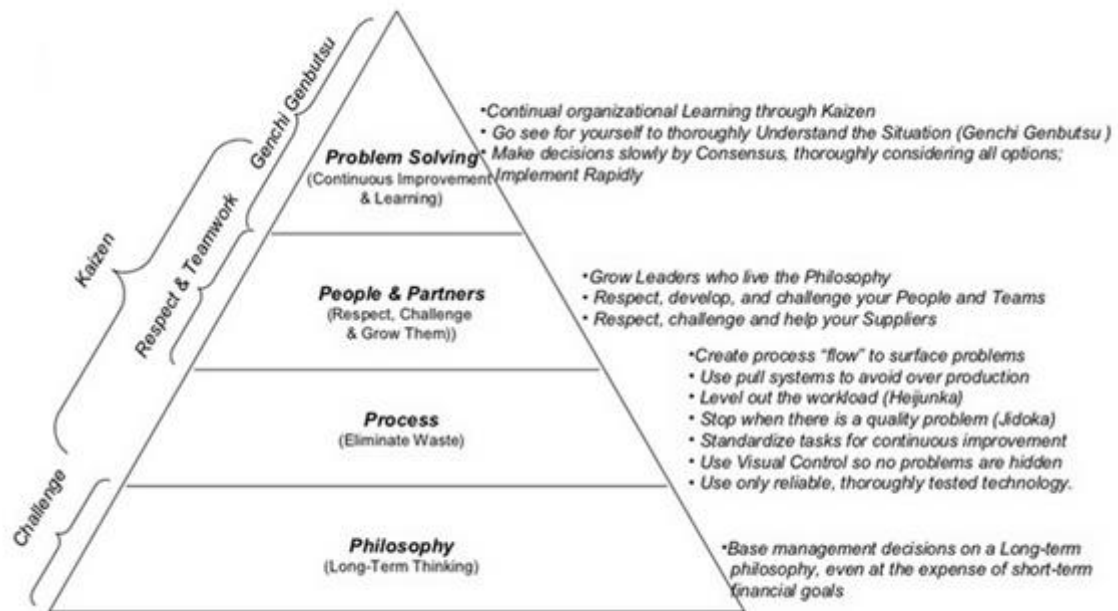


Figure 2-2: Liker's 4P model (Kumar, 2013)

What's more, Womack and Jones revised their implementation process in 2008 to encompass the human aspects of the organisation. Their newly developed three-step process included the Purpose, Process and People steps, thus including the immense role that people play in the organisation. The 3P process was developed because Womack believed that most organisations struggle with Lean because their purpose is not clearly defined, their processes are not clearly defined, and the people are not fully engaged (Found, et al., 2009).

The idea behind these three steps is that one first needs to consider the purpose of the organisation and why it needs to change. After this has been established, the organisation can improve the processes to create a synergy with the purpose of the organisation and the requirements to change. Lastly, once all of the above has been implemented and working correctly, the people factor receives attention.

## **Purpose**

The key principle behind Lean is to increase customer value and ultimately customer satisfaction. Although 'making money' is the response from most organisations when asked their purpose, it is merely the result of striving to achieve its real purpose, satisfying its customers. Once the purpose of an organisation is defined, one can identify which processes to pursue for optimum customer satisfaction (Womack, 2006).

The Purpose of an organisation has two aspects; first, what is needed to better satisfy the customer, and secondly what is needed to survive as a business (Womack, 2006). Both these aspects are crucial to the success and sustainability of an organisation, and form the foundation and cornerstones for the implementation of Lean.

## **Process**

The Process step simply refers to the production system as a value stream with all actions required from the start to the end of the manufacturing process (Womack, 2006). These processes and actions should all be value adding to the product.

The processes within a LPS must add value to the point where the customer needs are met and surpassed. Value stream mapping is the Lean tool used to eliminate non-value adding processes and improve efficiencies within the current production system.

## **People**

The most important asset of an organisation requires continuous knowledge and skills building to ensure the sustainability of the employees. Hence, Womack and Jones introduced the people aspect to the implementation steps of Lean. Employees require continuous training and development of skills to enable them to conduct the several additional tasks and responsibilities to contribute to the success of transforming to Lean (Deflorin & Scherrer-Rathje, 2012).

In order to ensure the sustainability of a lean production system the responsibility of continuous improvement needs to be delegated to the shop floor. In doing so

the employee knowledge of lean principles and tools requires constant improvement.

The development of employees in return is the responsibility of the management team and of the organisation. In order to be truly successful in the implementation of Lean, both the employees and the leadership need to be committed to the learning, implementation and continuous improvement of their Lean knowledge.

## **2.4 Human related factors influencing Lean implementation**

Research has found that various lean implementation barriers relate to human factors in organisations. Lean manufacturing barriers can be separated into two groups; Organisational barriers and People related barriers (Rahmana, et al., 2014).

Five main barriers for implementation have been identified as lack of leadership commitment, organisational culture, planning, organisational structure and the shortfall in lean knowledge (Dombrowski & Mielke, 2013). These results indicate that the implementation method suggested by Womack and Jones with the Purpose, Process and People steps, as well as Liker's 4P implementation method realises the importance of people related factors in the lean implementation process.

### **2.4.1 Management commitment**

Leaders have the ability and authority to make or break any improvement initiative within a company. Therefore, it is vital to gain their approval, support and commitment from the start. Two main causes of Lean production system failure are leadership commitment and organisational culture (Dombrowski, et al., 2012).

Lean methods and tools are important to the implementation methodology, but cannot be achieved if leadership does not have a deeper understanding of Lean (Womack, 2011). Leadership needs to support the initiative and commit to the cause by actively involving themselves in the implementation process.

Literature suggests that leadership have several factors influencing the implementation process of a LPS. The first of which is the commitment to

change, where the need for change must be identified and acted upon (Scherrer-Rathje, et al., 2009). People, in general do not commit themselves to change if they do not see the need to. Similarly, leadership and management of organisations want to see and understand the need for change and the benefits associated with it.

#### **2.4.1.1 Lean Leadership**

According to Liker's 4P model, the starting point in the transformation to Lean is to discover and identify the true purpose of the organisation. Many organisations believe that their sole purpose is to make money, and no matter how you look at it, making money comes from performing the true purpose of serving the customers' best interest. In doing so it is the responsibility of the leadership to direct and spearhead operations in all aspects.

One aspect is what has been defined as 'Lean Leadership', and encompasses the values and behaviours, which are essential for a Lean leadership team. Lean Leadership is a methodical approach for the sustainable implementation and continuous improvement of a LPS (Dombrowski & Mielke, 2013).

Furthermore the implementation of a sustainable LPS is not possible without the support and commitment from senior management (Scherrer-Rathje, et al., 2009). Hence, it is vital that management and leadership are adequately trained and involved to understand and support the transformation process where required. It needs to be understood that management and leadership are not the individuals who add value to the products, but play the essential role in setting a framework for value creation (Dombrowski & Mielke, 2013).

The principles of Lean leadership have been identified as (Dombrowski & Mielke, 2013):



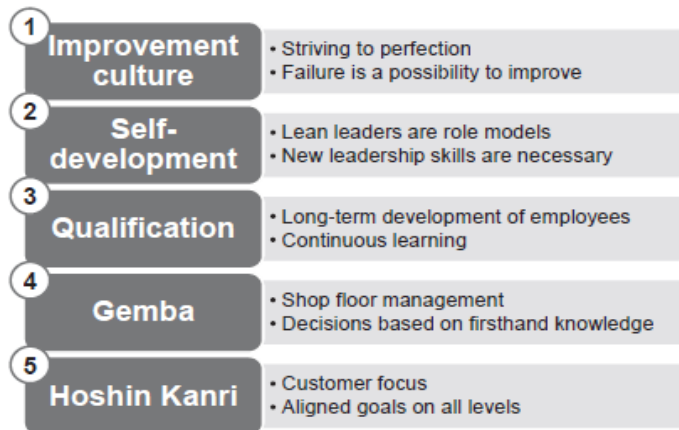


Figure 2-3: The five principles of lean leadership (Dombrowski & Mielke, 2013)

These principles underpin the traits of lean leadership, which need to be understood by each individual of the management team.

Liker and Convis (2012) presented a similar model to describe the most important characteristics of Lean Leadership within Toyota. This model consists of four stages namely:

- Commitment to self-development
- Coach and develop others
- Support Daily Kaizen
- Create Vision and Align Goals

When comparing the two models one can clearly see the roles and responsibilities of a lean leader. A drive for self-development, development of others, coaching and mentoring the principles and methods of Lean, and creating a vision, direction and goals, are the core responsibilities of lean leadership.

#### 2.4.1.2 Leadership roles

One may raise the question, if leaders do not add value to the product, what is their purpose?

Leaders play the role of the missing link between lean tools and the much-desired continuous improvement culture (Mann, 2009). Leaders need to encourage, coach, mentor and support the process of the LPS in any way required, while creating the environment for sustainable value creation.

Lean leadership describes an ideal organisation with mutual cooperation between leaders and employees in striving for perfection (Dombrowski & Mielke, 2013). The mutual cooperation can only exist if all parties involved are working towards a common goal, which has been identified and communicated to all employees. Lean implementation needs to be a top down approach and driven by management and leadership to the rest of the organisation (Scherrer-Rathje, et al., 2009). This is not only true for the implementation objectives and goals, but pertain directly to the culture and values which leadership wants to establish in their employees.

The hierarchy of an organisation operates in the same manner in which a household does. The 'children' will mimic the values and culture that the adults in the household embody.

Similarly, the organisational leaders need to set the example of how the employees need to behave and act within their respective roles in the organisation. When the management team point fingers and passes blame to others by not accepting the responsibility for rising issues, the employees will eventually perceive that of being appropriate management methods, and will result in the next generation of 'current' leadership.

Lean culture is defined as the "No-Blame Culture", where the focus is directed at solving the root cause rather than blaming the responsible person/department (Liker & Convis, 2012). Lean culture develops employees to understand and actively work at problem solving through continuous improvement, and teaches that each problem is an opportunity for improvement, rather than pointing out of a failure (Dombrowski & Mielke, 2013).

#### **2.4.1.3 Leadership development**

Another principle of Lean leadership is the strong need and commitment to self development. Leaders first need to know and deeply understand the methods and philosophy of lean, before they can take responsibility of teaching others (Poksinka, et al., 2013).

Toyota management is respected for both their technical knowledge as well as their leadership ability (Liker, 2004). Their respect is earned by having an in-

depth knowledge and understanding of the principles and methods of lean, as well as their ability to inspire, develop and lead people. In order to achieve a sustainable LPS one has to understand that there needs to be a significant cultural shift, and as with many processes in an organisation, it starts from the top.

In order to achieve this, leadership and management of the organisation need to develop their skills and improve their knowledge base surrounding the topic of lean manufacturing and its introduction. Leadership needs to understand that the top down approach is required for the transformation of its values and culture. Management needs to believe in the change and live the values and sought after cultural behaviour (Keiser, 2012).

The above is only possible through the presence of management and leadership in the daily tasks and operations of the business. They need to be actively involved in the problem solving initiatives and implementation steps to show their engagement and commitment to the project.

A special Japanese term has been coined for this: *genchi genbutsu*, which means to go to the workplace (*gemba*) and see for yourself. This is in strong contrast with the traditional management approach where daily reports are issued on the progress of projects. The physical presence of leadership and management shows the commitment, engagement and support for the initiative (Pieterse, et al., 2010).

#### **2.4.1.4 Strategic Leadership**

Although the presence of leadership is important, the successful implementation of lean requires Key Performance Indicators (KPI's) at a strategic level to ensure the progress of the project. Lean implementation, tracking and progress need to be discussed at a senior management level, where KPI's are reviewed and actions are taken where required.

The link to corporate strategy needs to be clearly defined and communicated throughout the company to show the importance of the project and commitment by senior management and leadership (Scherrer-Rathje, et al., 2009). By adding Lean to the corporate strategy indicates the importance of it; however it also

indicates it as a goal that needs to be achieved. Usually this entails that once the goal is achieved, it is removed from the corporate strategy and another goal is added. As previously stated, the objective of Lean is not to be seen as a goal or a KPI, but as a way of life, a philosophy of how work is conducted within a business (Scherrer-Rathje, et al., 2009).

Hence, the importance of a clearly stated value system and cultural behaviours from the outset, where management and leadership need to embody and live their proposed values.

#### **2.4.2 Cultural Fit**

Cultural adaptation and fit is a fundamental principle in the world of lean production systems. As noted by Wong (2007), cultural adaptation is a key aspect in the successful implementation of a Lean system. More so, organisational culture is the building block for achieving a high performing lean organisation by empowering people, strengthening partnerships, and building continuous improvement behaviour where all employees are involved in decision making on a daily basis (Al-Najem, et al., 2012).

Culture in its basic form encompasses the behaviours and actions of all employees within the organisation, and serves as a guideline to effective and efficient work habits. Culture is a powerful, latent and mostly unconscious force that determines individual and collective behaviour in a society (Al-Najem, et al., 2012). Organisational culture consists of common values, systems, beliefs, and behaviour, which sets apart a functional from dysfunctional organisation (Wong, 2007)

Lean implementation and eventual sustainability require the change of certain behaviours and beliefs within an organisation from the current organisational culture to what is known in the literature as the Lean culture. Change in culture is a daunting task, and should be well planned and agreed prior to the start of a project of this magnitude. The leadership of the organisation needs to understand and accept that a change of culture will require a substantial role from management who fully understand and support the initiative (Al-Najem, et al., 2012).

### 2.4.2.1 Personal culture

Cultural adaptation and change have been the topic of research for many, and literature comes to one conclusion, that organisational culture cannot be transferred across borders expecting the same result with the same input (Wong, 2007). Each nation or region is different in terms of their organisational and national culture, and therefore requires adaptation in order to find appropriate methods of incorporating the envisaged culture (Lacksonen, et al., 2010).

According to Hofstede (1988), cultures differ in four main dimensions: Power distance, Individualism/Collectivism, Masculinity/Femininity, and Uncertainty avoidance. These four dimensions are what sets each national culture apart, and cannot be transferred from one to the next.

- **Power distance.**

Defines how power is distributed through the organisation. High power distance is defined by more levels of hierarchy and specialised decision making abilities. Low power distance reflects the informal way of working, networking and collaboration. South African power distance is generally lower, due to the emphasis on democracy that rejects views of authoritarianism (Werner, et al., 2011).

- **Individualism/Collectivism.**

Refers to the extent to which individuals prefer to make decisions on their own or as a group.

- **Masculinity/Femininity.**

Refers to the preference for masculine values such as competitiveness, assertiveness etc., or feminine values such as nurturing, supportiveness and quality of relationships (Werner, et al., 2011).

- **Uncertainty avoidance.**

Refers to the extent to which uncertainty is found in the organisation. This includes work instructions, process standards and the normal working environment (Werner, et al., 2011). Organisations with high levels of uncertainty avoidance tend to have systems and documentation in place that control processes and standardises instructions. This ensures that all employees conduct their work in a standardised way.

With the various different languages, religions, and cultures in South Africa, imagining how one will encompass all residents under the same umbrella is difficult. Hence, it is vitally important to know and understand the cultural differences within the nation and more importantly within an organisation.

#### **2.4.2.2 Organisational culture**

Mullins (1999) added that factors influencing organisational culture are factors such as company history, goals and objectives, management and staffing, and primary function. Although these factors are not categorised and organised, the simple truth is, is that there are various models and ways of viewing organisational culture and the analysis thereof.

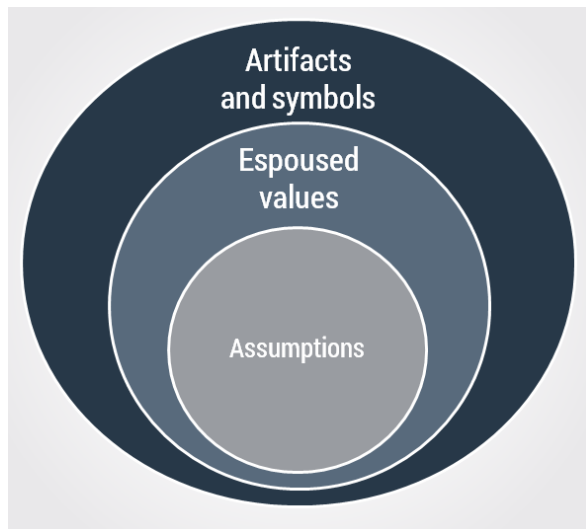
The most popular model for analysing organisational culture is Schein's Organisational Culture model, also known as the Onion model. Edgar Schein developed this model in the late 1980's, and described that organisational culture is similar to the layers of an onion.

The model defines organisational culture as consisting of three basic factors, which are increasingly difficult to change from the outside inward. These factors are identified as the following: Artefacts and symbols, Espoused values, and Basic Underlying assumptions (Van Vliet, 2013). Any attempt to change the organisational culture starts from the outside in, with the first focus being on the Artefacts and symbols, and working inward.

Artefacts and symbols describe and visualise the elements of the organisation such as logo's, architecture, corporate clothing etc. These factors are not only visible to the employees, but also have an external appearance to the general public and customers.

Espoused values are the values explicitly stated by the organisation. These are aligned with company goals, strategies and philosophies, which provide a deeper level of thought and drive overt behaviour (Wong, 2007).

Lastly, basic underlying assumptions, which are the basic unconscious beliefs, perceptions and feelings as expressed in daily unconscious behaviour (Van Vliet, 2013).



*Figure 2-4: Schein's Organisational culture model (Van Vliet, 2013)*

### **2.4.2.3 Lean Culture**

In order to create a learning and sustainable lean company, an organisation must change their culture in support of their long-term lean strategy (Deflorin & Scherrer-Rathje, 2012). To become a truly lean organisation, one needs to change the culture and not only focus on the hard issues such as tools techniques and implementation methods (Womack, 2011).

Lean Culture is well known as the 'no-blame' culture, which simply refers to the active analysis and problem-solving behaviour, instead of looking at the symptom and something to blame (Dombrowski & Mielke, 2013). Lean Culture is derived from the culture evident in the Toyota manufacturing company, where continuous improvement is the name of the game, and where all employees, from the shop floor to management have an input to daily decision-making (Al-Najem, et al., 2012).

Many traits and attitudes have driven the Toyota culture to its success including the sense of fairness among employees at work, their willingness to improve, job security and lower levels of barriers between management and the shop floor (Sugimori, et al., 1977). Lean culture is about continuous improvement, flatter organisational structure that provides lower barriers between the management and the shop floor (Al-Najem, et al., 2012).

As noted by Liker (2014) the Toyota culture revolves around three core values, which aim at customer satisfaction, continuous improvement and empowering the people. These three factors can be seen in all aspects of their culture and operations. Dahlgaard & Dahlgaard-Park (2006) explains that leadership commitment, employee engagement and customer-supplier relationships are essential factors for a lean culture; however, employee empowerment is a prerequisite for creating the envisaged culture.

### **The People**

One of the key factors in the Toyota culture is the massive role that employees play in the organisation. People are the key asset in the organisation, and it is the responsibility of leadership and management to develop each employee to their full capacity to positively impact the organisation (Liker & Hoseus, 2010). The key competency of Toyota is the continuous development of each employee (Meier, 2001).

Toyota believes in empowering people, and provides each employee with the opportunity to improve and invest in the company. Findings of Radnor et al. (2006) show that people are the most important tool to help change the culture to that of continuous improvement. Furthermore it is the belief of management that investing in people is the key to the success of the organisation (Liker, 2004).

All employees are placed in high regard at Toyota, which shows their value within the organisation. One of the most basic attributes is that each person is called a team member and not employees (Al-Najem, et al., 2012). The culture of teamwork and lower barriers enhances the work among all departments and hierarchy levels, and develops the teamwork attitude and behaviour. This one act raises the perception that every employee in the organisation has a duty to fulfil and irrespective of the position, each employee is required to add towards the team.

As each employee is required to fulfil a specific function, it is crucial that those team members know exactly why it needs to be done, when and how. Hence, the intense focus of development of employees within the organisation. Meier (2001) noted that the driver for the competitive competence of Toyota is the intense



focus on the development of team members. With doing so, each team member has the responsibility to perform a specific task to the best of their ability and to correct and put forward any improvement initiatives where required. Having provided learning and development opportunities creates a sense of ownership with each employee (Meredith, et al., 1991).

### **The Leadership**

As with employee development, management of the organisation has a large role in changing the organisational culture. The key to adopting a successful lean culture is having a clear top management strategy focusing on the employees, their development and motivation (Hook & Stehn, 2008). Moreover Angelis et al. (2011) describe that a clear top management strategy reduces the ambiguity of roles and responsibilities, which can lead to negative perception of lean.

In an attempt to increase teamwork between management and employees, Toyota management is visually more active on the shop floor between the team members. With management visually more active within the shop floor environment increases the trust of employees, and creates a perception of engagement and interest from management (Al-Najem, et al., 2012).

Continual engagement and involvement of management can only be sustainable if the lean improvement philosophy is entrenched in the corporate strategy of the organisation (Antony, 2006). In order to gauge whether the initiatives are working, a top level management strategic overview is required, where the leaders of the organisation can view the progress of improvement when required. Management must be the driving force behind the lean implementation initiative by setting an example and leading by encouragement (Larsson & Vinberg, 2010).

Although the engagement and support from management are vital to the successful implementation of a LPS, the support and engagement of the workforce are equally important. As stated by Radnor et al. (2006), employees need to be engaged and involved in the process as early as possible to ensure a motivated and committed workforce to the lean initiative.

### **2.4.3 Employee Engagement**

The successful implementation of a LPS requires harmonious teamwork between all levels of the organisation. Although management commitment has been discussed, the most important asset of the organisation has still not been highlighted. The employees of the organisation are the most powerful asset, and can make or break the LPS implementation attempt (Dombrowski & Mielke, 2013). According to literature, it is not merely the involvement of employees in the process, but the constant development, training, and autonomy that engage and motivates each member of the organisation (Alhuraish, et al., 2014).

In order to start the implementation process, management must ensure the correct development and training of employees relating to all aspects of Lean prior to implementation. Employees require the appropriate lean training so that the organisation can benefit from their tacit knowledge of the process (Dombrowski & Mielke, 2013).

All employees involved in the implementation process needs to be well aware of which tools need to be used where and at what time. To do so, the employees need to be constantly developed and groomed for the change to lean. Organisations such as Toyota have dedicated practical training centres where employees are trained in the art of lean. This training not only provides the employees with the required skills and knowledge, but shows commitment in the continual development of employees within the organisation. As noted by Dombrowski and Mielke (2013), the continuous development of employees and indeed leaders result in the sustainable long term success of a LPS.

Although development in all aspects of lean is vital to the success of a project, one of the basic skills for continuous improvement relates to the Deming cycle. The Deming cycle is well known as the Plan, Do, Check, Act cycle, which explains the basic application of problem solving and continuous improvement. In order for employees to succeed in the basic attributes of lean, they must apply their knowledge according to this cycle (Dombrowski, et al., 2012).

Having been taught the principles and techniques of lean it now becomes the responsibility of each employee to interact with one another and improve the

processes where required. With this simple act, the team members receive responsibility where they are solely responsible for the improvements to their own working environment.

As an intrinsic motivator, the responsibility must also accompany the authority to act where required. Dombrowski, Crespo and Zahn (2009) noted that after initial training the responsibility of process improvements need to be delegated to the shop floor. More so it is the responsibility of management to ensure that Lean is included in the company strategy to form the top down approach, resulting in the delegation of decision-making to the lean team and shop floor (Deflorin & Scherrer-Rathje, 2012).

By delegating the responsibility and authority to the shop floor provides the employees with autonomy to be self-sufficient in the workplace. This ensures that the team can operate freely and do not require supervision to function effectively. According to literature, this is one of the most important factors in achieving engagement from the employees of an organisation. Liker (2004) noted that Lean success is more likely to occur when the organisation has achieved the major strategic objectives namely, management commitment, employee autonomy, cultural fit and information transparency. In addition, Deflorin & Scherrer-Rathje (2012) concluded that the KSF's for Lean implementation are management commitment, employee autonomy, transparency of lean goals and inclusion in company strategic objectives.

In delegating the responsibility to the shop floor one must consider that the individuals or teams need to be aware of the direction of implementation and what has been decided in higher levels in the organisation. To achieve the transparency of information, management must ensure that the employees involved in the lean implementation initiative are well aware of any and all changes that need to take place. Thus, to include and engage the employees in the appropriate information sharing circles is of vital importance. This ensures the correct communication channels are followed and that the information is shared with all levels of the organisation, including the shop floor workers.

Engagement of employees in a Lean transformation initiative need to occur as early as possible. This ensures that the employees do not feel left out but

engaged and involved in the decision-making and operational aspects of the change in processes. According to Deflorin & Scherrer-Rathje (2012) the realisation was made that the employees need to be involved as soon as possible to gain their trust in the transformation process.

Altering employee responsibility, work practices and physical working environment require an additional process in which trade union negotiations need to be held. In the current South African industrial climate, one needs to ponder the fact to which extent the trade unions will influence the implementation of Lean initiatives.

#### **2.4.4 Union support**

It is common practice that the implementation or alterations of manufacturing processes require negotiation with trade unions, which will either resist or support the proposed changes. Due to the recent national industrial action in South Africa, the perception of trade union cooperation from a management perspective is bleak; this is due to the crippling effect on the various organisations, industries, and indeed the national economy.

Trade unions exist as a voice for the masses, and to ensure that employees have representation on a strategic level within organisations. The role of any union is to actively pursue the interests of the workforce (MacDuffie, 1995). This can vary as broadly as collective bargaining, health and safety concerns, overtime and ergonomics in the workplace and so on.

Although this is seen as the primary responsibility of trade unions, the inverse is also true. They are responsible for appropriate communication and information sharing to the shop floor workers. Trade unions need to ensure that organisational competitive forces and volatile market conditions facing a plant is well understood by the entire workforce (MacDuffie, 1995). Organisations can only support each individual's salary and wage if the corporate goals and objectives are achieved and reaping the rewards of a fruitful year. Effective communication surrounding strategic and operational directives are vital to gain the engagement of all employees involved.

As a result of historical business with trade unions in South Africa, the immediate perception of negotiations with union members is pessimistic. During the past number of years' negotiations with trade unions in almost any industry has resulted in mass national action involving significant revenue losses for the majority of organisations involved.

Due to this, the implementation of Lean in the automotive industry has been limited and to some extent shows restricted progress. Employers are obliged to involve trade unions whenever there are significant changes to an employee working environment or worker autonomy (MacDuffie, 1995). This includes the strategic decision of introducing Lean Production to a manufacturing facility.

The immediate perception with South African union history in mind is thus that trade union involvement may delay lean implementation due to a number of problems. These problems to name a few include, increased worker autonomy which consists of multiple skill requirements per employee, possible job losses due to the elimination of buffers and large logistics areas, blurred responsibility lines between management and workers and so on. The assumption is thus that unionised manufacturing facilities will lag behind the implementation of lean initiatives compared to the non-unionised facilities due to their resistance (Rachna & Ward, 2003).

### **Change of Mindset**

One of the major differences between conventional mass production and Lean Manufacturing is the way employees and shop floor workers are exposed to the various aspects of the operational side of the business. Mass production attempts to protect the production process from variations in quality and quantity by relying on low skilled workers in narrowly defined jobs that are interchangeable when required (MacDuffie, 1995). This allows very limited exposure to develop other skills and gain additional knowledge about the production process.

Quite the opposite is true with regards to Lean, where the process is designed to minimise waste by eliminating buffers and large logistics areas, and rely on the broad skills and knowledge base of the workforce to ensure quality and productivity. Thus the workforce provides the capability to deal with variations

and fluctuations in the production process. In doing so, the organisation uplifts the skills and knowledge level of their employees where previous production systems relied on limited knowledge and unskilled labour (Rolfesen & Ingvaldsen, 2012).

One of the cornerstones of Lean Manufacturing is the continuous development and training of employees to enable them to adapt to the ever-changing demands of the production system. The multi-skilling of employees enables management to place individuals in positions where more than one specialised skill is required. Employees thus have more responsibility and autonomy in a LPS whereas the conventional mass production system limits the skills, knowledge and responsibility to a narrow definition.

Expanding the responsibility of employees and shop floor workers may result in some overlapping functions with management. One of the possible risks for trade unions in the transformation to lean arises from the 'blur' of lines between management and employee interest (MacDuffie, 1995). This poses the problem that concrete job descriptions are no longer possible, and that employee responsibility and purpose are much more fluent (Bose & Sinba, 2012).

On the other hand, the continuous development and improvement of employee skills are a benefit to the union members within the organisation, as the employees improve and develop their skills and knowledge base. This is an advantage and benefit for the unions in a LPS as the employees feel valued and respected within the organisation.

Introducing a LPS also comes at a cost as the unions rely on the 'tightly strung' operations such as Just-In-Time and low buffer levels to lever their advantage. Many of the lean techniques rely on the production system to run smoothly in order to produce at the correct levels. This empowers the unions to readily inflict pain through targeted stoppages or boost their short-term bargaining power through the threat of a full industrial strike action (MacDuffie, 1995).

Although interaction with trade unions in respect to new manufacturing processes and improvements is essential, the support or resistance of the union as a whole,

including their members, can pose a fatal threat to the successful implementation of a Lean Production System.

## **CONCLUSION**

Many organisations have tried and failed to implement Lean as a production philosophy. Many of these have tried to replicate the processes of the original Toyota process, and have still failed. According to literature, the implementation of Lean is not merely the introduction of methods and techniques; it is the understanding of how the people of the organisation, regardless of their level in the hierarchy, add value to the organisation.

It is important to realise that the success of Lean does not only rely on the introduction of the tools that has been highlighted in literature, but is highly dependent on the living, breathing aspect of the organisation, its people.

As with any motivational theories and organisational value introduction, the implementation of Lean as a concept and philosophy starts at the top tier of the organisation. Without management commitment and drive for sustainable implementation, the Lean initiatives within any organisation will not take flight. It is thus imperative that management be involved in both strategic and implementation tactics in order for it to achieve the desired result.

Furthermore, management needs to foster the growth and mindset of a Lean culture within the organisation. This aspect goes hand in hand with ensuring the engagement of employees in the task of implementing of Lean as a philosophy. These two concepts cannot be dealt with individually, but requires a combined effort and intensive tactics to ensure its value is achieved. Engagement of employees in Lean implementation cannot take traction if they are not aware of the value system required from a cultural aspect. Vice versa, it cannot be expected that each employee is conducive to the fluent task responsibilities of a Lean production system before they have been introduced to the core philosophy and techniques of a LPS.

Last but not least, Lean cultural values expect the organisation to function and live as one organism and team. Without all functions of the organisation pulling in

the same direction towards a common goal, the result will be a failure. Even though most organisations will not admit it, the trade unions are part of the organisation just as much as any of the employees. Trade unions have massive input in the way business is conducted and have the power to uplift or demolish a project through its members. Hence, it is vital to communicate all necessary changes and proposed improvements in order to ensure a smooth transfer to a LPS.



## **CHAPTER 3 : RESEARCH METHODOLOGY**

### **INTRODUCTION**

Research methodology is defined as the systematic process of solving a problem through research. It is described as understanding the science of how research is conducted scientifically (Kothari, 2004). The following chapter will introduce and discuss the various steps of the scientific process of conducting research.

### **3.1 Research**

#### **3.1.1 Research paradigms**

Business research can be conducted in two different paradigms namely positivistic and interpretive. According to Collins and Hussey (2009), these two paradigms are used as a philosophy seeking the truth regarding a specific hypothesis.

##### Positivistic paradigm:

Positivistic research involves deductive processing of data to gain an understanding of theories and social phenomena (Collins & Hussey, 2009). Positivism seeks to provide the explanation of relationships between variables through the statistical calculation of empirical research data. Positivism is thus associated with quantitative research methods and analysis.

##### Interpretive paradigm:

Interpretive research interprets the information as perceived by the social scientists. It involved an inductive process to interpret the research data in able to understand the social phenomena (Collins & Hussey, 2009). Interpretivism thus uses qualitative data gained by interpersonal communication and interviews in contrast to the quantitative data of positivism.

### **3.1.2 Research approach**

It is clear from the above that two basic forms of research can be conducted, namely, qualitative and quantitative. The latter involves the generation of a data in a quantitative form that can be statistically tested, while the other involves the subjective evaluation through attitudes, behaviours and opinions (Kothari, 2004).

#### Quantitative research:

This type of research can further be sub classified by inferential, experimental and simulation approaches. The reason for the inferential approach is to gather a database of information and infer certain relationships between the variables of the population (Kothari, 2004). This type of approach utilises a survey method by means of a questionnaire or observation to gather the required data.

An experimental approach has much more control over the population where certain variables can be manipulated to observe the change in other variables. The simulation approach is similar to the experimental approach; however, here the research will be conducted under controlled conditions (Kothari, 2004). This approach uses a control group, and a pre-conditioned group to simulate the difference from the control to the pre-conditioned group.

#### Qualitative research:

This approach utilises the subjective evaluation of an observation by attitudes, behaviours and opinions. This type of research is the function of the researchers' impressions and insights (Kothari, 2004).

### **3.1.3 Research paradigm for this study**

This study will be conducted using a positivistic paradigm where quantitative data gathering will take place by the use of a questionnaire.

## **3.2 Research methodology**

Research methodology is defined as the systematic scientific process of conducting research (Collins & Hussey, 2009). The various methodologies of

conducting research are categorised according to the two different research paradigms namely positivistic and interpretivistic.

Positivistic studies are conducted using experimental studies, by use of surveys, cross-sectional studies or longitudinal studies. Interpretive methodology on the other hand consisted of hermeneutics, ethnography, participative enquiry, action research, case studies, grounded theory and feminist, gender and ethnicity studies (Collins & Hussey, 2009).

This study will be conducted by the use of the survey methodology where primary data will be collected from a specific population.

### **3.2.1 Data Collection Method**

Two different types of data can be used in research studies namely primary and secondary data.

- *Primary data*: Is gathered or collected by means of a primary source by the researcher. This can be conducted by means of an interview, observation or by a questionnaire.
- *Secondary data*: Is data readily available that was collected and analysed by another researcher. Secondary data can either be formally published data or unpublished data.

For the collection of primary data, there are two main data collection methods used namely questionnaires and interviews. The difference between the two is based on the paradigm under investigation. Collecting data by use of a questionnaire is generally related to a positivistic study where absolute data is required and can be statistically tested.

On the other hand, interview data collection is mainly concerned with interpretive studies, where the respondent's perception, feelings and experience are collected and analysed to for a conclusion.

- *Questionnaire*: Is used for collecting primary data in which the respondents are asked a list of carefully designed and structured questions with a view to eliciting a reliable result.

- **Interview:** An interview is designed to ask specific questions relating to a subject and evaluate what the respondent thinks, does or feels about the subject.

As this study has been designed under the positivistic paradigm, the primary data will be collected by use of a questionnaire.

According to Collins & Hussey (2009), there are three main methods for data collection:

- *Observation:* Is a method used where the researcher observes the subject's behaviour without active participation.
- *Experiment:* The researcher controls and manipulates the variables while under study and observes the resultant behaviours.
- *Survey:* Conducted through questionnaires and interviews, this is the most commonly used method of data collection.

### **3.2.2 Sample design**

The sample within a research project is defined as the subset of the population (Collins & Hussey, 2009). The most frequently used sample method in positivistic studies is random sampling, where the participant selection is totally random and ensures that the result is unbiased (Kothari, 2004).

Kothari (2004) notes the two different methods of sampling as the follows:

#### Probability Sampling:

Probability sampling ensures that the sample selection is random, and that every inclusion in the population has an equal chance of being selected. It is commonly compared to winning the lottery, where participants are not selected by a pre-determined process, but by pure random inclusion (Kothari, 2004).

- *Simple random sampling:* Sample taken randomly, each unit has an equal chance of being selected
- *Systematic sampling:* Sample is selected by using a pre-determined sequence of numbering.

- *Stratified sampling*: Sample is selected from different levels of the population.

#### Non-probability sampling methods:

Also known as deliberate sampling, non-probability sampling does not select the sample at random, but is selected by a pre-determined design (Kothari, 2004).

- *Quota sampling*: Selection of pre-determined quota based on the observable variable.
- *Convenience sampling*: The units are selected purely on a basis of availability. Used when the population has few participants with the required knowledge or experience required.
- *Purpose sampling*: Units are selected for a specific purpose.

Due to the availability of respondents with the required experience and knowledge of the field under investigation, this study will make use of convenience sampling to select the sample for observation.

### **3.2.3 Questionnaire design**

The questionnaire was constructed using the secondary data collection of the literature review as a framework. The literature review provided the questionnaire with the required variables that requires testing.

The aim of the questionnaire is to gather reliable data, which can be statistically analysed to either prove or reject the proposed hypotheses.

The questions have been carefully selected to a specific outcome based on the objectives of the study and will be stated so that the respondent can easily understand and select an answer based on their experience with the topic.

#### Question design

- Section A

The first section of the questionnaire is aimed at specifying the demographics of the study, and ensuring that the population is equally represented within the respondents.

- Section B

The second section of the questionnaire is where the respondents answered the questions relating to the study itself. The questions cover the following topics:

*Management Commitment.*

Management commitment to the implementation of a LPS is a very vague statement and needs to be defined according to what the study requires from the respondents. Management commitment comprises of two aspects under study, first being the responsibility to the organisation as a whole, and secondly to the employees of the organisation. This requires management to both have an upward responsibility as well as downward responsibility relating to organisational structure.

Upward responsibility refers to the strategic aspects of the organisation and how Lean is integrated into the corporate strategy and key objectives. When this is successfully integrated into the management hierarchy, it requires management to consciously ensure the achievement of the key performance indicators, thus ensuring its success.

On the other hand, management also has the downward responsibility of the employees of the organisation and ensuring that they are fully engaged and supportive of the initiative. This is achieved through effective communication to all levels of the organisation, development and training of the workforce in Lean as well as physical support during implementation to name a few.

*Employee Engagement.*

With any new process, one can expect some level of resistance both from the workforce and from the union. The resistance in the workforce normally stems from a fear of the unknown that is coupled with job security and incompetence. These aspects drive the resistance, and if eliminated can make for a more transparent and successful transition.

The same can be applied with the introduction of Lean. One of the lean principles is communication as one team, which describes that the leadership team needs to communicate any changes and improvements well ahead of implementation,

to ensure that all involved are aware of the changes. Together with this and probably more important for implementation are the training and development of the employees, and how they are planned to be integrated into the new production system.

It is only human to be anxious about change, nevertheless it is the task of the leadership and management of the organisation to encourage and support the employees to embrace and commit to this change.

### *Cultural fit*

To achieve the desired level of employee engagement, an organisation should also be an appealing place to work. This does not only comprise of a good salary, close proximity to home or a well-structured employee value proposition, but includes aspects such as career development, job security and respect between the different tiers in the organisation.

All of these attributes relate to a healthy organisational culture. The Lean philosophy describes a culture conducive to the LPS environment where the organisational structure is more flat, where all employees are equal, and where there is free information flow within the organisation. One of the most important aspects of the Lean culture is the development and continuous improvement in skills for the employees. This ensures the continuous development of employees, which in return not only lifts the knowledge level in the organisation but also engages the employees in what their tasks and responsibilities are.

A motivated workforce is the most powerful resource one can have in an organisation. The above highlights just some of the key areas to enable Lean culture.

### *Trade Union involvement*

Although a LPS requires a well-trained and multi-skilled workforce, the achievement of such a goal is not always easy. With the influence of trade union agreements with any change involving employees, the progress of implementation of any process improvement is time-consuming. Recent years in South African industry show the massive influence trade unions have in the

operations, efficiency and profitability of any enterprise. If the trade union in question is not engaged and involved in the decision-making process it might prove catastrophic for the implementation of any project.

Trade union influence can be either supportive or detrimental to the implementation of Lean initiatives. Although many trade unions support the implementation of Lean as a production system, the belief remains that the ulterior motive is to use the tightly strung operations such as JIT supply, Kanban etc. as a bargaining chip to use as threat to a strike. This enables the workforce to halt the operations of a multi-national organisation within a matter of minutes.

Therefore, it is crucial to establish the trade union support in day to day activities and how willing they are to negotiate and accept change prior to an entire production system change.

#### **3.2.4 Data collection**

Section A of the questionnaire is allocated to gathering demographical information from the respondents. This will serve the researcher with the required information to ensure that the various sections of the population are equally represented.

Section B of the questionnaire is allocated to the research questions as derived from the literature review. These questions have been designed to achieve a specific outcome for each section of the literature review under observation.

The questions in Section B of the questionnaire are designed as Likert scale with an interval of 1 to 5, with 1 being Agree and 5 Disagree. Likert scale questions were selected, as it requires the respondent to either agree or disagree with the related statement. This ensures that the questions are answered easily without much input and energy from each respondent to voice their opinion (Kothari, 2004).



### **3.3 Reliability**

Collins and Hussey (2009) define reliability as the absence of variation in results when the research is to be repeated. Hence, a study with good reliability presents a consistent result (Kothari, 2004).

According to Kothari (2004), there are two main contributing factors to achieve good reliability:

- Standardisation of conditions under which the study is conducted. This includes the elimination of external factors influencing the respondents answer.
- The use of trained and motivated persons to conduct the research and ensure the same results from group to group or between individual.

### **3.4 Test of Validity**

Validity is the criterion to test if the measuring instrument is measuring what it is designed to measure (Kothari, 2004). Collins and Hussey (2009) define validity as the extent to which the research findings reflect the phenomena under study.

Hence, ensuring the validity of research is critical and that this is adhered to throughout the study. Any study must adhere to three types of validity: Content validity, Criterion-related validity and Construct validity.

- *Content validity*: is the extent to which the measuring instrument covers the topic under study.
- *Criterion-related validity*: is the ability to infer a specific outcome based on the results of the study.
- *Construct validity*: relates to the ability to take into account the various non-observable phenomena such as motivation, anger etc.

### **3.5 Covering Letter**

The researcher designed a cover letter for the questionnaire to explain the reason for the study and the requirements from the respondent. The covering

letter explains that the content is confidential and that each of the respondents will remain completely anonymous.

The letter notes that participation in the study is completely voluntary, and respondents can withdraw from the study at any stage.

### **3.6 Ethical Considerations**

In order to protect the confidentiality of respondents the following ethical considerations needed to be taken into account.

#### **3.6.1 Permission to conduct study**

Due to the nature of the study with no confidential information shared, there was no requirement for the researcher to request permission to conduct the study from any organisation. None of the respondents can be connected to any individual or organisation in any way.

#### **3.6.2 Informed Consent**

Before taking part in the survey each respondent was provided with the scope of the study, briefly explaining the reason for the study and the proposed outcome. Together with this, it was explained that participation is completely voluntary, and that the respondents have the right to withdraw at any time. As part of the introduction of the questionnaire, the cover letter was repeated stating the above.

#### **3.6.3 Confidentiality**

As described by Collins and Hussey (2009), it is the responsibility of the initiator to protect the information and data shared by each respondent. By using the online SurveyMonkey platform, the information shared by the various respondents is assured to be completely confidential and cannot be traced back to any individual or organisation.

Hence, the information is kept entirely confidential and anonymous.

## **CHAPTER 4 : RESEARCH FINDINGS**

### **INTRODUCTION**

In Chapter 3 the research methodology was discussed and outlined. Chapter 4 will discuss the analysis and results of the data collected during the questionnaire survey. The results will be statistically tested and presented according to the findings as indicated by the respondents. Correlations will be drawn to which variables have a positive or negative influence on the other variables. This will identify the variables, which the organisation under study found to be most critical in the implementation of Lean.

The first section of findings will discuss the demographics of the survey respondents. This will indicate the reliability of the data and information under study. The demographic information was constructed to enable the researcher to identify three main aspects of each respondent, which will prove vital to their knowledge and experience in the field under study.

The second section will discuss the results found under the four variables as identified in Chapter 2 during the literature review.

#### **4.1 Analysis of empirical results**

All respondents were employees of an OEM within the Eastern Cape automotive industry with varying levels of responsibility. Each respondent was chosen due to their intimate knowledge of the implementation of Lean in the specific OEM, and the industry.

The questions were analysed and interpreted using the following format following the layout of the questionnaire:

Section A: Demographical information

Section B: Lean Key Success Factors

The questions in Section A were provided as a multiple-choice question, where each respondent had to choose the correct answer from the list. This section provided the respondents to fill out the information related to them.

Section B required each respondent to choose an answer based on the level of agreement with the statement. These questions were designed as Likert scale questions with a possible 5 answers depending on the level of agreement. The scale was designed as per Table 4-1 to assist with the analysis of data where each response correlates to a value.

Value	Text
1	Strongly Agree
2	Agree
3	Neutral
4	Disagree
5	Strongly Disagree

*Table 4-1: Likert scale value system*

#### **4.1.1 Response rate**

The questionnaire was distributed via e-mail to all respondents with an attached link to the online survey. The request was sent to a total number of 48 possible respondents, of which a total of 29 responded within the given timeframe.

The response rate was calculated as 60% with all 29 respondents completing every question in the questionnaire.

#### **4.1.2 Analysis and interpretation of demographical information**

The demographic section of the questionnaire was designed to establish how long each respondent has been working in the organisation, which department in the organisation they work in, and at which level within the company they work.

This will allow the researcher to establish what influence the level of experience has on the perception of the factors related to the implementation. Management will have a wider, more strategic outlook, where staff and line operators will have the hands-on experience. The objective of the study was to have respondents

from each level of the organisation as well as each one of the departments, which have Lean implemented within the area.

The following questions were asked to obtain the demographic information of each respondent.

- a) What is your current length of service in the organisation?
- b) In which department are you currently placed?
- c) What is your current position in the organisation?

The demographic information acquired was designed to determine three aspects of each individual. The length of service will indicate if the respondent had experience in the operations before and after the implementation of Lean.

Secondly, although Lean has been introduced within the entire organisation, the perception of various aspects of its implementation might differ between departments.

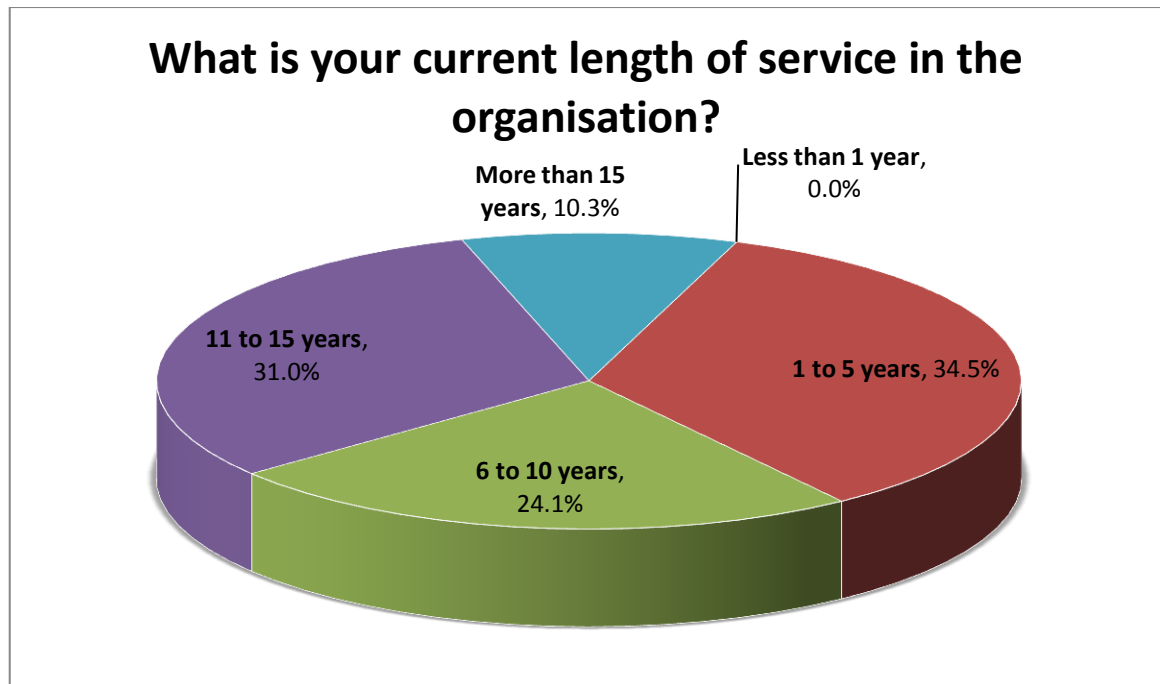
Lastly, the position within the organisation is important to have respondents supplying information from an operational level, to top management where a strategic view will be evident.

#### 4.1.2.1 Service length

The length of service provides an insight into the level of experience not only with Lean implementation but also within the automotive industry. Service length does not only show the experience of each respondent, but also show the level of commitment and engagement to the organisation. This provides the researcher with reliable data, and can deduce that each one of those individuals have the best of the organisation at heart.

What is your current length of service?	Response Percent	Response Count
Less than 1 year	0.0%	0
1 to 5 years	34.5%	10
6 to 10 years	24.1%	7
11 to 15 years	31.0%	9
More than 15 years	10.3%	3

Table 4-2: Responses - Length of service



*Graph 4-1: Length of service within the organisation*

It is important to note that the majority of respondents have a length of service in excess of 5 years. The 65,4% of respondents with more than 5 years' experience in the organisation would have been able to experience the changeover period and the starting phase of the implementation of Lean.

The 34,5% of respondents with the length of service less than 6 years will have joined the organisation with the initial implementation phase of Lean Manufacturing having been completed. This provides the researcher with the added advantage to view both sides of the employee experience band.

#### **4.1.2.2 Departmental split**

The researcher identified a set of five departments vital to the planning and operations of the organisation. These departments play a critical role in the current operations and have a specific role to play with planning and execution during the implementation of Lean. These departments were identified as follows:

- a) Production
- b) Production Planning
- c) Logistics
- d) Quality Assurance

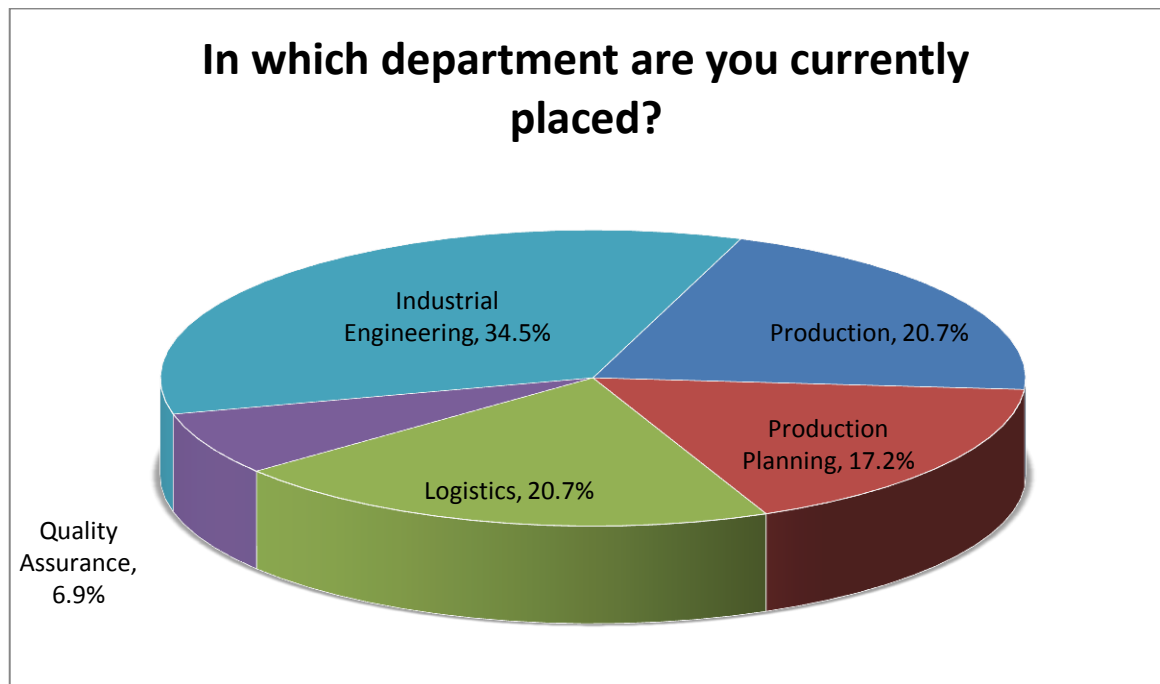
e) Industrial Engineering

In which department are you currently placed?	Response Percent	Response Count
Production	20.7%	6
Production Planning	17.2%	5
Logistics	20.7%	6
Quality Assurance	6.9%	2
Industrial Engineering	34.5%	10

Table 4-3: Responses - Department placement

Implementation of Lean requires the involve changes to mainly the production, logistical and process operations. Departments regularly involved with these changes are related to the production line, movement of components throughout the factory and assigning tasks to the production line workers.

The responses consisted of the percentages as viewed in Table 4-3, with industrial engineering with the highest percentage of 34,5%, followed by Logistics and Production with 20,7%. The service departments of Production Planning (17,2%) and Quality Assurance (6,9%) showing less involvement. The sample was there for a good match to the research conducted.



Graph 4-2: Departmental split

#### 4.1.2.3 Level within the organisation

In order for the researcher to achieve the widest scope of experience and knowledge within the organisation it is imperative that various levels of the hierarchy respond to the questionnaire. This provides insight to both the top management strategic overview as well as the operational aspects of the engineers and line workers.

It was thus critical that various levels of staff within the organisation contribute towards the study. The multiple-choice question required a response as follows:

- a) Department head or higher
- b) Management
- c) Supervision or Specialist
- d) Engineer or Technician
- e) Production operator

What is your current position in the organisation?	Response Percent	Response Count
Department head or higher	3.4%	1
Management	13.8%	4
Supervisor or Specialist	31.0%	9
Engineer or Technician	41.4%	12
Production Operator	10.3%	3

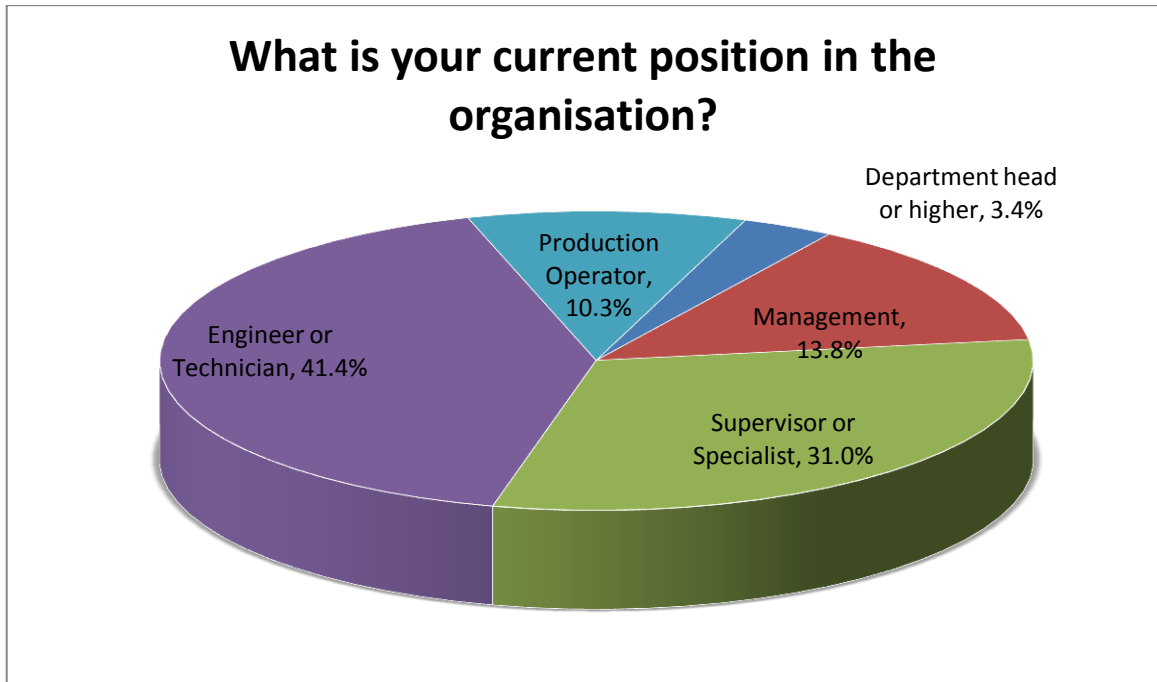
*Table 4-4: Responses - Position in the organisation*

Due to the different perspective of Lean implementation between management and production operators, it was important for the researcher to include both sides of the organisation as far as possible. The results provided the researcher with the required spread, taking into account senior management as well as the production operator.

Noticeably the main contributor of the survey was the level of Engineer or Technician with 41,4% of respondents, followed by supervision or specialists with 31%. The outlying factors were senior management and production operators



with all less than 15% contribution. Positively, management provided 13,8% of the responses.



Graph 4-3: Job position of respondents

#### 4.1.3 Analysis and interpretation of results

Reliability testing was carried out on all four variables producing a Cronbach alpha reliability coefficient. In order to determine if a variable is reliable, the result is compared to the interpretation intervals of Cronbach alpha coefficient as shown in Table 4-5.

Acceptance level	Coefficient
Unacceptable	< 0.50
Poor	0.50 - 0.59
Acceptable	0.60 - 0.69
Good	0.70 - 0.79
Excellent	0.80 - 0.89

Table 4-5: Cronbach alpha interpretation intervals

Results of the reliability test are shown in Table 4-6. One of the four variables required adjustment to achieve the acceptance level for reliability. This was achieved by removing one of the factors as posed in the questionnaire.

Variable	Number of factors	Cronbach alpa	Cronbach alpha (adj)	Description
LEADCOM	5	0.62	0.62	Leadership Commitment
EMPEMG	7	0.69	0.69	Employee Engagement
CULFIT	6	0.70	0.70	Cultural Fit
UNINF	5	0.45	0.72	Union Influence

*Table 4-6: Cronbach alpha results for all variables*

Leadership commitment was measured using 5 factors, where the Cronbach alpha reliability coefficient was calculated as 0.62. Using the interpretation Table 4-5, it shows that the variable was accepted as reliable. The 5 factors used to investigate this variable are as follows:

- LEADCOM1: Adequately trained leadership assists in the successful introduction of a Lean Production Systems.
- LEADCOM2: Lean goals are communicated clearly to the entire organisation.
- LEADCOM3: Implementation momentum is gained by incorporating Lean into the corporate strategy.
- LEADCOM4: Active leadership involvement at shop floor level is evident.
- LEADCOM5: Leadership provides adequate training opportunities to all personnel involved in Lean implementation.

Table 4-7 below shows Cronbach alpha results for the Leadership Commitment variable if any of the factors are deleted. The results show minor improvement if any of the factors are deleted. It was thus decided to keep all factors, as the results are acceptable.

Variable	Alpha
LEADCOM	0.62

Factor	Alpha if deleted
LEADCOM1	0.63
LEADCOM2	0.61
LEADCOM3	0.56
LEADCOM4	0.41
LEADCOM5	0.57

*Table 4-7: Cronbach alpha results – LEADCOM*

Employee engagement was measured using a factor of 7. The total Cronbach alpha result for EMPENG was calculated at 0.69. According to Table 4-5 this shows as an acceptable level, bordering on good. The seven factors used are the following:

- EMPENG1: Lean training, and training in general is available to all employees at all times.
- EMPENG2: Employee/team achievements are recognised within the organisation.
- EMPENG3: Employees are encouraged to be autonomous by being given the authority to improve processes where required.
- EMPENG4: Employees are involved in the creation of lean objectives.
- EMPENG5: Corporate information is shared freely by management to keep the workforce informed of current operations.
- EMPENG6: The organisational culture enables an environment where employees feel comfortable to talk to their direct management regarding any work related or personal topics.
- EMPENG7: Strategic organisational changes are communicated as early as possible to ensure perceived employee inclusion.

Variable	Alpha	Adjusted Alpha
EMPENG	0.69	0.70

Factor	Alpha if deleted
EMPENG1	0.62
EMPENG2	0.66
EMPENG3	0.65
EMPENG4	0.70
EMPENG5	0.70
EMPENG6	0.62
EMPENG7	0.59

*Table 4-8: Cronbach alpha results – EMPENG*

Factor EMPENG4 showed high variability and caused the reliability of the variable to decrease significantly, and if viewed from Table 4-8, it shows that if deleted, the reliability factor will increase to above the 0.69 threshold of acceptable. After deletion, Cronbach alpha coefficient for EMPENG was calculated as 0.70 showing more accurate and reliable result.

Cultural transformation to Lean culture was measured using 6 factors with a combined reliability coefficient of 0.7. This variable produced a good reliable result according to the interpretation Table 4-5. The six factors used for investigating CULFIT are:

- CULFIT1: The organisational culture promotes collaborative problem solving rather than finding the guilty party.
- CULFIT2: The organisational culture encourages each employee to be involved in problem solving activities (Idea creation/Cross functional teams/problem solving).
- CULFIT3: Management leads by example by involving themselves in the day to day lean initiatives on the shop floor.
- CULFIT4: The organisational culture encourages employee learning and self-development.
- CULFIT5: The organisational culture promotes the concept of working as a single team.

- CULFIT6: Problem resolution is a function of a cross departmental collaboration.

Variable	Alpha
CULFIT	0.70

Factor	Alpha if deleted
CULFIT5	0.62
CULFIT6	0.60
CULFIT3	0.67
CULFIT2	0.62
CULFIT4	0.67
CULFIT1	0.76

*Table 4-9: Cronbach alpha results – CULFIT*

The CULFIT predictor variable Cronbach alpha result was not changed due to the good result achieved. No factors were deleted and the variable was accepted and used as originally calculated with alpha = 0.7. The five factors used for the investigation of UNINF were:

- UNINF1: The trade union contributes to the speedy implementation of lean initiatives.
- UNINF2: The trade union supports the multi-skilled approach to give employees more autonomy by allocating more responsibility in the workplace.
- UNINF3: The trade union resists more fluent employee responsibility.
- UNINF4: The trade union supports the fluent responsibilities that come with lean development/ training of employees.
- UNINF5: Trade union buy-in is required when changes are made to the responsibilities of employees.

Variable	Alpha	Adjusted Alpha
UNINF	0.45	0.72

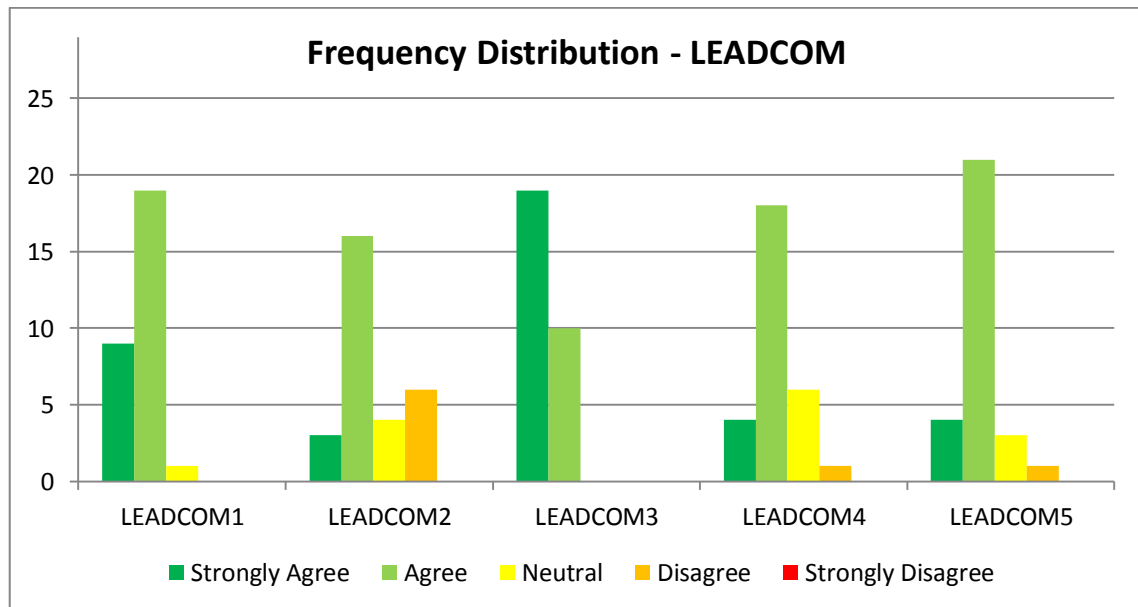
Factor	Alpha if deleted
UNINF1	0.20
UNINF2	0.19
UNINF3	0.72
UNINF4	0.22
UNINF5	0.37

Table 4-10: Cronbach alpha results – UNINF

The last predictor variable under study is that of the influence of trade unions in the implementation of Lean. This variable was investigated using 5 factors, of which the total Cronbach alpha result was 0.45. This coefficient was deemed not acceptable and was adjusted. The adjustment was made by the deletion of factor UNINF3, whereby increasing the alpha coefficient to 0.72. This provided the variable with a good reliability according to the interpretation interval index.

#### 4.1.3.1 Analysis of outcome variable – Leadership Commitment

During the analysis of each variable the frequency distribution is displayed to graphically indicate the responses per question. The frequency distribution provides an overview of the all responses per question together with the number of responses per interval.



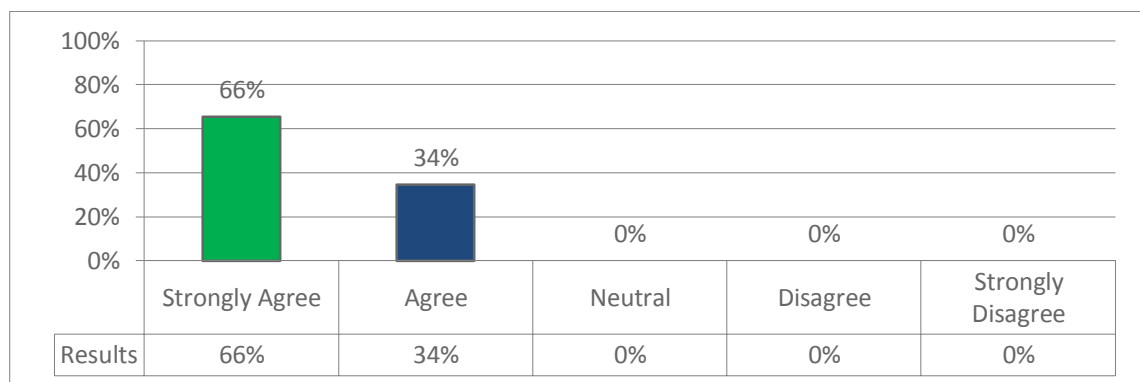
Graph 4-4: LEADCOM Frequency Distribution

In the below table the descriptive statistics of the variable LEADCOM is shown to indicate the basic interpretation of responses received. Table 4-11 ranks the result according to the numeric number of each variable question.

Factor	Mean	Std. Dev.	N
LEADCOM3	1.34	0.48	29
LEADCOM1	1.72	0.53	29
LEADCOM5	2.03	0.63	29
LEADCOM4	2.14	0.69	29
LEADCOM2	2.45	0.95	29

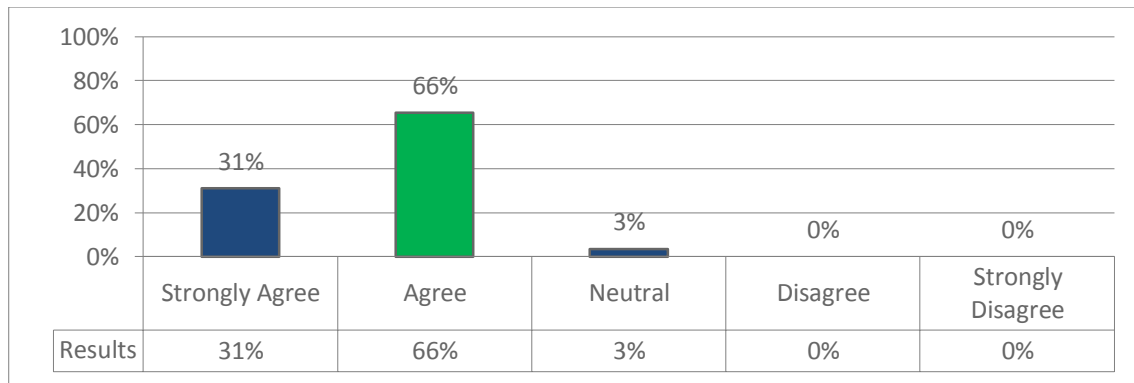
Table 4-11: Descriptive Statistics Pareto list – LEADCOM

Based on the information from Graph 4-4 and Table 4-11, the following deductions can be made.



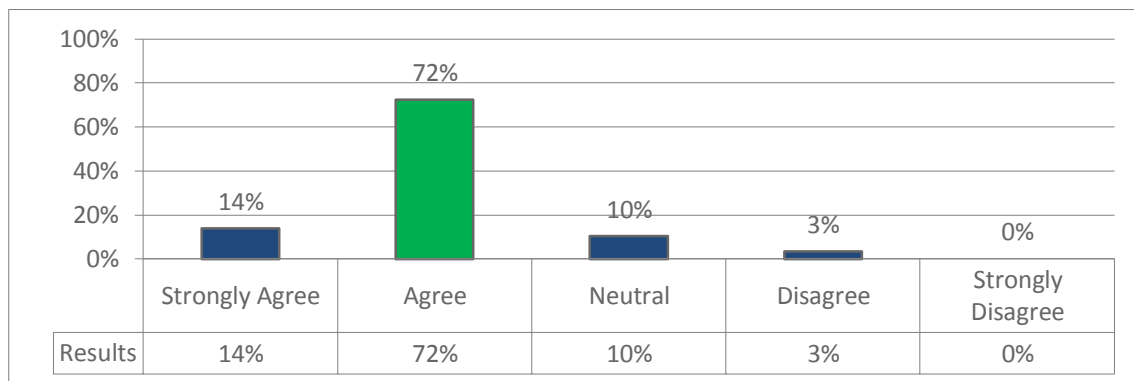
Graph 4-5: LEADCOM3 response results

**LEADCOM3:** With a mean score of 1.34, LEADCOM3 is regarded as the most important factor for the LEADCOM variable. The result shows that 100% of respondents agreed with the statement. Thus from their experience, inclusion of Lean implementation objectives into the organisational corporate strategy increases the probability of its success.



*Graph 4-6: LEADCOM1 response results*

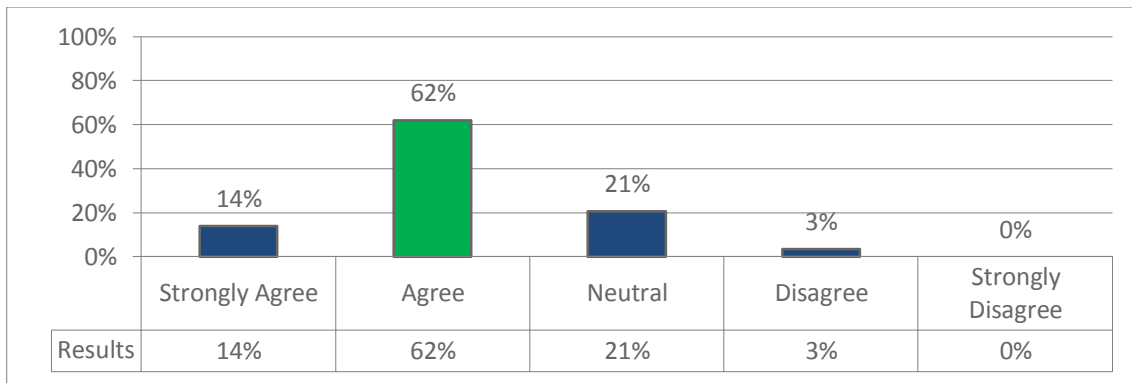
**LEADCOM1:** With the exception of one respondent, 97% of respondents agree that adequately trained leadership attributed to the successful introduction of Lean manufacturing within the organisation. Only one respondent thought adequately trained leadership does not necessarily contribute the success of its implementation. With a mean score of 1.72, LEADCOM1 is the second most important factor for the variable.



*Graph 4-7: LEADCOM5 response results*

**LEADCOM5:** A total of 86% of respondents agree that the required training was available to all personnel involved with the implementation of Lean. One respondent did not agree that leadership provided the appropriate training, and the remainder of respondents neither agree nor disagree to the statement. With a standard deviation of 0.63 there is a significantly wider spread, showing that respondents have a different perspective from their working level or job description.

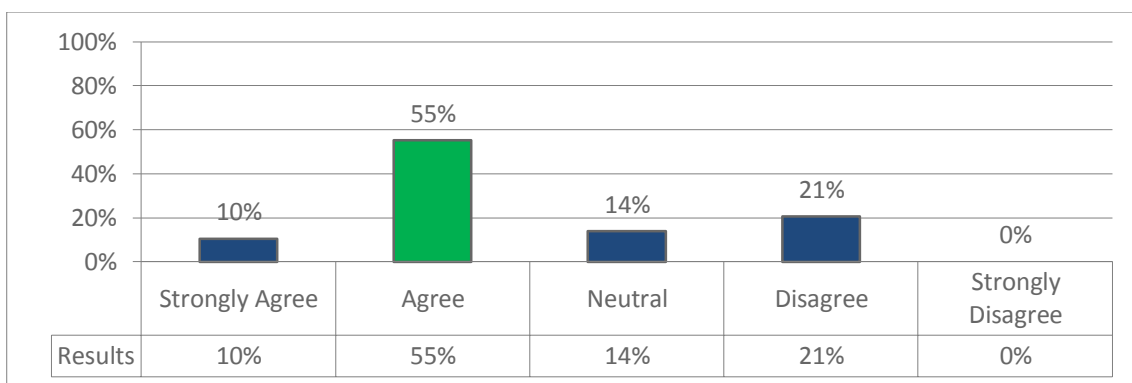




*Graph 4-8: LEADCOM4 response results*

**LEADCOM4:** Leadership involvement with the daily operations during implementation can prove to be a vital aspect. This indicates that leadership are committed to the cause and that they view the operations as important as the strategic aspects.

A mean score of 2.14 indicates that the majority of respondents agree that management was involved with daily operations on the shop floor. A larger standard deviation of 0.69 is evident pointing to the fact that the respondents did not have the same opinion. This may be due to the depth of involvement, level within the organisation, or understanding of what the appropriate interaction level should be.



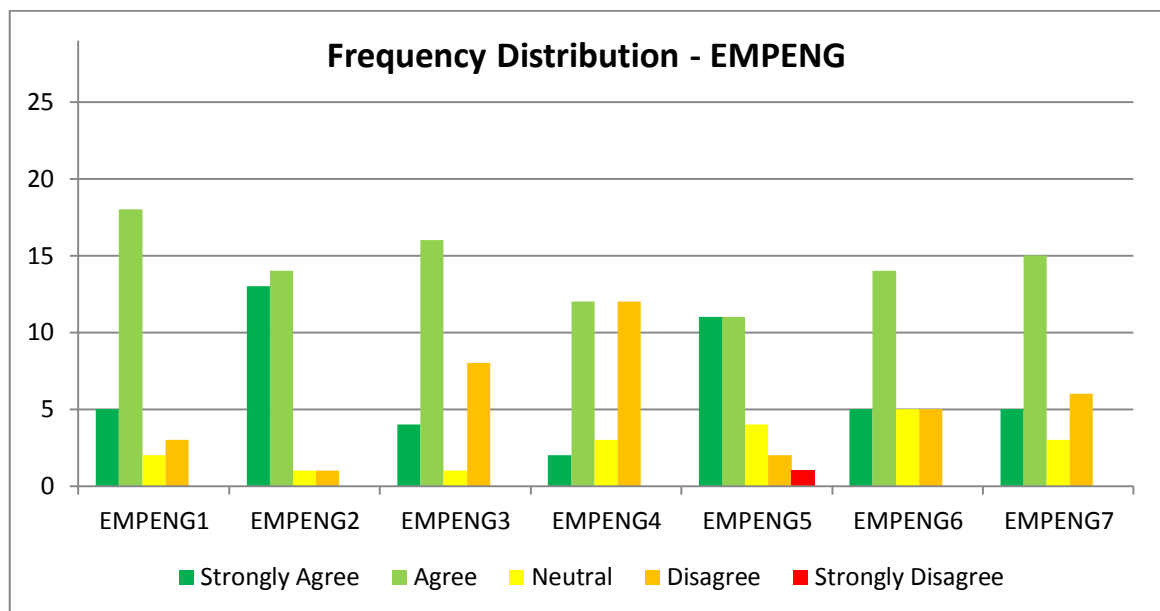
*Graph 4-9: LEADCOM2 response results*

**LEADCOM2:** In order to ensure that all parties work towards the same goals, it is important for the leadership to communicate the strategy and goals of implementation to the entire organisation. A standard deviation of 0.95 shows a wider spread of responses meaning that different views of communication were

perceived. 65% of respondents agreed that Lean goals were clearly communicated, while 21% disagreed, and were of the opinion that is was not effectively communicated to all parties.

#### 4.1.3.2 Analysis of outcome variable – Employee Engagement

The frequency distribution of the Employee Engagement factors shows a wider spread of responses, thus indicating that the sample had very different opinions regarding the relative statements. The split in data from *Graph 4-10* evidently shows that there are a number of responses that agree with the statements, and a large number that disagree.



*Graph 4-10: Frequency distribution – EMPENG*

*Table 4-12* shows the basic descriptive statistics for the variable EMPENG. Based on the mean score of the various factors, one can deduce that EMPENG2 is the most important factor for the variable and EMPENG4 the least important.

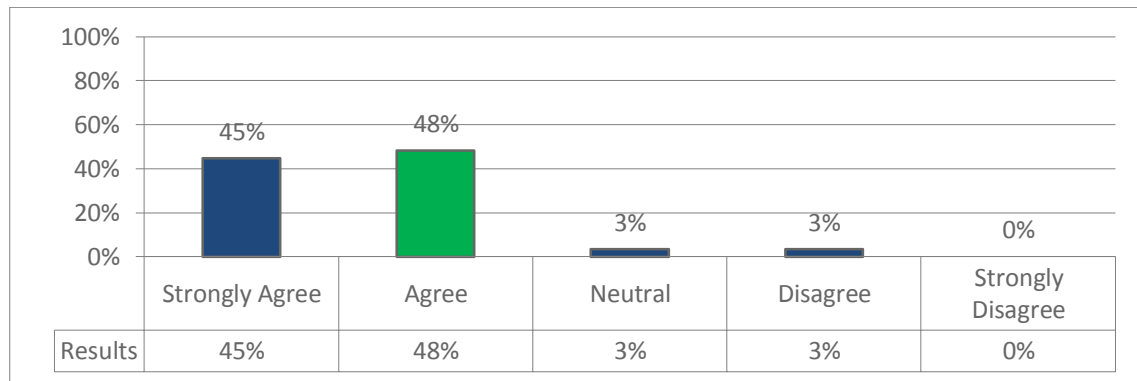
Furthermore it is identified that EMPENG2 recorded the lowest standard deviation indicating that the majority of respondents had approximately the same opinion regarding the statement.

Although EMPENG5 was identified as the second most important factor for the variable, the standard deviation was found to be the highest, indicating that a larger variety of agreement levels for the statement was evident.

Factor	Mean	Std. Dev.	N
EMPENG2	1.66	0.72	29
EMPENG5	2.00	1.07	29
EMPENG1	2.21	0.98	29
EMPENG6	2.34	0.97	29
EMPENG7	2.34	1.01	29
EMPENG3	2.45	1.06	29
EMPENG4	2.86	1.06	29

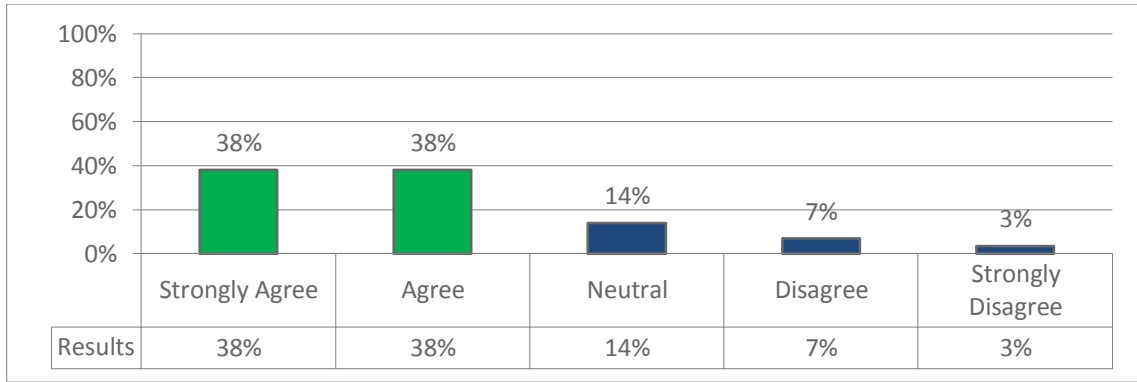
Table 4-12: Descriptive Statistics Pareto list- EMPENG

The results from Table 4-12 can be used to derive the following conclusions.



Graph 4-11: EMPENG2 response results

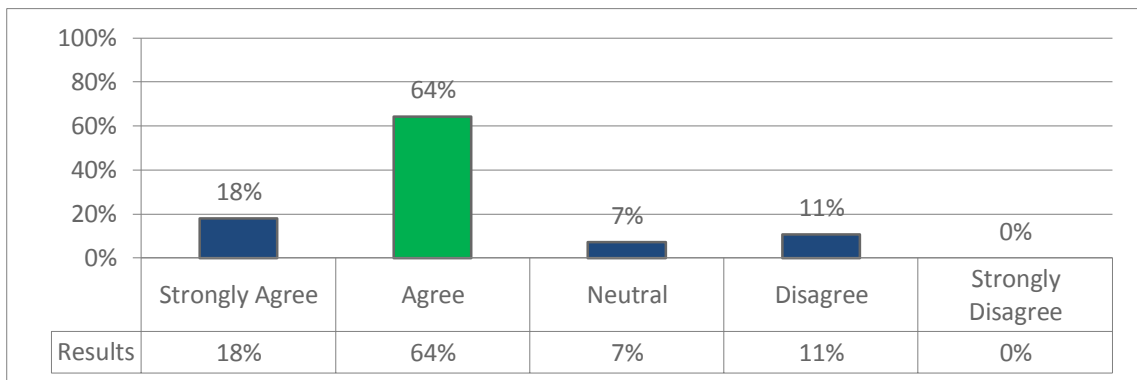
**EMPENG2:** An important part of employee engagement is to provide recognition where required, in the form of a team or individual. With a mean score of 1.66 it indicates that the large majority of 93% of respondents either agree or strongly agree that recognition in some form is expressed to employees within the organisation. EMPENG2 proved to be the most important factor for employee engagement, and only one respondent was of the opinion that recognition is not given where due.



*Graph 4-12: EMPENG5 response results*

**EMPENG5:** Corporate information is shared to keep employees informed of current events within the organisation. This statement was identified as the second most important factor for the employee engagement variable. With a mean score of 2.0 it indicates that employees want to have the engagement from management regarding corporate activities.

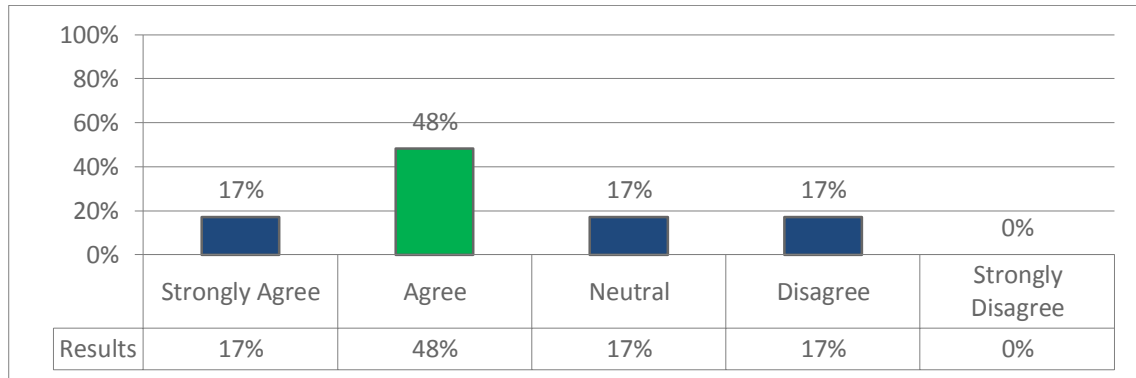
From *Graph 4-12*, a total of 76% of respondents agree that communication of corporate information is shared within the organisation where as 10% disagree and noted that corporate information is not shared to employees.



*Graph 4-13: EMPENG1 response results*

**EMPENG1:** Training of employees in the roll out and implementation of Lean is as important as the tools and techniques used. Lean training must be available to all involved in the implementation phase, furthermore it should be available to all employees to understand the concept and work towards continuous improvement.

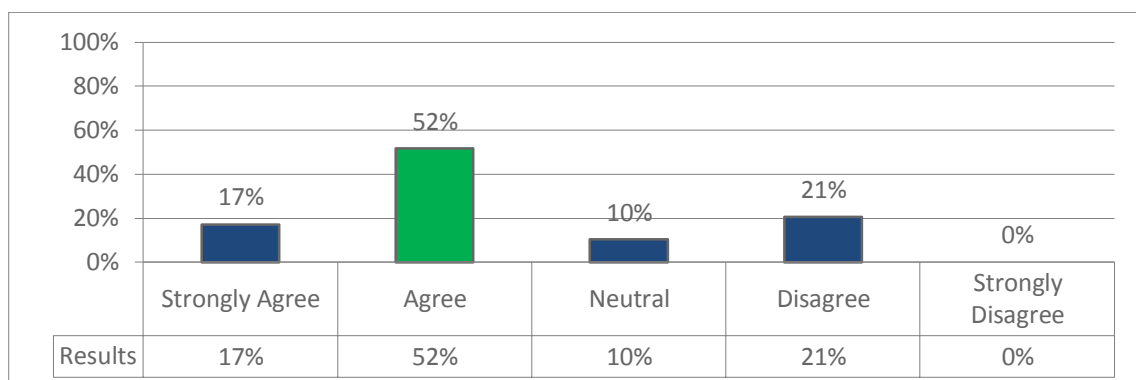
Graph 4-13 indicates that 82% of respondents indicated that adequate Lean training was available to all employees during its implementation. Only 11% of respondents disagree and noted that training was not available.



Graph 4-14: EMPENG6 response results

**EMPENG6:** The above Graph shows 17% of responses indicated that they are very comfortable to discuss any topic with their direct superior. A further 48% indicated that they agree that communication to their direct superior is not of a concern.

However a standard deviation of 0.97 indicates that not all respondents have the same viewpoint. In contrast, Graph 4-14 indicates a total of 17% of responses indicate that they do not feel comfortable to approach their direct superior regarding any topic.



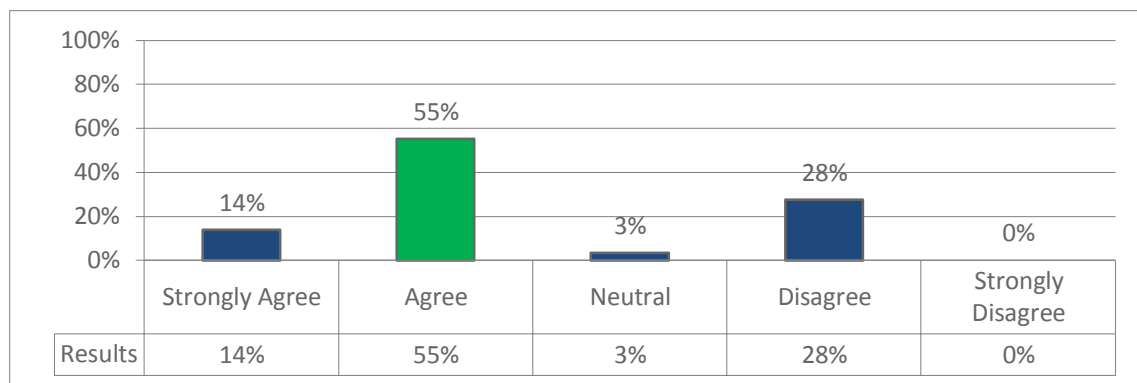
Graph 4-15: EMPENG 7 response results

**EMPENG7:** Strategic organisational changes are communicated and employees feel part of the change. This is the response from 69% of respondents, of which

17% agree strongly that changes are communicated effectively within a reasonable timeframe.

In contrast 21% of respondents indicated that changes to corporate strategy is neither effectively communicated nor in an acceptable timeframe.

Although EMPENG5 positively indicates that corporate information is shared within the organisation, the converse is true regarding changes in the organisational strategy.



Graph 4-16: EMPENG3 response results

**EMPENG3:** In order for the paradigm of continuous improvement to exist, the organisation must not only provide employees with the necessary responsibility, but also the authority. This provides employees with the ability to actively pursue changes and improvements to the manufacturing operations.

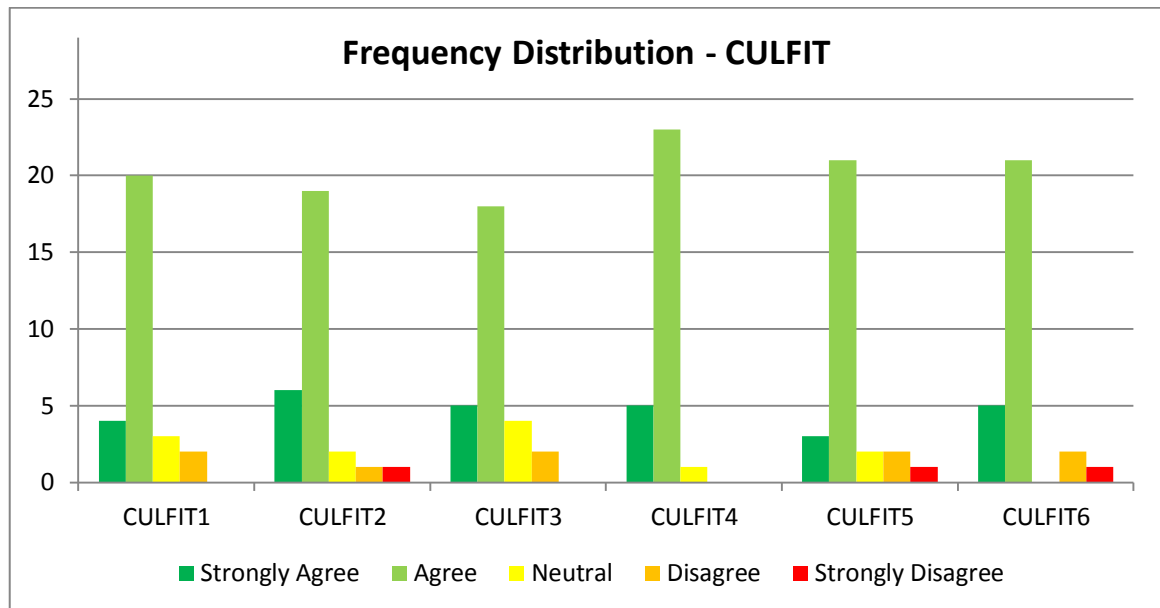
Based on the mean score of 2.45, EMPENG3 is the least important factor in the employee engagement variable. Graph 4-16 indicates that 21% of respondents state that autonomy in the workplace was not satisfactory. Although autonomy in the workplace is a subjective concept, it indicates that 55% of respondents did agree that they had the necessary authority to conduct their daily tasks.

#### 4.1.3.3 Analysis of outcome variable – Cultural fit

To gauge if the organisational culture is conducive to the implementation of Lean, the variable was used in comparison to factors found in a Lean culture. CULFIT as a variable received a positive response indicating that the culture is well poised towards a Lean perspective.

Based on the mean score indication in *Table 4-13*, CULFIT was calculated as the second most positively rated variable in the study, thus showing that the cultural aspect contributed immensely to the success of the Lean implementation project.

Although some respondents had a strong negative response to the statements, the majority of respondents agree that the organisational culture is a positive aspect to the implementation of Lean within the organisation.



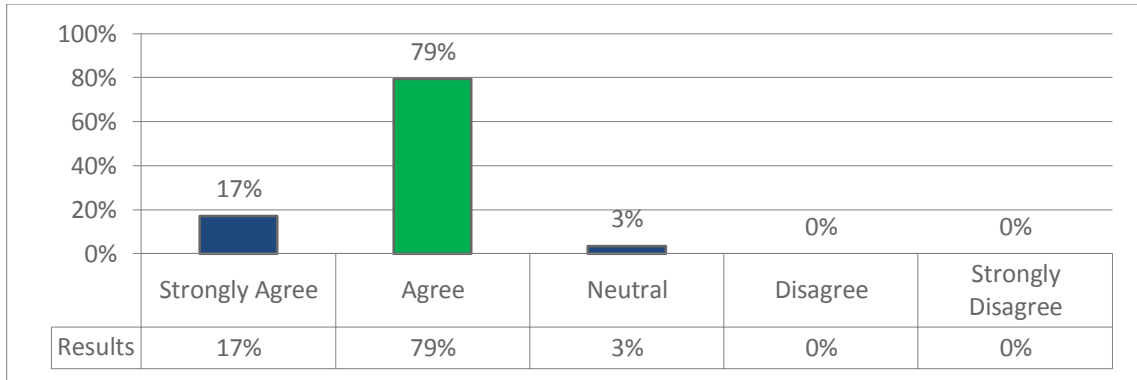
*Graph 4-17: Frequency distribution – CULFIT*

The resultant frequency distribution of the Cultural Fit variable is shown in *Graph 4-17*. Each of the CULFIT factors received a significantly positive response, indicating that for every variable the respondents agree that the culture experienced at the organisation is aligned with that of a Lean culture.

CULFIT as an outcome variable thus contributed positively to the successful introduction of Lean at the organisation under study.

Factor	Mean	Std. Dev.	N
CULFIT4	1.86	0.44	29
CULFIT2	2.03	0.87	29
CULFIT6	2.07	0.88	29
CULFIT3	2.10	0.77	29
CULFIT5	2.21	0.86	29

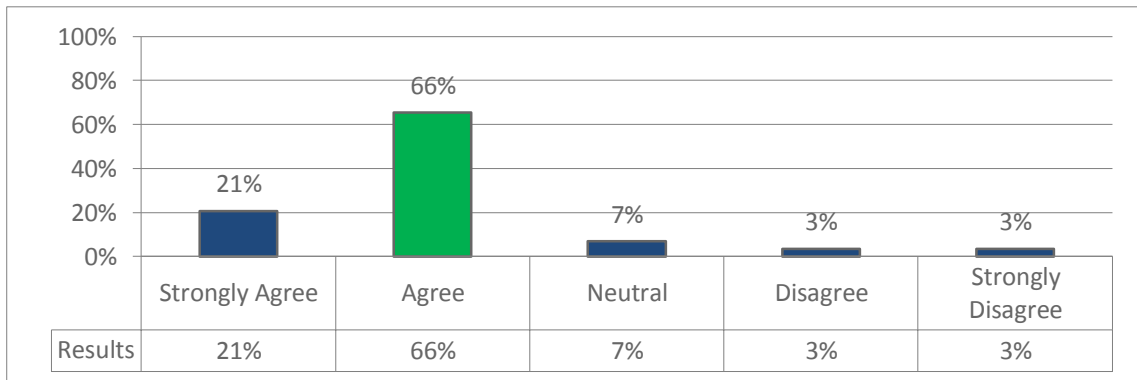
*Table 4-13: Descriptive Statistics Pareto list - CULFIT*



*Graph 4-18: CULFIT4 response results*

**CULFIT4:** With a mean score of 1.86, CULFIT4 is noted as the most important factor for the CULFIT variable and indicates that the majority of the sample agrees that the organisational culture encourages self learning and development.

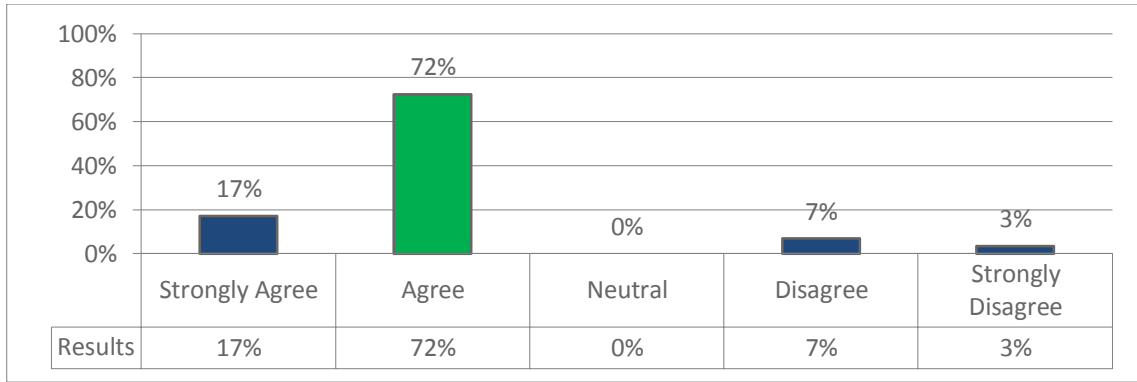
Furthermore, with a standard deviation figure of 0.44 it indicates that the respondents had a similar perspective regarding this statement. 99% of respondents agree that self learning and development is encouraged by the organisational culture.



*Graph 4-19: CULFIT2 response results*

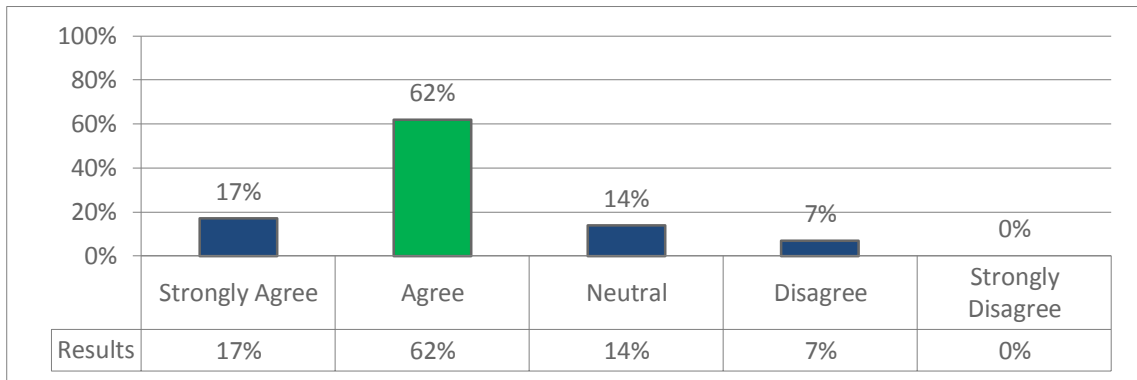
**CULFIT2:** The organisation culture encourages employees to be involved in problem solving initiatives was the response of 87% of respondents of which 21% strongly agree. Although two respondents did not agree with the statement, a standard deviation of 0.87 provides accurate and consistent results.





*Graph 4-20: CULFIT6 response results*

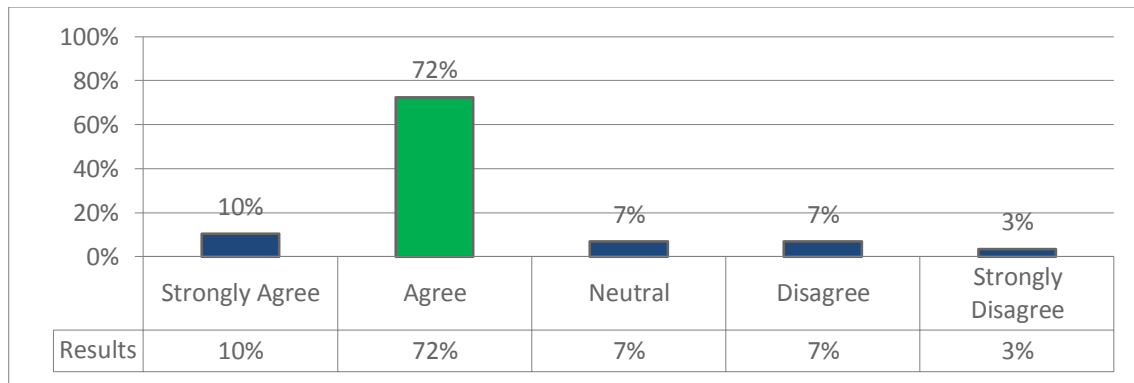
**CULFIT6:** The large majority consisting of 90% of respondents indicated that problem solving within the organisation is accomplished through cross functional collaboration of departments. The remainder of respondents disagree, and showed that cross functional problem solving does not take place. A standard deviation of 0.88 indicates that CULFIT6 had the widest spread of responses for the cultural fit variable.



*Graph 4-21: CULFIT3 response results*

**CULFIT3:** A total of 79% of respondents feel that management assists in the implementation of Lean by actively involving themselves in the daily operational activities on the shop floor.

The mean score of 2.10 is the second highest factor for the CULFIT variable, indicating that the respondents view active leadership involvement as not a significant factor for the successful introduction of Lean.



Graph 4-22: CULFIT5 response results

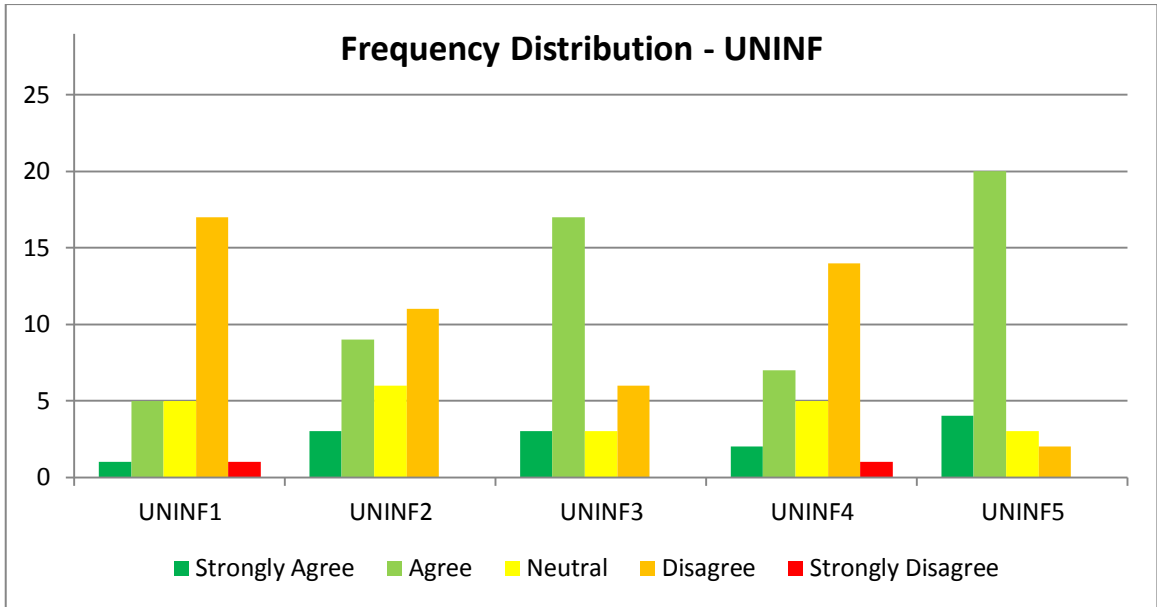
**CULFIT5:** A relatively high number of respondents agree that the organisation promotes the philosophy as working as a single unit. Some 82% of respondents agree that working as one team increases the probability for the successful introduction of Lean. As a vital factor in the Lean toolbox, teamwork is encouraged in all aspects of the organisation.

With a standard deviation of 0.86, lower than other factors in the CULFIT variable shows that the majority of the respondents had a similar perspective and some outliers may skew the result slightly.

#### 4.1.3.4 Analysis of outcome variable – Union Influence

The implementation of Lean requires a collaborative effort from all parties involved. This includes employees of all levels, management, leadership as well as the trade union. Although the trade union does not officially form part of the workforce, the leadership of any organisation must manage the constant interaction with the trade union.

As the voice of employees, the trade union can either assist or resist the implementation of a system such as Lean Manufacturing. Hence, the variable was included in the study to assess the impact of the trade union as a factor for the successful implementation of Lean.

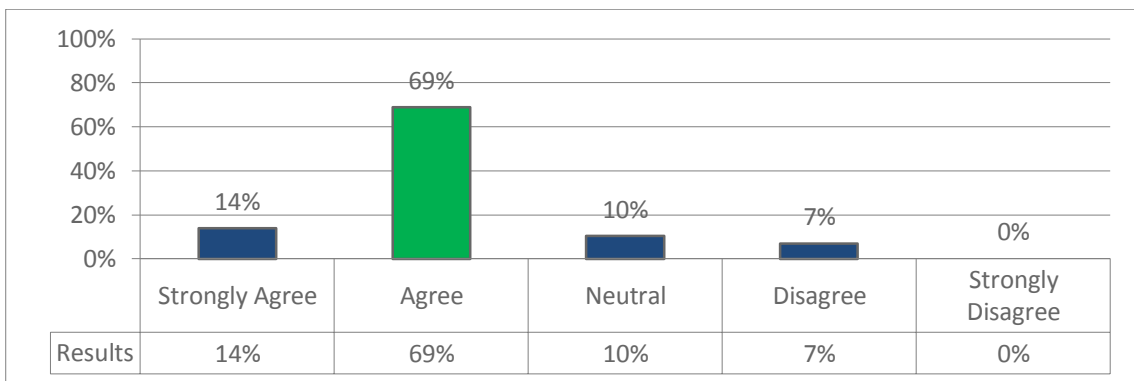


Graph 4-23: Frequency distribution – UNINF

Taking the above Graph 4-7 into account it is evident that the outcome variable of union influence did not receive a significantly positive result. All factors except UNINF3 was stated in the positive and still three of the five variables had negative responses. This indicates that the respondents disagree that the trade union supports and contributes to the success of the implementation of a lean production system.

Variable	Mean	Std. Dev.	N
UNINF5	2.10	0.72	29
UNINF2	2.86	1.06	29
UNINF4	3.17	1.07	29
UNINF1	3.41	0.95	29
UNINF3	3.59	0.94	29

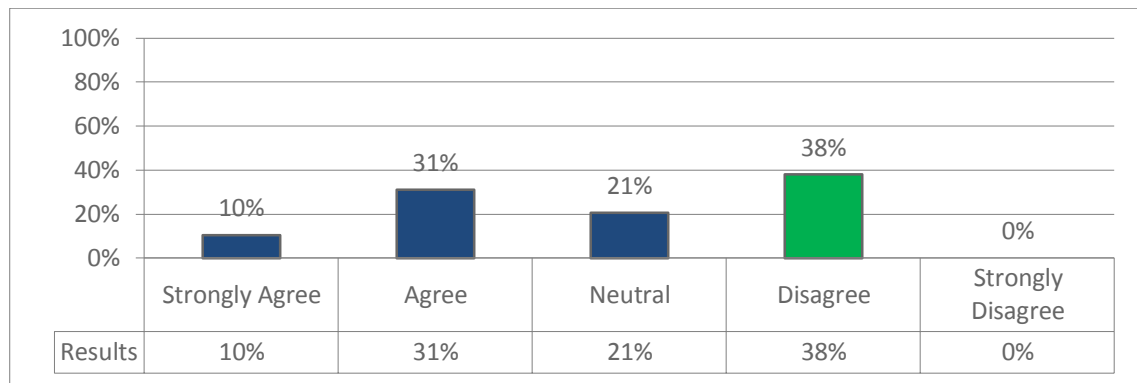
Table 4-14: Descriptive Statistics Pareto list – UNINF



Graph 4-24: UNINF5 response results

**UNINF5:** Trade union buy-in is required when changes are made to the responsibility of employees, resulted in a response of 69% of respondents that agree, 14% strongly agree, and a mere 7% disagree with the statement.

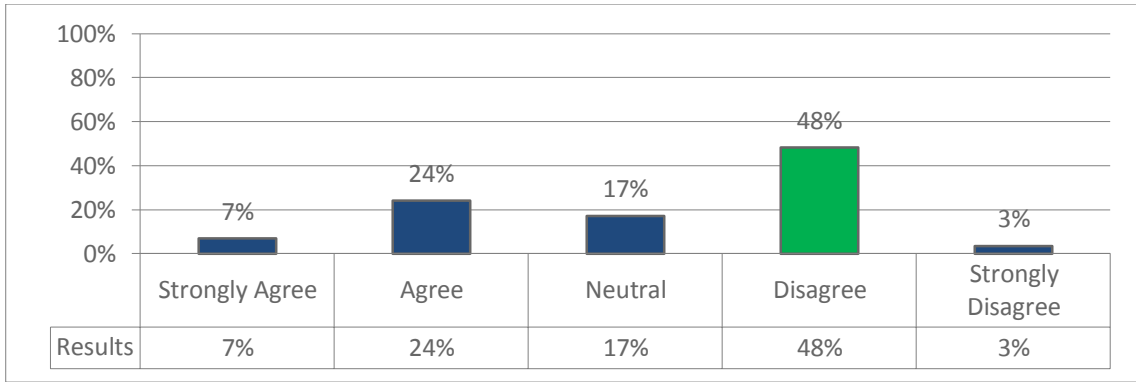
A standard deviation of 0.72 shows that the spread of responses were limited to a narrow agreement range. This proves the majority of respondents have the same perspective that the trade union has a tangible interference when alterations are made to the employee responsibilities. By doing so, the required activities to speedily introduce a production system such as Lean cannot be completed successfully within the given timeframe.



*Graph 4-25: UNINF2 response results*

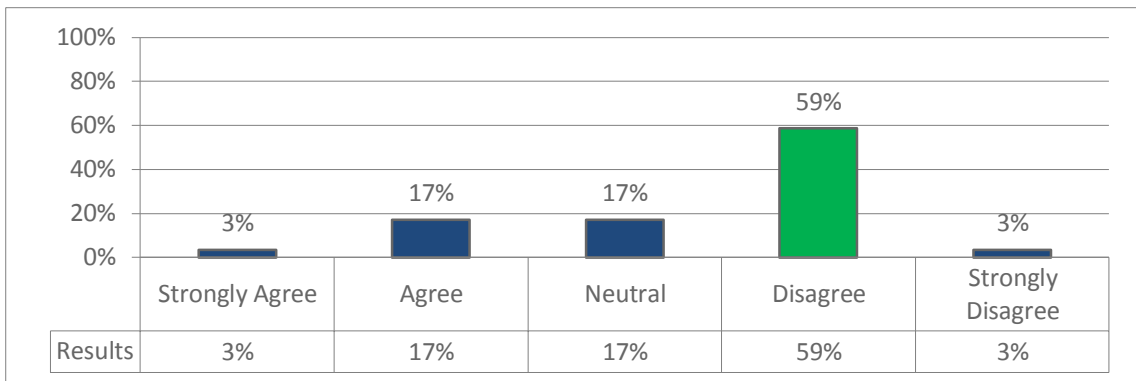
**UNINF2:** In order to cultivate a continuous improvement and waste elimination cultural mentality, it is required to develop and coach employees to a level where the employees can drive the sustainable improvements to daily tasks and operations.

A total of 38% of respondents agree that the trade union does not support the multi-skilled approach to ensure employee autonomy in the workplace. In contrast, 41% of respondents indicated that the trade union accepts the approach to ensure the skill building of employees.



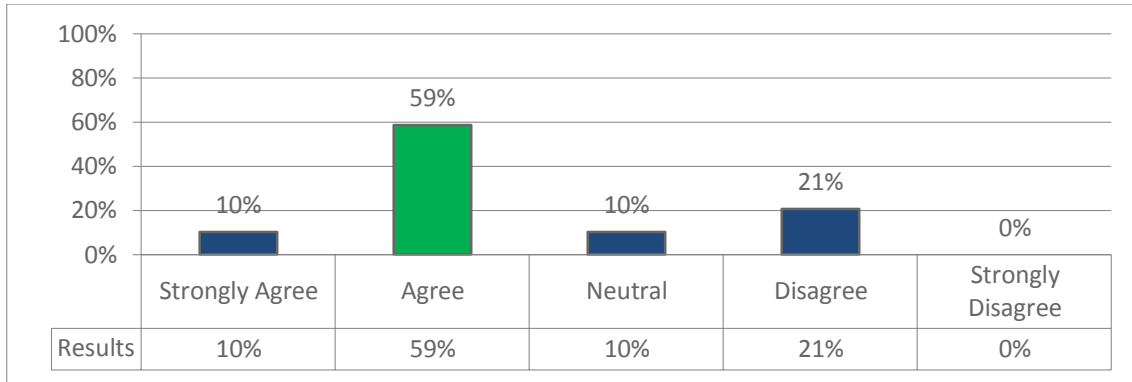
*Graph 4-26: UNINF4 response results*

**UNINF4:** Respondents indicated that 48% agree that the trade union does not support the wider scope of responsibility that accompanies Lean implementation. With a mean score of 3.17 it indicates that the majority of respondents have the opinion that the trade union does not assist in the successful introduction of Lean, due to the resistance to development of employees’ roles and responsibilities.



*Graph 4-27: UNINF1 response results*

**UNINF1:** It was noted from *Graph 4-27* that 59% of respondents disagree with the statement, and a further 3% strongly disagree. Therefore the larger majority of respondents believe that the trade union needlessly challenges and resist changes to operations and employee responsibilities.



*Graph 4-28: UNINF3 response results*

**UNINF3:** A total of 59% of respondents agree that trade union resists the fluent employee responsibility resulting from Lean implementation. Furthermore an additional 10% strongly agree that the resistance negatively effects the introduction of Lean.

### 4.3 Variable Correlation Analysis

Successful Lean introduction requires the simultaneous collaboration of various factors and variables. Without an interrelationship between variables, one cannot presume a complex implementation method. Hence, the deduction can be made that each variable has either a positive or a negative relationship to the other.

Furthermore, each variable used in this study was identified through extensive literature review and found to be related to the success of lean implementation. Although each variable was separately identified, it is clear that each of the variables have an influence on the entire implementation methodology. This consideration cannot be disregarded as the success of one factor might greatly influence the success of another.

Hence, a correlation study has been conducted to identify the proposed relationships between the various variables.

	CULFIT	EMPENG	LEADCOM	UNINF
CULFIT	1.000			
EMPENG	<b>0.489</b>	1.000		
LEADCOM	<b>0.627</b>	<b>0.603</b>	1.000	
UNINF	0.085	<b>0.410</b>	0.135	1.000

*Table 4-15: Correlation coefficient analysis*

According to Pearson's correlation coefficient ( $r$ ), the above *Table 4-15* shows a positive correlation between LEADCOM, CULFIT and EMPENG. For practical significance, the positive correlation coefficient can be interpreted using *Table 4-16* below.

Correlation level	Pearson's Correlation Coefficient ( $r$ )
Weak Correlation	<0.3
Moderate Correlation	0.3 – 0.49
Strong Correlation	>0.5

*Table 4-16: Correlation interpretation intervals*

The population correlation between EMPENG and CULFIT of 0.489 shows moderate and positive correlation. Furthermore, LEADCOM has the highest correlation coefficient to CULFIT of 0.627 that indicates a strong correlation. LEADCOM also indicates a strong positive relationship of  $r=0.603$  towards EMPENG.

## CONCLUSION

The statistical analysis results indicate that the four variables under study rank in importance as Key Success Factor as follows:

- I. Leadership Commitment
- II. Cultural Fit
- III. Employee Engagement
- IV. Union Influence

The top three variables all indicate a positive relationship to the dependent variable, where all three have a mean score of less than 2.3. This indicates that

the respondents strongly agree that these variables have a positive impact in the successful implementation of Lean.

The union influence variable indicates a faintly negative respondent score. This signifies that the respondents do not see the union influence as a positive contributor to the success of Lean introduction, but rather as a barrier.

The most significant variable as seen from the statistical analysis is commitment to the project by leadership of the organisation. Positive leadership ability and drive were the most sought after factors in the quest to implement Lean within the organisation successfully.

It is also important to note that leadership commitment indicates a strong relationship to some of the other variables, namely Cultural Fit and Employee Engagement. This shows that leadership commitment is not only important to initiate the implementation project, but also essential in cultivating the lean culture, motivating and engaging the employees within the organisation



## **CHAPTER 5 : CONCLUSION AND RECOMMENDATIONS**

### **INTRODUCTION**

Chapter 4 discussed the research findings of the study in detail, outlining the main variables and their results. The purpose of this chapter is to present the summary of the study and interpret the results as laid out in the previous chapter. Furthermore, limitations of the study will be highlighted and future research fields will be discussed. A conclusion will be drawn from the summary and recommendations provided from the findings of the study.

#### **5.1 Overview of the study**

##### **5.1.1 Summary of research**

The objective of this study is to determine the Key Success Factors, which are deemed vital for the success of Lean implementation in the Eastern Cape automotive industry. The study started with an introduction of the research problem in Chapter 1 where a brief background was provided on why the study was necessary. The objectives of the study were discussed and an introduction of the intended research method was provided.

Chapter 2 provided a brief history of Lean manufacturing as well as the main objective of eliminating waste in all aspects of operations. A further introduction and background surrounding the various implementation methodologies were discussed where the focus of lean implementation shifted from the operational aspects of an organisation to the inclusion of the human factors.

A further literature review was conducted to establish the KSF's for the implementation of lean manufacturing. Four variables were identified as key to the success of the lean implementation. These four variables were directly associated to the human aspects of the organisation. Each of the four variables was investigated to find the core factors vital to its success. These factors were used to investigate and analyse the variables and its influence to the overall successful introduction of Lean manufacturing.

An outline of the research methodology was presented in Chapter 3. In order to analyse the variables and their individual contribution to Lean implementation statistically, it was decided to conduct quantitative study. This provides the researcher with the opportunity to not only analyse each variable separately, but to draw conclusion from the interrelationships between the variables that ultimately contribute to the overall success of the project as a collective.

Results of the data collected are presented in Chapter 4. This includes the statistical analysis of the quantitative data and demographical information of the respondents. The most important variables were identified as well as the factors vital to ensure the success of each variable.

### **5.1.2 Interpretation of research objectives**

The main research objective was to investigate if the Key Success Factors for Lean implementation found in literature mirrors the KSF's found during actual implementation within an organisation.

In order to reach this objective, three sub objectives were created as follows:

- Identify human related KSF's from literature
- Conduct empirical study to test if KSF's found in literature was evident during implementation of Lean within the organisation.
- Statistically test relationships between variables

The three sub objectives had to be completed before the main objective was concluded.

### **5.1.3 Sub research objectives**

#### **5.1.3.1 Identify KSF's from literature**

The first objective was to identify various KSF's from literature and select the appropriate factors relating to the human aspect of the organisation. Various factors were identified as KSF's by a number of authors and industries; however the most important factors were identified as:

- Management Commitment
- Employee Engagement

- Cultural Fit
- Union influence

Other factors investigated include good communication, education and training, strategy, infrastructure etc. These factors were found to be all valid arguments, however, if one investigates the feasibility it is found that each of these factors are incorporated in either one of the four selected KSF's.

Verification of the four selected KSF's was obtained by use of further literature review with the focus on the South African economy and local industries. Both international authors and local industries find that the four selected KSF's are vital to the success of Lean introduction.

In order to test if the hypothesis is correct, the variables were tested in an automotive manufacturing plant in the Eastern Cape, which have recently introduced Lean as a manufacturing concept. The questionnaire was thus set-up to extract the respondents' opinion regarding each of the variables and how it contributed to the success of Lean implementation.

## **5.2 Empirical study results**

### **Management Commitment**

The conducted study confirms that the variable identified as most important to the successful implementation is leadership commitment. The results also indicate that the commitment embodied by leadership does not only drive the implementation process, but also effects the engagement of employees and the organisational culture.

It was found that the aspect of leadership commitment adding the most value is the commitment on a strategic level. In order to track progress of such an enormous operational improvement, the management and leadership require a top down approach where vital objectives must be set and monitored accordingly. A positive outcome of the study was that the respondents were confident that inclusion of Lean implementation in the corporate strategy improved the implementation process.

The next two variables relate to the planning and readiness for the implementation of Lean. These variables were identified as training for both management and employees. The second most important variable for LEADCOM was that the leadership of the organisation must be appropriately trained to handle day to day tasks if required.

Adequately qualified leaders are essential to any organisation and project; furthermore, leadership must ensure that all employees receive the relevant training to conduct their daily tasks. Although the training requirements might be different to various levels within the organisation, it is important that all employees understand the expectation. The organisation under study scored very high on the training and planning of Lean introduction. Hence, the preparations of employees for their future roles are placed in high regard to ensure that the changes and implementation process is conducted flawlessly.

Furthermore, the presence of management on the shop floor was identified as the next important factor. Shop floor management is a basic management skill that yields astonishing results when executed correctly. In order to improve working relationships and flattening the organisational hierarchy between management and employees, the management perform part of their daily tasks on the shop floor. This simple task changes the perception of employees of the “us and them” mentality. Furthermore, it strengthens the approach of working as one team and solving problems through teamwork.

Moreover, shop floor management improves communication between leadership and employees. This was identified as the last factor for LEADCOM with the lowest mean score indicating that communication of operational and strategic information was not acceptable. All parties need to be informed of current operations and status of implementation to fulfil the one team approach. Once top down communication regarding important issues are neglected, the perception of non-interest is created.

The organisation under study clearly agrees that Leadership commitment is a KSF for Lean implementation, however, based on the questionnaire results did not focus in key activities as identified by literature.

## **Employee Engagement**

A vital factor highlighted during the study is that the communication between management and employees are essential in all aspects of operations. Communication sets the tone of the business relationship and either engages or disengages employees. Communication not only refers to conversation, but to all communication regarding corporate information, recognition and corporate strategic objectives.

As part of the communication aspect it was indicated that recognition given to employees is of high importance. Recognition is a form of celebration of accomplishments within the organisation by any individual or team. Many authors and researchers also highlighter this as an important factor to accomplish the “one team” approach. Recognition of this kind attracts the attention of employees and shows commitment to good work and appreciation for achieving organisational objectives.

Furthermore it was emphasised that in order to engage employees in the change process, management must ensure adequate training is available to all employees involved in the implementation. Depending on the level of involvement, management should design the training so that employees have in-depth knowledge in the field where their responsibility will lie as well as an overview of what is required to transform the manufacturing process. This will provide the employees with the “big picture” overview so that strategic objectives and goals can be understood.

After employees have been introduced to the concept of Lean and the appropriate training has been provided, each employee then faces the reality of introducing the methods and concepts. Although each concept has a set method of introduction, the concept of continuous improvement does not.

In order to achieve continual employee engagement, the organisation and management need to enable employees through providing them with the responsibility and authority to make the required changes in the process. This will prove vital to the sustainability of Lean within the organisation.

## **Cultural Fit**

One of the most important aspects of Lean Manufacturing is the philosophy to operate as one team. In order to exist as a high performance organisation, one requires a high performance culture. The one team approach is enabled through the constant underlying representation of Lean methods and techniques during daily operations. Lean culture as a philosophy needs to be emulated and lived throughout all levels of the organisation.

Each employee needs to understand and live the culture of continuous improvement, not only in the organisational processes, but also in themselves. Management and leadership must cultivate an environment where employees are self-motivated to develop themselves and further their individual skills and knowledge.

The concept as one team has to be driven from top management to motivate and inspire the change in mindset. Part of the mindset change is the elimination of the “us and them” outlook between management and other employees. Management must therefore lead the change and involve themselves in the daily activities on the shop floor where employees have the opportunity to interact with their direct superiors. The cultural barrier of hierarchical organisations should be eliminated so that employees perceive the working relationship as a team approach instead of authoritarianism.

Moreover, the teamwork culture needs to consist of a cross departmental and cross functional team in order to extract the most experience and value adding from the group. Cross functional teams ensure that the various departments engage and contribute to the holistic solving of problems within the organisation. Teamwork is thus one of the vital cultural factors for the implementation of Lean, and must be purposefully and consciously emphasised and promoted.

Although these factors have some substance, the implementation and promotion of these concepts are not as easy as one might imagine. Although these concepts are grounded in theory, the implementation and success of the Lean Culture methodology are based on the Japanese mindset. In contrast to Japan, the South African culture is that of entitlement as to adding value for the greater

good. This poses a great concern, as with many organisations it is expected that managements need to provide all enabling factors, and the employees do the work with all peripheral requirements provided on a silver platter. This can be seen throughout the South African industry landscape, where strike action is rife and employees expect to work less but earn more.

Therefore, management in South Africa have a key challenge to motivate, encourage and engage employees in the work environment. It will prove vital for not only the implementation of Lean but also the sustainability of business in South Africa in the very near future.

### **Union influence**

An important factor in the South African landscape in recent years is the influence trade union has in the organisation and the leverage it possesses over operations. Trade union influence was included in this study to investigate the perceived value adding of the trade union when introducing a new process like Lean manufacturing.

Trade unions sell themselves as an organisation that looks after the interests of their members, and stand as unity representing the workforce when matters arise. In the recent South African past it seems that the trade union has its own agenda and the well-being of its members is of second priority. As mentioned, the trade union should have their member's best interests at heart not only monetary wise but also in training and development.

This is where the current trade unions fall short and from the study indicate that the highest priority is to resist management decision in any way shape of form. The study also shows that development of employees based on their exposure and responsibility within the organisation is extremely hampered by the union. Strict set responsibility is the requirement and where Lean enables employees to perform other functions and be more fluid in responsibility, the trade union at this stage resists the opportunity.

Furthermore, the study shows that the appropriate training is required and essential in order for employees to conduct their daily tasks successfully. However, this is in strong contrast to the results that show the trade union resists

the additional or altered responsibility that accompanies the training and development. This resistance and opposition to management cause a fundamental barrier to implementation and another aspect that needs to be placed in high focus to improve the chance of its success.

Trade union influence is thus found to be not only a key success factor, but in the current economic and industrial climate a barrier to implementation. A clear strategy to overcome this barrier needs to be defined by any organisation attempting to implement Lean as a production concept. This will provide management with the support of the trade union, faster implementation and higher employee engagement to the cause.

Moreover, the study indicated that trade union influence has a direct effect on employee engagement, and that if management intends to achieve success, this aspect needs to be addressed as one of the first strategic change points.

### **5.3 Recommendations**

In light of the current world economy and the constant threat of globalisation, improving operations in any way possible is vital for all organisations. Sustainable process improvements are essential to increase competitiveness and to ensure the future of the organisation. Lean Manufacturing provides such improvements and based on the study the following recommendations can be made.

The decision to change the manufacturing process to Lean is taken by the top management and leadership of the organisation. Thus, the extent to which the employees have access to information and training is entirely up to the management. Communication was identified as key to the successful interaction between leadership and employees. Although not all employees are involved with the implementation, the perceived engagement from a management level with employees is vital.

Communication needs to take place not only on a corporate and strategic level, but at a shop floor base level as well. It is vital that production management engage with their employees and provide feedback regarding corporate issues and current status of implementation. The progress with such an enormous task



is not always visible to employees not directly involved in the process, and needs to be visualised. This provides employees with the sense of accomplishment and that their efforts are paying its dues.

On the other end of the scale leadership must ensure that Lean implementation is tracked on a corporate level and milestones are monitored and achieved. This drives the implementation from the top down and shows the commitment from leadership. Showing this commitment from leadership empowers and engages employees and cultivates the Lean culture within the organisation.

The study also confirmed the fact that the various aspects of management commitment have an influence on the cultural aspects and employees' engagement. The cultural aspects of an organisation need to be conducive to its values and goals. Hence the importance of significant management involvement during and after Lean implementation to achieve the single working team culture.

Self-development and training is another aspect of the Lean culture that requires commitment and input from leadership. This requires leadership and management to encourage employees to learn and develop their skills and knowledge not only for the benefit of Lean, but also as a benefit to themselves. This behaviour needs to be cultivated and lived through the development of set training programs and training facilities per area where Lean is to be implemented. The basic methods and tools can be developed through theory and also be put into practice by use of practical problem solving to simulate improvements.

Another way of connecting with the employees and engage all staff in the continuous improvement culture us to invite and encourage employees to take part in continuous improvement idea submission program. As part of the improvement idea program the organisation should have an incentive scheme that will reward the employee by use of monetary benefit or other. This incentive based program should yield a better result as employees perceive the benefit from expending some effort from their side above their normal responsibility.

To achieve the above, employees need to be engaged in the process and collectively strive towards achieving the goals. This study revealed that

communication is vital aspect to employee engagement and that trust between management and employees must exist. As with the incentive based program, management needs to implement some rewards program where high performing individuals and teams are recognised for their outstanding performance. This increases employee morale and creates the much-needed perception that employees are valued within the organisation. The teams can be identified by use of nominations or can be extracted by use of performance to KPI's.

In order to achieve all the above, the management needs to consider the influence and power of the trade union and its members. Preparation and planning can be in vain if the trade union resists progress and employees are disengaged as a result. The stance from a trade union perspective is not likely to change but the way the management approach the process might add benefit to the cause.

Leadership of organisations need to approach trade union representatives in a new and improve manner by utilising its strengths as a global player in an international market. Improvements, changes and indeed benefits must be made clear from the outset and explained in terms of process improvements, sustainability of business and ultimately retention of jobs.

#### **5.4 Limitations of study**

Due to the limited number of qualified personnel with the organisation under study, one of the limiting factors identified was the relatively small sample size. This topic is also addressed under recommendations for future research.

The study was conducted within an OEM in the Eastern Cape automotive industry and thus only collected data from a single source within the industry. A variety of automotive suppliers and manufacturers operate within South Africa, and provide an ideal opportunity to include all manufacturers for further research studies.

With a limited sample size of the study and only one OEM under study the results and conclusions are generalised and can cause misconceptions if not

understood. This needs to be addressed in future studies where a broader base of manufacturers and suppliers need to be included.

### **5.5 Future research**

The study was conducted within one organisation that had introduced Lean as a production philosophy. With a relatively small sample size it is difficult to draw conclusions based on variable relationships and correlations. To ensure an increase of respondents, further studies can be conducted utilising the entire automotive industry in the Eastern Cape Province. This will enable the researcher to incorporate various automotive organisations covering numerous counties of origin.

Furthermore, due to the diverse cultural and leadership attributes of the organisations, factors might divert from the original set and include other dimensions not included in this study.

Future studies can investigate which tools and techniques were introduced during implementation and its effect on total success of Lean implementation. This will add understanding if certain tools are prone to produce additional potential for the success of Lean during implementation.

## **CONCLUSION**

Implementation of lean manufacturing is a massive undertaking and poses potential disruption to the operational flow of an organisation. Identifying factors that will enable the implementation to succeed in an undisruptive and sustainable approach is thus critical. This study identified four key factors from literature, which individually will not automatically ensure the success of lean introduction, but with a combined and synergistic approach may improve the probability of its success.

The overarching variable was found to be the commitment from a leadership perspective towards the implementation of Lean. Leadership commitment has shown influence in all of the other three variables and has the potential to make or break the implementation process. Leadership commitment shows tangible

relationships to achieving the desired organisational culture and enticing employees' engagement to the cause.

Leadership has a large role to play in the quest for success and must live, breathe and radiate Lean to pose as the example and role models for the employees and future leaders to come.

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# ANNEXURE 1: QUESTIONNAIRE AND COVER LETTER

[SURVEY PREVIEW MODE] MBA Questionnaire - Lean Implementation Survey

Page 1 of 6

## MBA Questionnaire - Lean Implementation

### Key Success Factors for Lean Implementation

Dear Respondent,

I am studying towards my MBA (Masters in Business Administration) degree at the Nelson Mandela Metropolitan University Business School. The goal of the questionnaire is to investigate which human related factors are deemed as key to the successful implementation of Lean manufacturing in the Eastern Cape Automotive industry. The results of the questionnaire will be evaluated against the Key Success Factors found in other industries within South Africa and around the world as defined in literature.

The questionnaire should not take more than 5 – 8 minutes to complete. Please answer the questions as accurately as possible. There are no correct or incorrect answers; however it is essential that all questions are completed.

All responses are captured electronically via Survey Monkey which guarantees complete anonymity.

Please note that your participation is entirely voluntary and that respondents have the right to withdraw at any stage.

Thank you

Louis Coetzer

To verify the authenticity of this study, please contact Prof. Koot Pieterse at 083 271 8344 or [jjpieterse@nmmu.ac.za](mailto:jjpieterse@nmmu.ac.za)

1. What is your current length of service in the organisation?

- Less than 1 year
- 1 to 5 years

<https://www.surveymonkey.com/r/?sm=EYHDE9qVQsEuWYqfSNkpSRXS16ZkQ20...> 2016/12/06

- 6 to 10 years
- 11 to 15 years
- More than 15 years

2. In which department are you currently placed?

- Production
- Production Planning
- Logistics
- Quality Assurance
- Industrial Engineering

3. What is your current position in the organisation?

- Department head or higher
- Management
- Supervisor or Specialist
- Engineer or Technician
- Production Operator

4. Please select your level of agreement for the following comments.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Increased implementation momentum is gained by incorporating Lean introduction into the corporate strategy.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The organisational culture promotes the concept of	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
working as a single team to achieve an objective.					
Problem resolution is a function of a cross departmental collaboration.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Corporate information is shared freely by management to keep the workforce informed of current operations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trade union buy in is required when changes are made to the responsibilities of employees.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lean goals are clearly communication to the entire organisation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Management leads by example by involving themselves in the day to day lean initiatives on the shop floor.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Employees are involved in the creation of lean objectives.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The trade union contributes to the speedy implementation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
of lean initiatives by not challenging all changes and improvements.					
Active leadership involvement at shop floor level is evident.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The organisational culture encourages each employee to be involved in problem solving activities (Idea creation/Cross functional teams/Problem solving teams).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Employees are encouraged to be autonomous by being given the authority to improve processes where required.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The trade union supports the wider scope of responsibilities that come with lean development/training of employees.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leadership provides adequate training opportunities to all personnel involved in Lean implementation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The organisational culture encourages employee learning and self development.					
Lean training is available to all employees at all times.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The trade union resists more fluent employee responsibility.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The organisational culture promotes collaborative problem solving rather than finding the guilty party.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Employee/team achievements are recognised within the organisation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The trade union supports the multi-skilled approach to give employees more autonomy by allocating more responsibility in the workplace.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Adequately trained leadership assists in the successful introduction of a Lean Production Systems.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The organisational culture enables an environment where employees feel comfortable to talk to their direct management regarding any work related or personal topics.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strategic organisational changes are communicated as early as possible to ensure perceived employee inclusion.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Done



## ANNEXURE 2: ETHICS CLEARANCE FORM



**FORM E**

### ETHICS CLEARANCE FOR TREATISES/DISSERTATIONS/THESES

*Please type or complete in black ink*

**FACULTY: Business and Economic Sciences**

**SCHOOL/DEPARTMENT: Business School**

I, J. J. Pieterse the supervisor for L. Coetzer, student number 209927992

a candidate for the degree of Magister of Business Administration with a treatise

entitled:

**Key Success Factors for Lean Implementation in the Eastern Cape Automotive Industry**

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)?		X
<p>Note:</p> <ul style="list-style-type: none"> <li>• If your questionnaire <b>DOES NOT</b> request respondents' identification, is distributed electronically and you request respondents to return it <i>manually</i> (print out and deliver/mail); <b>AND</b> respondent anonymity can be guaranteed, your answer will be NO.</li> <li>• If your questionnaire <b>DOES NOT</b> request respondents' identification, is <i>distributed via an email link and works through a web response system (e.g. the university survey system)</i>; <b>AND</b> respondent anonymity can be guaranteed, your answer will be NO.</li> </ul>		

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.

\_\_\_\_\_  \_\_\_\_\_

1 November 2016

SUPERVISOR(S)

DATE

\_\_\_\_\_  \_\_\_\_\_

1 December 2016

HEAD OF DEPARTMENT

DATE

\_\_\_\_\_  \_\_\_\_\_

21.10.2016

STUDENT(S)

DATE

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