AN INVESTIGATION INTO THE POTENTIAL FOR IMPLEMENTING LEAN AT GRINDROD CONTAINER DEPOT IN STANBRIDGE ROAD

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Submitted in partial fulfillment of the requirements
For the degree of

Magister in Business Administration

At the

NMMU Business School

November 2013

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DECLARATION

I, Ferderico Recardo Andrews, hereby declare that

- The work in this paper is my own original work;
- All sources used or referred to have been documented and recognised;
- This treatise has not been previously submitted in full or partial fulfillment of the requirements for an equivalent or higher qualification at any other recognised educational institution.

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Ferderico Recardo Andrews                       November 2013
I sincerely thank the staff and management of Grindrod Intermodal for the opportunity to conduct my treatise research at the Stanbridge Road depot. I wish in particular to acknowledge the following:

- Professor Koot Pieterse for his encouragement, motivation and assistance;
- Thobela JaVu for assisting in difficult times;
- My Children for their support and encouragement;
- The management and staff of Grindrod Intermodal, who made this treatise possible
ABSTRACT

On a daily basis organizations strive to achieve maximum output with minimum input for greater levels of efficiency and profitability. However, in our dynamic modern world and economy the variables have changed dramatically and the time when business was simply about the ‘bottom line’ and all else was subordinate to the objective of profit, has come and gone.

In the contemporary world of business today the variables are much broader and more dynamic, as people are no longer just employees, and suppliers are no longer people whose payment should be delayed for as long as possible. In addition, the environment is no longer to be plundered at all costs.

Today Lean as an all-encompassing management philosophy with its emphasis on adding value, is more relevant in business than at any other point in business history. At a time when the global economy is facing some of its greatest challenges, it is ultimately business and its networks that, through effective management, can restore the global economy and provide livelihoods to millions of people. The Lean management philosophy is about constantly searching for the best possible way of doing things and eliminating waste in pursuit of value.

If Lean is in pursuit of eliminating waste and turning it into value, and the customer, irrespective of required product, is in constant pursuit of finding value, then Lean is surely the management philosophy that can deliver the greatest level of customer satisfaction. This means satisfied customers returning to an organization for repeat sales as long as they perceive that the value they derive meets their expectations.
6.8 RECOMMENDATIONS ......................................................................................................................... 127
7. LIST OF SOURCES ................................................................................................................................. 129
LIST OF FIGURES

Figure 2.1  PDCA Cycle
Figure 3.1  Depot organisational structure
Figure 3.2  Current flow layout Stanbridge Road depot
Figure 3.3  Future flow layout Stanbridge Road depot
Figure 5.1  Depot gender mix
Figure 5.2  Job types
Figure 5.3  Employment type
Figure 5.4  Education
Figure 5.5  Period employed
Figure 5.6  Question 1
Figure 5.7  Question 2
Figure 5.8  Question 3
Figure 5.9  Question 4
Figure 5.10  Question 5
Figure 5.11  Question 6
Figure 5.12  Question 7
Figure 5.13  Question 8
Figure 5.14  Question 9
Figure 5.15  Question 10
Figure 5.16  Question 11
Figure 5.17  Question 12
Figure 5.18  Question 13
Figure 5.19  Question 14
Figure 5.20  Question 15
Figure 5.21  Question 16
Figure 5.22  Question 17
Figure 5.23  Question 18
Figure 5.24  Question 19
Figure 5.25  Question 20
Figure 5.26  Question 21
Figure 5.27  Question 22
Figure 5.28  Question 23
Figure 5.29  Question 24
Figure 5.30  Question 25
Figure 5.31  Question 26
Figure 5.32  Question 27
Figure 5.33  Question 28
Figure 5.34  Question 29
Figure 5.35  Question 30
Figure 5.36  Question 31
Figure 5.37  Question 32
Figure 5.38  Question 33
Figure 5.39  Question 34
Figure 5.40  Question 35
Figure 5.41  Container handlers in use versus on hand
Figure 5.42  Trucks to depot daily for September 2013
Figure 5.43  Truck queue time at depot daily for September 2013
Figure 6.1  Top 10 negative responses that could impede implementing Lean at Stanbridge Road depot

Figure 6.2  Top 10 positive responses from survey
LIST OF TABLES

Table 6.1  Top 10 negative responses that could impede implementing Lean at Stanbridge Road depot
Table 6.2  Top 10 positive responses from survey
**GLOSSARY**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIFO</td>
<td>First In First Out</td>
</tr>
<tr>
<td>EOQ</td>
<td>Economic Order Quantity</td>
</tr>
<tr>
<td>EDI</td>
<td>Electronic Data Interchange</td>
</tr>
<tr>
<td>TPS</td>
<td>Toyota Production System</td>
</tr>
<tr>
<td>PDCA</td>
<td>Plan Do Check Act</td>
</tr>
<tr>
<td>PPECB</td>
<td>Perishable Products Export Control Board</td>
</tr>
</tbody>
</table>
1. CHAPTER 1

1.1 INTRODUCTION
According to Sharma (2005), everybody is knowledgeable about what world class manufacturing means. When you are world class, you are among the best in the world at what you do. Unfortunately it is not that simple for manufacturers, as there is no universally accepted definition of world class manufacturing. Everyone has a different view of world class manufacturing (Sharma, 2005).

Top manufacturing companies, led by Toyota, embraced, improved and profited from Lean production methods, but the benefits have not been nearly as visible for service industries applying Lean principles (Hanna 2007:1). This is believed to be because:

1. Operations and improvements in the service industries, in general, are a long way behind manufacturing;
2. Not all Lean manufacturing concepts translate from the production process to the office environment;
3. A Lean operating system alters the way a company learns through changes in problem solving, coordination and various connections and pathways, including standardisation.

According to Wright (2007:1), non-manufacturing industries have not yet embraced Lean principles to the same extent as those producing a product. Some service industries have found that the same principles apply, although the use of Lean manufacturing tools varies.
Since the liberalisation of trade, the South African economy has experienced considerable competition from foreign companies in the domestic market, including their ability to export competitively to foreign markets. This adverse competition stems from the fact that South African industry is characterised by low levels of productivity (Productivity Institute of South Africa. The notion of continuous improvement provides a proven methodology for increasing the effectiveness and efficiency of production processes albeit on a piecemeal basis.

Given the situation that faces South African industry it would seem appropriate to investigate how the concept of continuous improvement can be applied to a specific South African organization, for example, Grindrod Intermodal Container Depot, to improve its effectiveness and efficiency.

Solotorow and Banks (2006:1) state that in the Toyota Production System (TPS) Lean management principles have effectively been applied over the years. However, they have only recently been applied outside manufacturing. This raises the question why in areas such as safety, quality, customer and staff satisfaction cost-effectiveness transcends industry and therefore applying the Lean philosophy to service makes business sense. All organizations by their nature strive to provide value added products or services as a competitive advantage, not only to retain but also gain market share and enhance profitability in the process.
1.2 BACKGROUND
The Stanbridge Road Grindrod Intermodal Container Depot was used for the purpose of this study. This depot has a facility where shipping lines, leasing companies and individuals can have their containers stored either full or empty, and repaired to their and industry’s specifications. The depot comprises the following business areas:

- Tracking which has the following business functions: tracking containers in and out of the depot by capturing them on the Tracker system that is used along with the required documentation;
- Workshop which has the following business functions: estimating what structural damage there is to containers and quoting for repair work. If quotes are approved by clients, repairs are then carried out;
- Reefer Operations which has the following business functions: technicians perform pre-trip inspections on units and based on faults found in the process, submit quotes to the client for repairs. Upon approval of quotes the reefer technicians repair all refrigerated containers as per the customer's requirements in line with industry and statutory guidelines;
- Wash Bay which has the following business functions: to wash refrigerated containers either with normal water wash or chemicals depending on the state of the container and in line with statutory standards. Each refrigerated container must be inspected by the Perishable Product Export Control Board (PPECB) and only when passed by an inspector can it be used for food transportation. General purpose containers are not subject to inspection, but are also washed from time
to time depending on the cargo carried prior to entering the depot;

- Yard Operations which has the following business functions: to ensure various customers' containers are stacked in an easily accessible manner, that containers are dispatched on a First in First Out (FIFO) basis and that customers' containers are separately stacked to prevent the wrong containers being dispatched to clients. Yard also moves containers internally inter alia from the various stacks to the workshop, wash bay, and mechanical repair towers, and loads them on and off trucks delivering and collecting containers from the depot;

- Store which has the following business function: to ensure the safekeeping of various stock items including equipment, materials and tools. Ensuring that the Economic Order Quantity (EOQ) of material is adhered to. Doing monthly stock counts to verify stock and equipment balances. Issuing material and equipment to various departments involved in the repair and storage processes;

- Administration which has the following business function: to ensure all repair quotes are submitted to the various websites of shipping line clients, and to obtain authorisation for repairs. Ensuring all authorised quotes are invoiced timeously. Responsible for the general administration of the depot including timekeeping, and staff and customer queries, and for submitting various reports to customers, analysing various systems reports and suggesting corrective actions to the various departments.
Grindrod Intermodal PTY (LTD) was formed in 2008 by the merging of four different entities - Cross Country Containers, CMC Grindrod Container Depot and Grindrod JJ Logistics - to serve the intermodal business in the Port Elizabeth and broader Eastern Cape area. Grindrod Intermodal was set up with the intention of deriving synergy from having transport, depot, warehousing and container sales and leasing within one business, but the company was divisionalised in 2009 as a division of Grindrod SA PTY (LTD).

Grindrod Intermodal, a Division of Grindrod SA PTY (LTD), is guided by the following principles.

1. To add value to clients’ operations:
   - By ensuring the availability of containers as per industry standards;
   - By rendering a transparent, cost effective container repair and maintenance service;
   - By maintaining clear and effective communication with clients and their clients;
   - By being ethical in all business practices.

2. To provide clients with relevant and accurate information regarding their stock by:
   - Ensuring all relevant reports is sent to clients timeously by Electronic Data Interchange (EDI) or e-mail;
   - Submitting all invoices and quotes within a 24 hour period;
   - Ensuring clients are informed of any developments that may impact their operations, whether positive or negative.
3. To ensure legal compliance at all times:
   - Grindrod Intermodal Depot strives to operate within the ambit of the law;
   - It observes the rights of its clients, suppliers and employees at all times.

1.3 MAIN PROBLEM
Grindrod Intermodal Depot operates in the intermodal part of the value chain and is mainly concerned with inbound and outbound logistics. Owing to this middle man position, the depot is strategically placed between clients and their clients, which calls for a large degree of trust and ethical conduct. It is an area subject to intense competition, due to pricing. When customers compare prices between different service providers they do not necessarily compare service quality. Lean, with its emphasis on value-adding and waste removal from processes to enhance competitiveness, is an ideal management philosophy to explore. Lean will put the depot in a position to more effectively meet customer expectations, namely, rendering an efficient service at a competitive price.

Lean will more effectively address the main concerns of clients and put the depot in a better position to consistently meet or exceed customer expectations. Examining what drives depot activities from a customer perspective will assist the depot in identifying processes where Lean interventions will be most effective.

Customers measure Grindrod Intermodal Depot’s service by:
• The speed with which their containers are received at the depot, since they do not want their transporters to lose transit time at the depot;
• The speed with which they receive status reports from the depot;
• The quality of communication and reports;
• The quality of repairs;
• The cost of repairs, parts, materials and labour;
• Whether containers are released on a FIFO basis;
• Whether containers are tracked in and out under the correct owners;
• Whether repairs are compliant with industry set standards and containers are in seaworthy condition;
• Whether queries are resolved timeously;
• Whether clients run out of containers for export.

Providing quality service is important to ensure customer satisfaction is attained and maintained; this will foster customer loyalty. Operating in a price sensitive market means that focusing on an efficient and effective operating environment driven by quality and accuracy could substantially decrease the input costs of the depot.

Theron, Bothma and Du Toit (2003:5) note that Texas A and M University found customers rate service quality against the following five factors:

1. Reliability - the ability to provide promised goods or service, accurately and dependably;
2. Assurance - the ability to convey trust and confidence, knowledge and courtesy to customers;
3. Tangibility – the physical facility and appearance of the service provider;
4. Empathy – the individual degree of attention shown;
5. Responsiveness – the willingness to assist customers timeously.

Although depot customers are slowly moving towards the mind-set that service quality provides greater savings, a large number of clients predominantly look at price when considering a service provider. This result in an even greater need to ensure processes and workflow are improved to provide service to clients in an efficient and effective manner. These improvements will reduce costs and translate into rates reflecting the principles of Lean that suggest savings should be passed on to the customer.

1.4 RESEARCH PROBLEM
To determine how the operations of Grindrod Intermodal container depot in Stanbridge Road can benefit from implementing Lean at the Stanbridge Road depot as in manufacturing.

1.5 SUB-PROBLEMS
To be able to develop the appropriate research strategy and which deals with and find solutions to the main purpose of this study, the following sub-problems have been identified.
1.6 SUB-PROBLEM 1
The first sub-problem was to determine what the literature reveals about the application of Lean in the service environment.

1.7 SUB-PROBLEM 2
The second-problem was to determine what factors, that is, people, operations or change management could impede implementing Lean at Grindrod Intermodal Stanbridge Road Depot.

1.8 SUB-PROBLEM 3
The third sub-problem was to determine what the most appropriate implementation strategy would be at Grindrod Intermodal Stanbridge Road Depot.

1.9 RESEARCH OBJECTIVES
The aim of the study was to investigate how Lean manufacturing tools, as they are applied in manufacturing enterprises, can be used to improve efficiency and customer service, and embed a continuous improvement culture in the Grindrod Intermodal Stanbridge Road Depot.

1.10 DELIMITATIONS
1.10.1 The organization
The research study was conducted in the Grindrod Intermodal Stanbridge Road container depot in Port Elizabeth.
1.10.2 The area within the organization
The entire operation of the Grindrod Intermodal Stanbridge Road depot was the focus of the study.

1.11 RESEARCH DESIGN
The broader methodology followed in this study will be outlined.

1.11.1 Research Methodology
To solve the main and sub-problems, the following procedure was used.

1.11.2 Literature survey
Previous research conducted on Lean was reviewed and where possible the gaps in the research were identified.

1.11.3 Empirical study
Questionnaires, observations and interviews were conducted at all levels within the Grindrod Intermodal Stanbridge Road depot business functions. The data was collected, analysed and interpreted. Observations and interviews were scheduled and conducted ad hoc.

The objective of the questionnaires and interviews was to obtain insight into whether or not value is added and to identify areas for future value-adding and for Lean processes to be adopted.

1.11.4 Gap analysis
The need for a continuous improvement culture was identified after the results were analysed and interpreted. A readiness and understanding of the need to apply Lean was also identified.
1.12 ASSUMPTIONS
The study will assist the organization in improving its efficiency and effectiveness with regard to customer service. Management at the Grindrod Intermodal Stanbridge Road depot will want to implement Lean management tools, as will other depots within Grindrod Intermodal. Management, employees and customers will participate in the research with the intention of bringing about positive change.

1.13 THE SIGNIFICANCE OF THE RESEARCH
Lean philosophy is rooted in the quest to continuously search for ways to improve an organization’s processes, by creating a new culture of efficiency and eliminating all forms of non-value adding activities. A number of manufacturing concerns have adopted Lean tools in their pursuit of attaining a competitive advantage in the face of global and domestic competition.

According to Kilpatrick (2003:3), the benefits of implementing Lean are broken down into three broad categories, namely, operational, administrative and strategic gains. Kilpatrick concludes that a Lean organization is much more responsive to and faster at servicing clients than non-Lean organizations, as Lean addresses all organizational aspects and influences the entire system.

Through using Lean, Grindrod Intermodal Container Depot in Stanbridge Road will be able to operate in an environment where continuous improvement is embedded in all functional processes. This will result in a culture where employees take ownership of identifying and eliminating all forms of waste in the processes they
encounter in the carrying out of their duties in a structured and systematic manner.

The successful implementation of the study’s outcomes will create an environment within which employees will embrace change as opposed to having change forced upon them.

1.14 TEXT LAYOUT

The study is laid out as follows.

Chapter 1: Introduction

The research topic is explained and a background is given followed by the Problem Statement, significance of the research, delimitations of the study and a brief review of prior research on this topic.

Chapter 2: Literature review/theoretical framework

In this chapter, the literature consulted is demarcated and discussed.

Chapter 3: An analysis of the Grindrod Intermodal Container Depot in Stanbridge Road Deal Party, Port Elizabeth is followed by demarcation of its operations.

Chapter 4: Research design and methodology.

A theoretical explanation is given of the methodology applied to conduct the research.

Chapter 5: Results
This chapter deals with the results of the empirical study, which are interpreted to arrive at conclusions. The main findings are highlighted.

**Chapter 6: Conclusions and recommendations.**

The final chapter analyses whether the research objectives have been attained. Areas for further research are also identified.
2. CHAPTER 2

2.1 INTRODUCTION

This chapter serves to review the literature relevant to Lean. The focus is Lean manufacturing, its history, and the various applications, principals and scheduling techniques used in the Lean manufacturing philosophy.

Lean manufacturing is primarily associated with the Toyota Production System pioneered by the Toyota Motor Corporation. However, some authors hold the view that Lean has been around for much longer than the dawn of the Toyota Motor Company.

Hobbs (2004:14) views Lean’s background with reference to the Industrial Revolution that started in 1860, when managing machines with large product quantities output. He refers to the suggestion in 1885 of Frederick Taylor’s 1885 suggestion that work should be broken down into individual tasks. Later during the 1930s, due to consumers driving changes in product life cycles, the key manufacturing challenge became managing a variety of products that were produced in the same factory. The result of these changes in product variety driven by consumers brought about a different manufacturing approach in Asia, primarily in Japan.

According to Hobbs (2004:16), the change in Asia was driven by the Toyota Motor Company when they contested the conventional profit equation at the time, namely, Cost + Profit = Selling Price. They
suggested profit should be viewed as Profit = Sales Price – Cost. The fundamental shift brought about by redefining the profit equation, was the basis from which Toyota created a manufacturing system which concentrated on costs that was translated to waste. The key areas identified in the system were raw materials and related inventories, work in progress and safety stock.

Hobbs (2004:17) points to Toyota’s ability to increase productivity while reducing costs and unnecessary inventory. These improvements were underpinned by creating a quick customer response based on Toyota’s ability to build a variety of products within an integrated one flow system.

Bicheno and Pieterse (2008:3) diverge from Hobbs: they consider the birth of Lean production to have occurred in 1950 as a result of the visit of Eiji Toyoda, an engineer from the Toyota Motor Corporation, to the Ford production facility at Detroit. The main purpose of Toyoda’s visit was to see what could be learned from Ford and applied to the Toyota facility, which had been plagued by numerous setbacks. He concluded that mass production was a viable course of action for Japan if they were to become globally competitive.

Taichi Ohno, former Vice President of Manufacturing for Toyota Motor Corporation, became the driving force behind the development of the Toyota Production System (TPS) when he joined the company in 1945. The TPS was inspired by values like mutual respect, vigorous waste elimination, challenging the status quo, and fact
based analysis rather than reports. These were the values that led Ohno to discard the mass production model in favour of the TPS (Ohno 1982:38-40).

Initially the new approach created various challenges, which led Ohno and his team to look for ways around these problems. A case in point would be that large amounts of inventory were unacceptable to Toyota Motor Corporation, due to space and costs related to handling and storage of material. Inventory allowed for dealing with unavoidable variations and the only feasible solution was to replace such variation with stability (Dennis 2007:29-30).

Ohno developed a low inventory strategy to bring about stability in production: it was based on eliminating various types of variation that led to Kanban and Just in Time (JIT) (Ohno, 1982:76-79). From these emerged new concepts, for example, Rapid Die Change, U-shaped cells and zero defects.

These developments enabled Toyota Motor Corporation to compete with American and European manufacturers on the basis of costs, quality and variety, although their facilities and capabilities were smaller than their competitors. The TPS was documented for the first time in 1990 by Womack, Jones and Rice and became known as Lean Production, which was adopted early on by western companies like Harley Davidson and General Electric.
Booz, Allen and Hamilton (2002:2) note that having been initially developed as a Toyota Production system, Lean manufacturing has followed three development phases over the last four decades. They are as follows.

**Lean Phase 1:** The early philosophy focused solely on production and concentrated on three sub-principles:

- Embedding quality assurance into the manufacturing processes rather than inspections at the end of production;
- Stabilizing production to minimize the variability caused by the production system;
- Reducing waste and increasing awareness to minimize overstocking of inventory and low value activity.

**Lean Phase 2:** The introduction of Lean principles resulted in a set of five sub-principles:

- Reduce cost drivers not cost buckets;
- Focus on improving quality, speed and cost in a collaborative manner, since quality and speed improvements leads to greater cost reduction than focusing on cost alone;
- Empower frontline staff with ownership of work to ensure Lean production is realized;
- Manage processes from start to finish realizing benefits;
- Eliminate complexity of product design and product footprint by starting at the structural level.
**Lean Phase 3:** Following on the work of leading Lean manufacturing companies a third Lean phase emerged that dealt with all the principles and sub-principles combining three main factors:

- Product architecture that facilitates managing structural complexity, which enables balancing cost and variety by focusing on the commonalities in many products: this enables product architecture to be developed;
- Decision rights architecture that drives speed, quality and costs, involving a complete review of decision making in terms of who can make decisions at what levels to enable effective decision making;
- Technological architecture to develop the process to support product and decision architecture.

During the 1950s and 1960s American vehicle manufacturers like Ford and General Motors completely dominated the world market through their ability to successfully access markets and use their core competence to establish dealer networks. What further strengthened these American giants in the global market was the opening of production plants in foreign countries (Womack, J.N.D).

The Japanese, who were meanwhile studying mass production, realized their capabilities were limited and faced various constraints compared with their American rivals. The development of the Toyota Production System resulted in a Japanese competitive advantage in the automotive industry globally (Womack, J.N.D).
Black and Hunter’s fourth and last revolution was Computer Integrated Manufacturing. The introduction of low cost high performance computers enabled companies to design, produce and deliver a product with minimal labour costs being incurred throughout the process. Combining the efforts of geographically dispersed teams facilitates design and simulates the manufacture and assembly of products prior to the initial ordering of components. This includes the design and assembly of the manufacturing process and equipment preceding designing and building the actual factory. This results in considerable cost reduction as it allows for perfect product and production design including quality and reduced factory size, which further reduces production overheads (Black and Hunter, 2003: 2-8).

To assist the Toyota Motor Corporation the Japanese government decided to restrict foreign direct investment in its automotive sector in a bid to allow Toyota a growth opportunity in the car making business, considering the economic challenges that faced the country during the late 1940s.

The Toyota Motor Corporation struck a historic compromise with its workforce and union at the time, resulting in retrenchment of a quarter of its workforce. The remaining staff was guaranteed lifetime employment and steeply graded pay by seniority rather than specific job function, and bonus payments were linked to company profitability.

In return Toyota workers agreed to be flexible in work assignments and to actively promote the interests of the company through
suggesting and implementing improvements. The impact of this historic agreement brought Ohno to the realization that with employees guaranteed lifelong employment they had in effect become a major fixed cost. It therefore made sense to continuously improve their skills and reap the benefits of their knowledge and experience (Womack, Jones and Rice, 1990:55).

In summary, while Lean manufacturing is linked to the Toyota production system, the methodology and concept were in existence long before the Toyota Production System was conceived. In a real sense, the TPS could be said to have been born from studying, reviewing and analyzing the production systems that existed when the Ford Production System was paramount. The Japanese then introduced improved production methodologies that were congruent with the economic and resource constraints faced by their organization and broader society at the time. Since then the Lean concept has undergone several developmental phases.

2.2 WHAT IS LEAN
According to Papadopoulou and Ozbayrak (2005:786), it was Krafcik who first came up with the name “Lean” in 1988. Krafcik was a quality engineer at a Toyota-General Motors joint venture plant in California. Krafcik used the term to describe a production system that has the ability to produce better quality and quantity with fewer resources than the traditional mass production philosophy (Papadopoulou and Ozbayrak, 2005: 786).
Although Krafck eventually named the process Lean in the late 1980s, the Lean concept evolved from various management sciences. According to Strategos (2002), Lean manufacturing dates back to 1799 when Eli Whitney was awarded a US army contract to manufacture 10,000 muskets and he developed the concept of interchangeable parts in an assembly line.

Lean manufacturing is a major shift from traditional manufacturing practice as outlined in the history and background of Lean. These differences are rooted in the principles and philosophies of Lean thinking and practice. Many people still struggle with a clear definition of exactly what Lean is. In defining Lean there are divergent views among many scholars and practitioners. The difference in methodology becomes irrelevant, however, since the overriding factor remains the elimination of waste or non-value adding activities.

Shah and Ward (2003:129-132) define Lean manufacturing as a combination of practices that includes JIT, quality systems, work teams, cellular manufacturing, supplier management and related practices to achieve a framework of manufacturing systems that produce high quality finished goods that meet customers' demands.

Iowa (2008) defines Lean as a collection of principles, methods and tools that improve the speed and efficiency of any process by eliminating waste. Although Lean was conceptualised in Toyota’s manufacturing process as the Toyota Production System, the various tools have successfully been applied in organizations across sectors internationally. Although the principles of Lean as a management
philosophy were originally developed for use in the private sector with a specific emphasis on manufacturing processes, there has been a steady migration of the philosophy to services and administrative processes with tangible benefits.

Karlsson and Ahlstrom (1996:25) affirm that Lean is not confined to the physical manufacturing process, but includes product development, procurement and distribution.

Solotorow and Banks (2006) define Lean as a philosophy that consistently applies specific tools and methods in a disciplined and systematic manner to eliminate waste and improve operational effectiveness, including finding the smoothest possible flow of work. The main focus is to determine the value of a given process by distinguishing value-added steps from non-value-added steps and eliminating waste.

This view is strongly supported by Bhasin and Burcher (2005) who see Lean philosophy as a journey. If Lean is viewed simply as a tactic or a process, then it could be construed as being applied to achieve an outcome rather than a mindset shift that influences how one looks at the entire business process. Lean is an enabler to gather and align several change initiatives running through a business in a coherent manner, and it has the potential to resolve serious organizational challenges.

The Lean approach views any process as a critical number of steps used to identify value to the customer by removing waste, increasing
flow, improving quality and reducing variation. Solotorow and Banks (2006:1) maintain that Lean is not a manufacturing tactic or a cost reduction program. It is certainly not a staff and equipment reduction tool, or a short term solution; rather, it is a strategic journey during which organizations can realize sustainable improvements to their operational and financial performance and many other areas.

Womack and Jones (1996:37-49) describe the concept of value as the elements of a particular product or service that add value to the customer at a specific time and place. It is ultimately the customer who has to pay for all the processes and the transportation of the product purchased. With the current free flow of not only goods and services, but also people and information, customers are much more informed. The result is increased pressure on corporations to produce products that eliminate waste and add value to the consumer.

According to Womack and Jones (1996:15), the Lean philosophy provides a way to specify value by lining up value creating actions in a sequence that facilitates conducting these activities without interruption whenever someone requests them, and performs them with increasing effectiveness. The philosophy is referred to as Lean because it searches for the best possible way of performing a task, resulting in more being done with less human effort, less equipment, less time and less space, while coming ever closer to providing customers with exactly what they want. Lean also creates working methods that provide more staff satisfaction and encourage feedback on efforts to convert waste to value.
Supporting the position of Womack and Jones, Venkant and Wakeland (2006) view Lean thinking as a systematic approach to enhance business processes with the view to doing more with less while coming as close as possible to meeting customer expectations. Currently, Lean thinking is the dominant paradigm in manufacturing because it provides a way to specify value, determines the best sequence for value creating steps and performs these activities without interruption when a customer requests them, while continuously improving the process.

Womack and Jones (1996:15) add that Lean thinking creates new work as opposed to simply destroying jobs in the name of efficiency.

Iowa (2008) mentions that the Lean philosophy and tools can be applied to any process where the employee encounters the following:

- Chases information to complete a task;
- Must go through multiple decision stages;
- Is constantly interrupted when trying to complete a task;
- Is engaged in expediting reports, purchases, material, etc;
- Does work in batches;
- Does not know what s/he does not know.

The Lean system is a free flow system and therefore a Lean manufacturer is continuously improving with the following in mind:
• Lean is a dynamic process of change driven by a systematic set of principles and best practice aimed at continuous improvement;
• Lean refers to the total enterprise from the shop floor to the executive suite, and from the supplier throughout the entire value chain of the organization;
• Lean demands the rooting out of everything that is non-value adding;
• Becoming Lean is a complex process which requires a holistic approach as opposed to focusing on a specific area in an organization.

In summary Lean is a philosophy that applies a broad set of tools holistically and congruently within an organization cutting across all divisions and management levels consistently and systematically to ultimately improve the operational effectiveness and meet customer expectations by eliminating waste. Lean thus creates value in the business processes while simultaneously reducing or eliminating non-value adding activities or processes.

It is a journey through which an organization can achieve sustainable improvements with significant cost savings that can greatly improve profitability. Lean philosophy applies a methodology that views the business as the sum of all its parts before paying specific attention to any particular area of the business. Lean provides a practical guide for aligning a business and all its parts and in particular, guides the way an organization thinks and behaves so that the overriding culture becomes one of excellence, and waste the number one enemy.
Rooney and Rooney (2005:47) define waste as an activity that consumes resources and does not necessarily add value to the product or service for clients. (Bicheno and Holweg, 2009:20). But consider:

- Waste elimination is but a means to achieving the Lean ideal and should not be seen as an end in itself;

- Waste prevention is as important as waste elimination;

- Value is the opposite of waste, and the organization should continually strive to improve the ratio of value adding to non-value adding activities. There are two ways to achieve an increased ratio - by preventing and reducing waste and also by specifically pursuing value enhancement.

According to Bicheno and Holweg (2009:20), waste reduction is not the same as cost reduction. Waste can be reduced with zero impact on cost: to translate waste reduction into cost reduction requires follow up action, for example, improving flow or increasing sales (Bicheno and Holweg, 2009:20). Taichi Ohno, founder of the Toyota Production System, JIT and Lean, originally assembled the seven wastes, Deming emphasised waste reduction in Japan in the 1950s (Bicheno and Holweg, 2009:20).

(Jones and Hines, 1997:155 note that Ohno demonstrated that a consistent and systematic focus on reducing waste will inevitably reduce poor performance within the organization. Ohno identified
seven fundamental forms of waste. The seven wastes can be remembered by asking, ‘Who is TIM WOOD?’ Answer:

- Transport
- Inventory
- Motion
- Waiting
- Over-processing
- Over production
- Defects

2.3 LEAN TOOLS

The perfect Lean factory produces on request in other words, there is perfect equilibrium between supply and demand. Consequently, the customer waits for delivery. The system caters for greater product variety, as individual customer demand drives the production process. This results in zero inventories of materials between the various stages of the value chain.

Within the Lean factory the ultimate outcome is a state of continuous flow which requires numerous Lean tools. The tools are discussed in detail below.

2.3.1 Single-piece flow

Production within Lean manufacturing comprises stations physically placed to represent the sequence in which a part is produced. The
layout enables parts to be produced individually and moved along in the production process from one step to the next. Consequently, taking inventory between production stages is eliminated, with defects being detected before an entire batch of defective parts has been made (Russell and Taylor, 2003:517).

2.3.2 Pull Scheduling
Within a "pull" system team members at a workstation take only those parts they need for processing from the previous work station. This serves as a signal to the previous workstation to manufacture enough to replenish the number of parts that were taken, and no more than required (Russell and Taylor, 2003:517). With no comprehensive scheduling system, the work station operates in a synchronized manner.

2.3.3 Quick set-ups
Russell and Taylor (2003:523) emphasize that a Lean environment requires an ability to change setups quickly because of the small batch and mix model dynamics at play.

2.3.4 Standard work
The concept of standard worksheets was developed by Ohno. The standard worksheet records the tasks required to perform an operation (Russell and Taylor, 2003:514). Workers should complete these in a manner that can be understood by everybody.

Imai (1997:51) indicates that the normal day to day business practices work in accordance with certain defined formulas which
when written down clearly, become standards. Plunkett and Attner (1997:496) define a standard as "any guideline or benchmark established as the basis for measurement of capacity, quantity, content, value, cost, quality, or performance" that sets the explicit expected result and serves as a mechanism to prevent and detect unacceptable deviations from the plan.

Standards serve as specific guides, but allow enough room for flexibility, providing greater involvement to workers by allowing them to change processes, rather than requiring industrial engineers to improve the standards. This allows workers to continually redesign their own jobs, which instills pride, innovation and continuous improvement.

According to Bicheno and Pieterse (2008:96), within the service industry standards play an empowerment role rather than being restrictive. The greatest standard is the one that is so effective that performing a task in any other way would just be plain silly.

Imai (1997:51) emphasizes that in the event of a mistake on the shop floor - whether it results in a poor quality product or a disgruntled customer - management must find the root cause, take corrective action and change the working procedure to eliminate the problem if at all possible.

Bicheno and Pieterse (2008:98) highlight three key aspects of standard work that need to be understood:
• Standard work should never become static: as soon as a better way to perform tasks is identified, the procedure should change;
• Variation is reduced by standard work while supporting stability, since a task is carried out in the same way over and over;
• Continuous improvement is a crucial aspect of standard work, since it enables workers to work from a base standard to a better standard.

2.3.5 Quality at the source
Within the Lean manufacturing factory every point in the production process bears the responsibility for producing products or services free of defects. This sharply contrasts with the mass production philosophy where comprehensive quality inspections take place only at the end of the production line, at which point huge quantities of defect products may have been produced.

The TPS gives workers the authority to stop the line whenever a defect is detected. This practice is referred to as “Jidoka” in Japanese (Russell and Taylor, 2003:527). In the event of the line being stopped, engineers, supervisors and maintenance staff gather on the line to solve the problem and deal with its root cause.

Workers are granted additional time during the day to investigate problems and perform basic maintenance, housekeeping and planning functions. To further support the principal of quality at source, a philosophy of continuous improvement, or “Kaizen”, and
full employee involvement in the continuous improvement process is required (Russell and Taylor, 2003:527).

### 2.3.6 Flexible resources

Lean manufacturing requires adaptable, multi-purpose machines that can manufacture parts in small quantities. The machines should be able to move around to areas where they are needed, within shaped manufacturing cells (Russell and Taylor, 2003:512).

This production method effectively reduces waste in the form of inventory or scrap. A flexible workforce that can perform and operate more than one function or machine at a time is a requirement of a Lean manufacturing environment (Russell and Taylor, 2003:512). Flexibility results in the optimal utilization of labour as workers do not stand idle between processes, which is a common occurrence in mass production.

To enable worker flexibility within the Lean environment, it is necessary for workers to be multi-skilled. This is achieved through comprehensive training. Knowledge of the training status of each worker allows workers to be moved between functions to suit the workload without affecting quality in a negative manner.

### 2.3.7 Kanban

Lean manufacturing uses a card or “Kanban” system to control work in progress, the flow of inventory, and production in the plant. Todd (1965:64) notes that Kanban was developed by Toyota during the
early stages of the JIT improvement process of the Toyota Production System. In the “pull” system, every Kanban card represents a standard new supply trigger, which is the release of a re-ordering card sent directly to the supply point, authorizing the production and movement of parts in the factory (Russell and Taylor, 2003:518).

The use of Kanban is not restricted to the factory: it is used in ordering material from suppliers. The supplier delivers a filled container where required at the factory and the empty container is collected as a Kanban for replenishment (Russell and Taylor, 2003:520).

According to Todd (1995:65), following the introduction of Kanban, a number of variants was developed:

- The two card Kanban system where the user releases a card that indicates to the store to replenish material to the user. The store removes a second card, which is then attached to the container, which is sent to the supplier to approve the production and delivery of another batch of standard quality materials;
- The one card Kanban system operates similarly to the two card system, except that the one card serves a dual purpose: it is both the move and produces enabler, and is used when the supply point is close to the user point;
- The container-based Kanban system uses a predetermined number of pallets or containers that are uniquely linked to a
particular type of part or component to enable the empty container to be filled with these parts;

- The shelf-space Kanban system determines the maximum and minimum number per pigeon hole. When the minimum quantity is reached it indicates that more should be added;
- The floor grid Kanban system works similarly to the shelf-space Kanban system, but it is used for bulky or heavy components.

### 2.3.8 Cellular layout

Cellular layout involves placing equipment in a U-shaped layout dedicated to producing similar parts in a manufacturing cell (Russell and Taylor, 2003:514). The processes and equipment are arranged to facilitate the free flow of materials and components through the production process with the minimum amount of transport or delay.

For a manufacturer to successfully utilise a manufacturing cell, the following conditions have to be established:

- Sufficient volumes of a product family must exist;
- Dedicated and moveable small equipment must be available;
- Flexible, cross trainable staff must be available.

Operators may be required to load or unload pieces at the start or end of a process, but would otherwise be freed up to implement process improvements. Using a cellular layout enables flexibility of
production capacity to either increase or decrease by adding or removing production cells.

Cellular manufacturing reduces the distance and travel time to obtain parts. This results in an improvement in the flow of parts because single-piece flow is achieved. Work in progress levels are reduced to a minimum, machine utilization and delivery time accuracy are increased and quality feedback is immediate.

Todd (1995:273) describes cellular manufacturing as the grouping of manufacturing facilities into a production cell, in order to produce a family of parts requiring a similar sequence of processes. The origins of cellular manufacturing stem from converting job work to a semi-flow production line by identifying those parts requiring similar processes. Cellular manufacturing began in the machine tool based manufacturing process, yet it is applicable to any organization with a production process.

Staff within a cellular layout is skilled to operate all the equipment within the cell and take responsibility for its output. There are a number of advantages to this layout, which include faster process time, less work in progress and less material handling, which all reduce overall production cost.

Employees, by virtue of being responsible for output, take ownership of their work and are motivated by the training and multi-skilling that takes place, as it enriches and enlarges their jobs.
Todd (1995:274) indicates that cellular manufacturing is a product orientated layout with similar material allocated to a cell. This provides the types of equipment within the most efficient sequence of processing required to manufacture the products while keeping the flow and set-up changes to a minimum. The actual tasks involved in planning and introducing cellular manufacturing are dependent on the manufacturing processes involved. There are five stages involved in the cellular manufacturing planning process.

- Stage 1 – product quantity analysis, volumes and target
- Stage 2 – process route analysis, process steps and times
- Stage 3 – product analysis into cell grouping
- Stage 4 – layout planning
- Stage 5 – control system planning.

### 2.3.9 5S

The 5S program is a basic housekeeping approach which facilitates greater productivity: it focuses on improving housekeeping and quality and safety in all business types. The 5S particularly emphasises visual order, organization, cleanliness and standardization (Hudgik, 2008).

Imai (1997:21) notes that 5S comprises five Japanese words that have become an integral part of any manufacturing organization.
According to Pieterse (2007:63), the five words are associated with the implementation of Lean tools. They are Seiri, Seiton, Seiso, Seiketsu and Shitsuke, which can be translated as sorting, straightening, sweeping, scheduling and sustaining.

Bicheno and Pieterse (2008:51) argue that 5S is the most popular tool in Lean as it is easy to implement and generally has a positive impact on quality and productivity. Bicheno and Pieterse (2008:51) note that 5S requires a mindset change, since it focuses on changing the mindsets of staff from working in an untidy office to working in an organized, clean office, where everyone knows where everything is and any out of place or missing items are noticed immediately.

It is further suggested that the real objective of 5S is to reduce waste and variation and improve productivity. Below follows a brief description of the five 5S Japanese words.

**2.3.9.1. Seiri (Sorting)**

The first step is sorting what is needed from what is not needed. That which is of no value and is not needed is discarded. In so doing, clutter is reduced and all those unwanted, unnecessary and unrelated materials that are disposed of free up space. The result is the ease of finding needed items, and space for work related items.

Items to be used during the day and items used at regular intervals should be kept close for ease of use. This reduces time wasted. The
result of Seri is simplified space, which is effectively utilized and facilitates purchasing items in greater economic quantities (The 5 ‘S’ process, 2004).

2.3.9.2. Seiton (Straightening)
Seiton is about enhancing efficiency. This step comprises putting all that is needed in a specific area so it can be accessed or retrieved quickly. The faster an item can be accessed, the greater the flow of work. Employees become more efficient and productivity is increased resulting in greater output with less effort and resources. Every item must be marked and its location labeled for easy identification (The 5 ‘S’ process, 2004).

2.3.9.3. Selso (Sweep)
This step turns every employee into a cleaner. Cleaning the work area regularly results in a clean workplace in a very short space of time (The 5 ‘S’ process, 2004). Cleaning must be done by all employees at all levels of the organization from operators to managers. The best way of managing this process is to assign each area in the workplace to a person or group of persons to clean. No area should be left unclean. All employees should perceive the workplace through the eyes of a visitor and be in a position to judge whether or not the workplace is clean enough to make a positive impression on the visitor (The 5 ‘S’ process, 2004).

Bicheno and Pieterse (2009:79) emphasize that physical tidying up should occur on an ongoing basis: team members should always be looking out for anything that is out of place and strive for immediate correction. Some companies have developed a five minute clean up
routine for each day of the week so that by week end the result is a clean workplace (Bcheno and Pieterse, 2009:79).

2.3.9.4. Seiketsu (Scheduling)
Seiketsu is the fourth step of the 5S program and is characterized by the standards with which staff measure and maintain cleanliness. Seiketsu includes both personal and environmental cleanliness, automatically resulting in a clean workplace. Every person accepts responsibility for keeping his/her individual area of work clean and collectively dealing with common areas.

Visual management is an important aspect of Seiketsu. Colour-coding of surroundings facilitates the immediate visual identification of non-conformance in the surroundings. Staffs are trained to detect non-conformance using their five senses and to correct such non-conformance immediately (The 5 'S' process, 2004).

2.3.9.5. Shitsuke (Sustaining)
Shitsuke is the last step of the 5S program. The step indicates a commitment to maintain order and to practice the principles of 5S as a way of conducting daily tasks. Shitsuke’s emphasis is on changing bad habits and continually practicing good and acceptable habits.

It should become a common occurrence that employees consistently maintain orderliness and cleanliness: orderliness and cleanliness should not only be practiced when an audit occurs, or senior management visits a site: they should be the result of disciplined
staff. True Shitsuke is achieved when staff voluntarily observe cleanliness and orderliness at all times, without having to be reminded by management to do so (The 5 ‘S’ process, 2004).

Pieterse (2007:64) prescribes the following as an implementation plan for 5S:

- **Step 1:** Form, train and develop 5S grading/recognition teams. Setting standards is the responsibility of the grading team, who will assess progress. The results will then be visually displayed to all staff;

- **Step 2:** Develop a 5S model that will serve as a guide to the remainder of employees. Before and after photos will motivate other departments;

- **Step 3:** Top management to implement the 5S initiative. Emphasis should be placed on the importance of the program and how it will improve quality and productivity;

- **Step 4:** Training of staff. Training needs to include the lowest levels in the organization, both teams and individuals;

Implementing the 5S program can be achieved in many different ways. A number of companies find the Plan, Do, Check and Action (PDCA) approach to be the most effective. It is important to take note of the company’s health and safety policies with regard to waste disposal when implementing the 5S program (Pieterse. 2007:64).
Bicheno and Holweg (2009:21) note that the least recognized aspect of the 5S concept is that it can be powerfully applied to information and information flow. It can be used to sort and simplify information transactions that flow in the organization, for example, the flow of emails, and to establish rules about copying recipients on emails and when to expect answers. More importantly, it can be used to examine decision making processes in terms of what minimum information is required for planning, scheduling, ordering, invoicing, staffing and recruiting (Bicheno and Holweg, 2009:81).

5S overlaps with Lean Accounting, as opposed to Accounting for Lean, and with A3, but goes far beyond, resulting in savings and streamlining that often make physical 5S seem trivial. Sorting should not be limited to wasted communication, but should include a time accuracy tradeoff resulting in simplification to identify the best means of communication (Bicheno and Holweg, 2009:81).

2.3.10 Automation

Machines are equipped with error-proofing or “Poka Yoke” (Failure Prevention) devices that not only detect errors but prevent an error or wrong action from occurring (Russell and Taylor, 2003:527). “Jidoka” (Automation) is a term derived from the Toyota Production System that describes a level of automation where the production process is immediately stopped in the event of a defective or non-conforming condition occurring.

While there are various definitions for example, autonomination or automation with a human interface, its roots are from Sakichi
To yod a, who was responsible for inventing a simple mechanism that detected a broken thread and shut off an automatic loom. Due to the controlling of an abnormal condition the concept flourished as defects were identified early on in the manufacturing process (Sugimori, Kusunoki, Cho and Uchikawa, 1977:554).

2.3.11 **Total Productive Maintenance (TPM)**
The breakdown of machines in a Lean factory cannot be afforded, as the line is brought to a standstill. TPM originates from Japan and was developed by Nakajima. TPM is concerned with eliminating machine downtime by fostering a partnership between operators, engineers, technicians and suppliers. The first line of maintenance staff are the operators: they attend to daily issues, for example, cleaning, adjustments, lubrication and minor part changes (Chaneski, 2002:46).

TPM is proactive and applies a team approach focusing on shop floor conditions. Production staffs who operate equipment daily are trained to diagnose technical problems and are enabled to solve less complicated problems (Russell and Taylor, 2003:529).

TPM results in a cleaner and more organized work environment. Equipment operators can solve minor problems themselves, while the maintenance staff focuses their time and energies on establishing the root cause of breakdowns to prevent them from recurring.
Ahuja and Khamba (2007:340) describe TPM as considering and involving everyone throughout the factory from the top down, it minimizes interruption to production, and provides a degree of autonomy and ownership to production staff to perform maintenance.

According to Pycraft, Signh, Phihlela, Slack, Chamber, Harland, Harrison and Johnson (1997:717), TPM aspires to establish good maintenance practice in operations through the pursuit of five goals:

- Improving equipment effectiveness through examining all losses that occur;
- Allowing machine operators to take responsibility for certain of the maintenance tasks, and encouraging maintenance staff to take responsibility for improving performance, resulting in autonomous maintenance;
- Facilitating a maintenance plan with a fully worked out approach to all maintenance tasks;
- Equipping all staff with required maintenance skills, while focusing on job related and continuous training;
- Attaining early equipment management which is directed at getting to the point where maintenance can be prevented.

2.3.12 Mixed modelling

The purpose of mixed modeling (Russell and Taylor, 2003:526) is to match production and demand by employing a regularized schedule that prioritises popular products. The process requires even smaller batch sizes. For the process to work effectively, parts have to be supplied to the assembly line in the order in which the products are produced.
2.3.13 Continuous improvement

Coupled with a strong Lean culture, is the Lean organization’s ability to continuously improve. This involves the overall improvement of factory performance through many small incremental steps. As noted earlier, the process is referred to as “Kaizen” in Japanese and requires the involvement of everyone (Russell and Taylor, 2003:525).

By consistently meeting customer expectations and requirements, organizations delight the customer and achieve a reputation for excellence. However, attaining quality can only be realized through the intervention of continuous improvement and teamwork.

Heizer and Render (2001:174) explain continuous improvement as a never ending process within TPM that includes, people, equipment, suppliers, materials and procedures. The Plan, Do, Check, Act cycle (PDAC) (Heizer and Render 2001:174) emphasizes the continually improving nature of the process.

PDCA requires interrogating the workings of an operation on a continuous basis. The process uses the universally accepted PDAC cycle as depicted in figure 2.1.
The current method being used is initially studied in the Plan stage. The Do stage is when a plan of action is implemented. The Check stage primarily evaluates the effectiveness of the implemented solution. The Act stage is where the solution that has been implemented is standardised if the preceding three steps were successful. Otherwise the steps are repeated.

Ehrlich (2006:43) states that an organization’s ability to eliminate waste by delivering the customer’s demand as fast as possible is the cornerstone of Lean service. This is accomplished through identifying value flow, which means servicing a single client at a time from start to finish, thus avoiding the waste of work in progress inventories. When waste elimination is achieved and the order to
Cash cycle is reduced, profit margins and cash flow becomes greater (Ehrlich, 2006:43).

Pycraft et al (1997:665) emphasize that improvement is small, continuous and incremental. The size and nature of each step is not the overriding factor, but rather that there will be consistent and continuous improvement.

According to Cole (2001:8), the importance of continuous improvement is about renewing the organization and preventing it from becoming inflexible and complacent. The following benefits associated with continuous improvement are highlighted:

- Continuous improvement mobilizes a greater number of employees rather than a select few with expert knowledge;
- A range of smaller victories normally precedes large changes. These create space for the large changes by providing impetus and basic learning, while limiting constraints for optimizing new processes and products;
- The majority of the major changes can be traced back to initial smaller victories;
- Small victories rooted in daily work routines encourage learning, since they are rooted in current best practice;
- The fact that these small victories are based on tacit knowledge makes it hard for them to be noticed or traced by competitors.
2.3.14 Uniform production levels
The production system should be leveled for the Kanban pull system to operate effectively. By implication the production volume and mix equalizes over time (Russell and Taylor, 2003:525). Level scheduling is referred to as “Heijunka” in Japanese: smaller batch production is the norm, resulting in a significant reduction in work in progress which reduces inventory.

The result is an overall improvement in the rhythm and consistency of production and simpler production planning and control. Control improves transparency as visibility is enhanced to all involved, including upstream suppliers.

2.3.15 Can you go too far on waste reduction?
The Lean practitioner will respond “No” to this question. This response is not incorrect provided that the bigger picture in terms of Lean outcomes is kept in mind. Consider the following:

- For over thirty years Henry Ford drove out waste on the Model T production line. Cars have never been produced as efficiently since. Notwithstanding, customer dissatisfaction forced abandoning the line to less efficient mass production;

- The best way to do the high jump forty years ago was applying the ‘western roll’, until the Olympic rules changed and Dick Fosbury, a physics student, recognised the opportunity created by allowing athletes to land on airbags. He developed the Fosbury Flop, and ever since it became the only way to improve the world record. One could continue improving the
western roll, driving up the maximum height achieved by that method, but one would never win the Olympic title. This example aptly illustrates how focusing on the wrong method could result in doing the wrong thing perfectly.

Therefore waste reduction should always be seen as an essential part of innovation as both are necessary for an improved outcome (Bicheno and Holweg, 2009:27).

2.3.16 Gemba and ‘Learning to See’
This whole philosophy can best be captured by “Gemba” (Bicheno and Holweg, 2009:27). According to Bicheno and Holweg (2009:27), “Gemba” is the place of action, but it is often not necessarily referring to the workplace. This Japanese word is more significant now than when Taichi Ohno, the legendary Toyota engineer, said that management begins at the workplace.

When Gemba is contrasted with the traditional Western way, it is to go to the place of action and find the facts. The traditional Western management method is to remain in the office and discuss opinions. In contrast, Gemba is about going to the place of action and finding the facts. Go to the actual workplace, look at the actual process, observe what is actually happening and collect the actual data. Gemba is also about learning to see in your approach to work, which requires you to question what you observe:

- Is it really of any benefit to keep everything under lock and key and at remote locations?
- Is it really necessary to fill in all forms?
• Why are customers asked to sign next to the x agreeing to all the conditions when reading them will take half an hour?

• Can customers wait in more comfortable situations? Why should they wait in line? Can they not be called when needed?

• Why are there interruptions in the middle of the process inducing start-up losses?

• Rather than experiencing a ‘near miss’, put preventative measures in place.

• Is a one stop procedure possible?

• Has the root cause of a problem been identified? Instead of patching the problem ask if the problem can be eliminated?

Bicheno and Holweg (2009:28) point out that none of these questions can be answered effectively by managers sitting at their desks: a questioning culture is only possible if one uses Gemba. Gemba breaks away from the culture of ‘It’s not my problem’ and the attitude ‘I only work here’. It is the failure of management if employees have these attitudes (Bicheno and Holweg, 2009:28).

Under Gemba, employees are empowered to make immediate improvements: if a problem is encountered, or a decision needs to be made, it is advisable to consult Gemba first, since trying to solve a problem away from the workplace may result in the problem lingering. Taichi Ohno was famous for his chalk circle approach: he would draw a chalk circle on the factory floor and require a manager to spend several hours in it observing operations, noticing variations and taking note of wastes. The West too has devotees. John
Sainsbury, who ran the supermarket chain, could pass a shelf and see a wrong price at a glance. His retirement may account for the decline of this once great chain (Bicheno and Holweg, 2009:28).

An open plan office with senior management sitting right there embodies Gemba. Gemba should be part of implementation. Most of the time the Western way is based on change agents, simulation, computer information systems and classroom based education. These all have a place, but Gemba emphasises implementation by everyone in the workplace face to face, based on in-depth knowledge, low cost and no cost solutions rather than big-scale expensive information technology solutions (Bicheno and Holweg, 2009:28).

According to Bicheno and Holweg (2009:28), Gemba is not Japanese-based; they learned it from the Americans pioneered by the famous Hawthorne experiments at General Electric in the 1930s. One study investigated the effects of different levels of lighting on productivity. It was initially thought that increased lighting resulted in increased productivity; however, when the lighting was reduced productivity did not reduce. What actually happened is that workers responded to the interest being taken in them by the researchers. This became known as the Hawthorne effect. The west, however, promptly forgot the lesson and the Japanese adopted it. Management is thus advised not to sit in the office looking at spread sheets, imagining that this is improving productivity. Instead, they are advised to use Gemba and learn to anticipate problems (Bicheno and Holweg, 2009:28).
3. CHAPTER 3

3.1 INTRODUCTION

In chapter 1 the researcher provided the reader with an introduction to the research topic. The main research problem and its sub problems were explained, including key concepts. The chapter outlined the research methodology and structure of the study.

Chapter 2 provided the reader with an overview of Lean as a management philosophy and explained the various Lean tools applied in manufacturing. The key concepts and applications of Lean and its successes were described with an emphasis on its focus on value adding and waste removal, which results in greater customer satisfaction and more cost effective production methods.

The researcher was greatly assisted by doing an analysis of the operational approach of the depot. This analysis created an understanding of its state and assisted in choosing areas to use in the empirical study. Grindrod Intermodal operates container depots in Johannesburg, Cape Town, Durban and Port Elizabeth.

The focus of this chapter is the operations of the Grindrod Intermodal container depot in Stanbridge Road Deal Party, Port Elizabeth. The study covered all functional areas of the depot operation with a view to identifying areas where waste can be turned to value by applying Lean principles.
3.2 ORGANIZATIONAL BACKGROUND
The selected organization is part of the Grindrod Group of companies, a diversified shipping, freight, trading and financial services group. The depot service offering is part of the Grindrod Freight Services Division, which encompasses a major share of local ships agencies and sea and land freight logistics. The land based operations in Southern Africa focus on dry and liquid bulk terminals, intermodal solutions and all facets of traditional and specialized logistics (Grindrod, 2012).

The container depot in Stanbridge Road is part of Grindrod Intermodal, a Division of Grindrod SA (PTY) (LTD). Grindrod Intermodal was a consolidation of four different companies, namely, Cross Country Containers, CMC Grindrod, Grindrod J&J Logistics and Unitainer. While the history of Grindrod Intermodal is composed from the histories of these four entities, the researcher’s intention was to delineate the history of the depot, focusing on its current and future operations (Grindrod, 2012).

CMC Grindrod, the depot component of the four entities that merged to Become Grindrod Intermodal, started in 1992 with a single depot in Edwin Swales Drive, Durban. Richard Foulds owned the business which was originally named Confreight Cargo Management Centre. Confreight offered warehousing and a bond store, and shortly after 1992 established a depot in Gauteng (Grindrod, 2012).

In 2001 Grindrod Container Services entered discussions with Confreight Cargo Management Centre with the view to rationalizing
operations in Natal and Gauteng, and exploring expansion into the Eastern and Western Cape to establish a national brand. The two companies entered a joint venture and the name was changed to CMC Grindrod to reflect this partnership (Grindrod, 2012).

The partnership continued until January 2007 when Grindrod Intermodal took full control of depot operations and all CMC Grindrod depots were incorporated under the depot division of the new entity. Since its independence as Grindrod Intermodal, the depot has faced competition from privately operated depots. This has placed considerable pressure on the depot’s ability to compete, given the impact of the global financial crisis on trade worldwide. Since the container industry is intricately linked to global trade, the supply and demand for containers to and from a depot is driven by global demand for South African exports and the ability of South African consumers and industry to import globally (Grindrod, 2012).

Since 2008 the depot has dealt well with its various challenges and has operated profitably since 2009. Grindrod Intermodal container depot in Stanbridge Road Deal Party is currently the market leader in depot services and is the only depot out of four in Port Elizabeth that offers full and empty container storage and handling and all repairs, including major repairs. No depot in Port Elizabeth has the capacity to do major structural repairs to containers: this is a big competitive advantage.
3.3 OPERATING ENVIRONMENT

The most important aspect of the depot operations is the environment, since the external environment greatly impacts these operations. Laudon and Laudon (2003:96) refer to Porter's competitive forces model to illustrate the number of external threats and opportunities a firm faces. There are five forces that impact a firm:

- The threat of new entrants to the market;
- The pressure from substitute products or markets;
- The bargaining power of customers;
- The bargaining power of suppliers;
- The positioning of traditional industry competitors.

The threat of new entrants to the market is constant and ever present. It is, however, quite expensive to set up a depot: the cost of land and equipment and sourcing experienced staff are major challenges. These challenges are a barrier to entry into the industry, however it is not impossible for smaller operators to enter the market if they have land available and use second hand equipment.

In the case of depot business there is no substitute product: the service is the storage and repair of containers. Whoever provides good quality at reasonable prices will have an advantage over competitors.
The bargaining power of customers in the industry is significant: the customer base is no more than five major clients and none of them uses a specific depot exclusively. The result is that individual depots have limited bargaining power over the shipping lines that are the depots’ dominant customers. Smaller sales and leasing and private customers have no significant power over the depot as their business constitutes less than five percent of depot business. This places great pressure on the depot to remain competitive and meet the demands of clients.

The bargaining powers of suppliers vary according to the different inputs required by the depot. The depot has limited control over facilities, equipment and material and is in the position where suppliers are more dominant than the depot. A case in point is the cost of diesel and spares for containers, which is mainly imported. The prices of these products are set internationally in Dollar terms. This puts pressure on depot margins as price is largely influenced by the exchange rate over which the depot has no control.

The position of major industry players is much the same as Grindrod Intermodal. There is currently no particular competitor that has an outstanding competitive advantage. In fact, from a capacity point of view with regard to facilities, human capital and equipment, Grindrod Intermodal has the competitive advantage in the market.

According to Lauden and Lauden (2003:96), a firm may gain a competitive advantage by enhancing its ability to deal with customers, suppliers, substitute products and services, and new
entrants to the market, which could change the balance of power in favour of a particular firm.

3.4 ORGANIZATIONAL STRUCTURE
The depot’s organizational structure is a typical command structure. The depot is managed by a business unit manager reporting to the regional manager. The various sections within the depot have team leaders or supervisors reporting to the business unit manager and staff reporting to them. The depot operates from 7:30 to 17:00 and during fruit export season - April to September - a dual shift is operated and the depot is open until 22:00. The Depot is also open at the request of customers on a Saturday and Sunday should container volumes justify the cost. Certain areas of the depot also operate a night shift during fruit export season.

According to Plunkett and Attner (1997:222), the vertical structure of a business clearly defines who is in control and how decision making takes place. Plunkett and Attner (1997:262-271) add that there is no perfect organizational structure and careful consideration should be given to type of structure as team structure has advantages and disadvantages.

Advantages:

- People who know each other break down barriers across departments and are more likely to compromise than are strangers;

- Decision making and response times are speeded up as decisions are taken at the team’s level;
- The scope of work is not narrowly defined, which results in motivated and committed employees and brings about greater enthusiasm;

- It is an improvement over the matrix structure as it does not involve double reporting.

Disadvantages:

- The team is dependent on individuals who learn and train for success;

- In the absence of training performance suffers;

- Team meetings may consume a lot of time.

Figure 3.1 outlines the depot organizational structure.

**Figure 3.1 Depot organizational Structure**

<table>
<thead>
<tr>
<th>Admin Team Leader</th>
<th>Tracking Team Leader</th>
<th>Reefer Supervisor</th>
<th>Yard Team Leader</th>
<th>Workshop Team Leader</th>
<th>Storeman</th>
<th>Office Assistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Staff</td>
<td>6 Staff</td>
<td>6 Staff</td>
<td>10 Staff</td>
<td>10 Staff</td>
<td>0 Staff</td>
<td>0 Staff</td>
</tr>
</tbody>
</table>

Source: Researcher’s own construction

### 3.5 DEPOT OPERATIONS

Although Figure 3.1 shows the Stanbridge depot, owing to space constraints an additional 10 000 square meters of depot space across the road adjacent to the Grindrod Intermodal warehouse operations was used. Consequently, staff and equipment were spread over these two operational areas as required. The additional area at Transnet Park in Ries Street was mainly used for storing
general purpose containers and Stanbridge Road was generally used for refrigerated containers and when space permitted, general purpose containers were also stored there.

The main depot services provided to clients comprised storing and repairing containers to be ready for transporting cargo. Clients also used the depot to store containers which were not used to transport cargo. These clients, however, comprised a minimal amount of depot business. The depot operations will be described in detail per department below. The depot operations can be categorized as yard and administrative operations. Administrative happens inside, and repairs, washing and storage operations happen outside and are commonly referred to as yard activities.

The main consideration in the depot yard operation is the layout of the yard to derive operational efficiency. According to Pycraft et al. (1997:229), there are a number of factors to be considered when deciding on a good layout:

- **Inherent safety** – A process or operation with potential danger should not be accessible to people irrespective whether staff or customers. Fire exits and pathways should be clearly marked and kept clear of obstacles;

- **Length of flow** – Flow of material, information and processes should be arranged in such a manner that the movement and distance travelled by the transformed resource be kept to a minimum;
• Clarity of flow – Flow of material and transformed resource should be well signposted, kept clear and be evident to everyone at all times;

• Staff comfort – A pleasant working environment should be provided with adequate lighting and ventilation, where staff are located away from noisy or unpleasant parts of the operation;

• Management coordination – Location of staff and communication devices should assist supervision and communication;

• Accessibility – Everything should be accessible to a degree which is sufficient for cleaning and maintenance;

• Use of space – Appropriate use should be made of the total available space, both floor space and height;

• Long term flexibility – Layout should keep future operations in mind and the design should make provision to accommodate any expansion that might be necessary.

3.5.1 Administrative
The inside operations of the depot are twofold, namely, tracking and general administration.

3.5.1.1 Tracking
In the main tracking is concerned with tracking containers in and out, irrespective of type. Tracking primarily has to do with tracking a container into the depot under its correct owner and details. Tracking also involves instructions from clients to receive or release containers. This makes accuracy and effective communication an
integral part of the activities in the tracking department. The main skill required of tracking staff is data capturing: they capture the details of the client’s container on the depot’s tracker system and then produce stock reports on a daily basis for the client.

3.5.1.2 Administration
Administration is responsible for the all administrative functions inter alia, petty cash, submitting quotes to clients, invoicing clients, processing all internal forms, preparing operational reports and dealing with customer queries. The most important skills required by administrative staff are, accuracy and effective communication skills as they are the interface between the depot and its clients, both internally and externally.

3.5.2 Yard
The main services provided to clients are storing and repairing containers to be ready to transport cargo. The yard operations comprise mechanical repairs to refrigerated containers, structural repairs to both refrigerated and general purpose containers; wash bay, store and storage area. Refrigerated containers, and to a lesser extent, general purpose containers, are washed. These different sections are briefly discussed below.

3.5.2.1 Mechanical Repairs
A dedicated team of technician’s repairs refrigerated containers to be used for export by the various clients. This comprises doing a pre-trip inspection of the unit. Should any part not be working it is replaced once authorization has been obtained from the client.
3.5.2.2  Structural Repairs
Structural repairs to containers can be either internal or external and are performed by semi-skilled and skilled artisans. Once repairs are approved by customers they are executed and invoiced.

3.5.2.3  Wash bay
The wash bay washes containers to meet cleanliness standards set by the Perishable Products Export Control Board of SA (PPECB). This can either be a normal water wash, or when extremely dirty or stained the containers are washed with chemicals and water washed afterwards to rinse away the chemicals.

3.5.2.4  Stores
All materials are stored, purchased and issued via the store, which is controlled by a Storeman. All materials are issued from the store on the basis of a specific job card for a repair that has been approved by a customer.

3.5.2.5  Stacking
The rest of the yard is used for storing both containers that are ready for export use and those still to be repaired. Unrepaired containers can also be moved from depot to other locations in the world.
3.6 THE VALUE STREAM
Specifying value for a customer means identifying the value stream (Womack & Jones, 2003: 37). This comprises all the steps and actions required to bring a specific product or service to completion. During this process steps are identified in terms of:

- Value adding – comprises all the steps contributing to the process that a customer is willing to pay for, and paying any additional cost;

- Non-Value but necessary – these are the steps in the process that need to be completed although they do not add any value, neither is there an expectation that the customer will pay any additional fees or costs for these steps;

- Non-Value and unnecessary – these are the steps that are pure waste. They do not create any value for the customer and should be completely removed from the process.

3.7 DEPOT PROCESS FLOW
The nature of the depot operations is such that it will always be driven by customer demands, as it is always the customer informing the depot how many containers of each category to prepare for use. This puts the depot in a favorable position: instead of employing a push approach in its operations it can operate a pull system, which facilitates working on containers as and when they are required. This results in considerable cost and waste reduction, including facilitating implementing Lean principles in the process. Figure 3.2 depicts the current depot flow layout operating a push system, as is currently the practice.
Figure 3.2 Current Flow Layout Stanbridge Road Depot

Source: Researcher’s own construction

The flow layout illustrated in figure 3.3 illustrates a pull system that comprises a working area in the centre of the depot.
Figures 3.2 and 3.3 compare the flow of the depot using first a push and then a pull system. The figures illustrate that the process starts with the customer, and ends with a slightly different customer, that is, a client's client. The manufacturing process traditionally starts with individual components or raw materials from suppliers. These raw materials are processed into finished goods.

A container, irrespective of type, is received to be stored safely at the depot and in a lot of cases also to be repaired. If containers need to be repaired and prepared for export they go through the depot value stream and are finally confirmed ready for use by the PPECB inspectorate in the case of refrigerated containers. General purpose containers are not subject to the PPECB.
Using the push system (refer to Figure 3.2) results in a large amount of waste, as containers get moved around numerous times during the repair and wash processes until they finally reach either the AV stack or dispatch. The ideal state would be operating as shown in figure 3.3 where a container is placed in the working area once and only moved when all processes are complete, which turns waste into value.

Containers are then dispatched to various customers to use and export. The various haulers contracted by the containers' owners are responsible for moving the containers to and from the depot. The pull instead of the push system is one of the cornerstones of Lean, which regulates the flow of work, work in progress and inventory (Womack and Jones, 2003:67).

3.8 Conclusion
Chapter 3 provided the context of the depot operation. The chapter outlined the value proposition and the flow from one set of customers to the next.
4. Chapter 4

4.1 Introduction
The main problem of this study evaluated the key success factors, as well as other influential factors that could affect the successful implementation of Lean in the operations of the Stanbridge Road depot.

In chapter 2 an understanding of Lean tools and their application was gathered through a literature review. This information was compared with the information obtained from the empirical study to determine whether it supports the study.

Chapter 3 gave an overview of the history, structure and value stream of the Stanbridge Road depot.

The purpose of chapter 4 is to describe the research methodology used in this study. It includes a brief layout of the research design and research methods used to obtain information to solve the main problem and the sub-problems related to the study.

4.2 Definition of research design
Research design comprises two distinctive elements, research and design. These elements will be briefly discussed below.
4.2.1 Definition of research
Leedy and Ormrod (2005:2) define research as a systematic process of collecting, analyzing and interpreting information in order to increase understanding of the phenomenon the researcher is interested in.

Rozakis (1999:3) concurs that research is the gathering and presenting of reliable information. The medium by which the research is communicated is the researcher's paper, or thesis. Rozakis (1999:4) states that the research is an analytical way of arguing a point supported by facts, details, examples and opinions.

According to Collis and Hussey (2003:1), there is no universally accepted agreement in the literature on how research should be defined, as research means different things to different people. The three main issues there is agreement on are:

- Research is a process of enquiry and investigation;
- It is systematic and methodical;
- It increases knowledge.

4.2.2 Definition of design
According to Hawkins (1986:224), design is defined as a preliminary outline or drawing for something that is to be constructed and it includes the intent or purpose and a mental plan, scheme of attack or approach.
4.2.3 Research design and research methodology

Mouton and Babbie (2001:74) indicate that researchers frequently mix research design and research methodology despite the two being very different dimensions of research. They explain that a research design is the outline of how you plan to conduct the research.

There are many potential mistakes that can be made while developing a research design. The research design is about how research activities are organized, including the collection of data in ways that are most likely to achieve the research aims (Easterby-Smith, Thorpe and Lowe, 1991:33).

4.3 QUANTITATIVE AND QUALITATIVE RESEARCH APPROACHES

According to Birch and Mauch (1998:16), research can be divided into two categories, namely, qualitative and quantitative. Qualitative research is used to answer questions about the complex nature of the phenomena. Mostly it is a case of describing and understanding the phenomena from the participant’s point of view. In contrast, quantitative research is used to answer questions about relationships measured in relation to variables with the purpose of explaining, predicting and controlling phenomena (Leedy and Ormrod, 2005:94).

According to Collis and Hussey (2003:13), research can be differentiated according to the approach being adopted by the
researcher. Some people opt for the quantitative approach, which is objective in nature and concentrates on measuring phenomena, while others prefer a qualitative approach. The qualitative approach is more subjective and involves examining perceptions in order to gain an understanding of human and social activities and reflect on them.

According to Leedy (1997:122,) qualitative research can be further divided into descriptive survey methods and historical survey methods. Descriptive survey is data obtained by observations and is also known as the normative survey method. Historical survey refers to the review and analysis of literature or documents aimed at solving problems that are historical in nature (Leedy, 1997:122.)

According to Leedy (1997:123), quantitative research can be divided into analytical survey method and experimental method. Analytical survey method refers to the statistical analysis of data that was obtained through quantitative techniques. Experimental method refers to data collected by comparison of a group under controlled conditions with a group under experimental conditions (Leedy, 1997:122).

4.4 DATA COLLECTION
According to Preece (1994:96), the following methods for data collection are available:

- Survey - Conducted by means of interviews and questionnaires, which are the most common methods of collecting data;
• Observation - The researcher observes the subjects behavior without interfering in the process or actively participating;

• Experiment - The effects of changes that are manipulated and controlled by the researcher are observed in a laboratory.

This study applied the descriptive/normative survey using questionnaires distributed to all staff at the depot irrespective of rank, or whether permanent or not. It also used interviews to gain a better understanding to certain responses to the questionnaire.

4.4.1 Survey as data collection method
Leedy (1997:143) describes survey as follows: “to look or to see over or beyond”. The survey allows the researcher to obtain data in order to determine the outcomes of events.

According to Leedy (1997:86) the data collection instruments for surveys are as follows:

• Postal survey - These are questionnaires posted to the respondent to be returned to the researcher upon completion. This is the only communication medium between the researcher and the respondent;

• Personal interviews - While these are expensive and time consuming, respondents are willing to co-operate;

• Telephonic interviews - Their cost is lower than for personal interviews; however, they do not allow for sufficient quality time with respondents.
For the purpose of this study the appropriate data collection method decided on was the survey method, which has the following benefits:

- It is deemed anonymous and less time consuming than alternative methods;
- The data can be collated with ease;
- The data can be obtained within a short time frame;
- Interviews were also used to clarify certain responses from respondents.

### 4.5 CREDIBILITY OF THE FINDINGS

According to Collis and Hussey (2003:58), two measures exist to describe the credibility of research findings, namely, reliability and validity. Leedy and Ormrod (2005:29) state that reliability and validity can differ in form, depending on the nature of the research problem and the data collected, and the general research methodology.

#### 4.5.1 Reliability

Reliability is concerned with the credibility of the research and deals with the research findings. Collis and Hussey (2003:58) note that research findings are reliable if they can be repeated. Mouton and Barbie (2001:119) clarify and explain that if a particular technique is applied to the same object repeatedly and it yields the same result then the result is reliable. Leedy and Ormrod (2005:29) add that reliability refers to the consistency with which a measuring
instrument yields a particular result if the entity measured remains the same.

The findings obtained in this study are deemed reliable because the researcher ensured that the research instrument was designed in a manner to elicit the required responses from the participants. The use of closed questions limits the range of responses, resulting in reduced variability of responses received.

4.5.2 Validity
According to Leedy and Ormrod (2005:28), the validity of the measuring instrument is determined by the extent to which it is able to measure what it is intended to measure. Collis and Hussey (2003:58) acknowledge that validity is concerned with the extent to which a research finding accurately reflects what is actually happening in the situation. Collis and Hussey (2003:58) add that an effect or test is valid if it demonstrates or measures what the researcher thinks or claims it does.

According to Easterby-Smith, Thorpe and Lowe (1991:121), there are three ways of estimating validity:

- Validation by known groups – comparing groups otherwise known to be different using the factor in question;
- Face validity – examining the plausibility of the instrument;
- Convergent validity – comparing the instrument with other independent measurement procedures.
In this study, the researcher has a high degree of confidence in the validity of the answers, since the sample consisted of depot employees. It is regarded as reasonable to believe that responses received represent a true reflection of the respondents’ situation and experience.

4.6 QUESTIONNAIRE DESIGN

The questionnaire is used to extract information from respondents and to standardize the format for recording the information (Haugue, 1994:12). Easterby-Smith, Thorpe and Lowe (1991:119) note that when a questionnaire is designed, the main decisions to be made are the overall framework and the type of questions to ask. Collis and Hussey (2003:173) refer to a questionnaire as a list of carefully structured questions chosen after considerable testing with a view to obtaining reliable responses from a chosen sample on what they do, think or feel. Collis and Hussey (2003:174) list the main decisions to consider when using questionnaires:

- Design of the questionnaire, include any instructions;
- Wording of the questions and how to ensure that they are intelligible with no ambiguity;
- Sample size;
- Type of questions asked;
- Wording of any accompanying letter;
- Method of distribution and return of the completed questionnaires;
- Testing for validity and reliability and when they should be applied;
• Any action to be taken if questionnaires are not returned;
• Methods for collating and analyzing the data collected.

4.6.1 Layout of questionnaire
The questionnaire layout was designed to ensure it was easy to complete and easy to analyse the data. The following characteristics prescribed by Allison, O'Sullivan, Owen, Rice, Rothwell and Saunders (1996:75) were applied:

• Title;
• Instructions to complete the questions;
• Demographic data of respondents;
• Introduction to provide assurance of confidentiality and anonymity;
• Core data - the main focus of the empirical study;
• Closing remarks thanking respondents for their participation.

When the questionnaire for this study was designed, closed questions requiring the application of judgments in rankings were chosen. The questions used are referred to as a Likert scale. The layout used in the questionnaire was easy to complete despite there being 35 questions.

The questionnaire consisted of three pages. The questions measured the respondent’s personal experience, change management and operational effectiveness. The questionnaire comprised four areas,
namely, demographic information, staff engagement, change implementation and monitoring, and operational effectiveness. The demographics were intended to obtain the demographic makeup of the staff compliment at the depot. The second part, staff engagement, ascertained the level of employee engagement, that is, how satisfied employees are with the work they do and whether they feel part of a team culture where personal growth is encouraged. The third part of the questionnaire sought to ascertain whether staffs were being involved in change initiatives, their implementation and their monitoring. Lean places a large emphasis on staff involvement in idea and suggestions generation to improve performance and turn waste into value. The third section of the questionnaire also investigated whether or not good performance was recognised.

The fourth section of the questionnaire sought to ascertain how effectively staff was managed operationally, and whether they knew what was expected of them, and had the tools and support to deliver what was expected.

The questionnaire's four categories comprised demographic information which had seven questions, staff engagement with seven questions, change implementation and monitoring with 15 questions and operational effectiveness with 13 questions.

A total of 44 questionnaires were handed out and 30 received back of which all 30 were used in the analysis.

The answers to the questions were clustered according to type of answer, namely, strongly agree, agree, disagree and strongly disagree. The purpose of the questionnaire was to ascertain both management and employee willingness to implement Lean.
4.6.1.1 **Demographic information**
The first part of the questionnaire solicited demographic details from respondents with the purpose of understanding the make up of the depot staff within the demographic profile. The seven demographic questions in this section are listed:

- Gender – male or female;
- Age bracket – 20-24, 25-35, 36-45 and 46 and above;
- Whether or not staff reports to a respondent and the potential number of direct reports;
- Whether a respondent is employed permanently or temporarily;
- Job category – the job categories comprise academic, professional, technical and auxiliary;
- Highest qualification – qualifications range from some schooling to Matric, Diploma and Degree;
- Length of service – measures period of service ranging from less than a year, 1-5 years, 6-10 years, 11-15 years and 16 years and above.

Demographic information is important as it gives the researcher an idea of what the skills profile, years of experience and type of employment preference the organization has. There is pressure on companies to perform and be profitable and as a result a number of companies make excessive use of temporary staff. This may be cost effective, but not always sustainable, as it results in high staff turnover. Having the right skills is critically important for any
organization as it means the difference between being competitive or not.

4.6.1.2 Staff engagement
The second part of the questionnaire determined whether or not staffs are stimulated by what they do on a daily basis. The emphasis of this section was to ascertain whether staff feels proud about their contribution and whether they have the freedom to contribute to improving the fortunes of the organization. There are seven questions in this section:

- I find the work I do stimulating;
- I feel that I am being helped in improving my abilities to perform my duties;
- I have the freedom to contribute to improving the work environment;
- I regularly get feedback on my personal development and how to improve as an individual;
- I have made changes in my workplace which I am proud off;
- I am encouraged to be part of a team culture;
- I am willing to assist with duties outside the scope of my normal duties.

The type of changes Lean would bring about depends on staff to initiate and implement. Therefore, it is critical to ascertain the level of engagement of staff as they will play a critical role in driving the process pre- and post- implementation.
### 4.6.1.3 Change implementation and monitoring

The third part of the questionnaire was to obtain an understanding of the current change implementation and monitoring culture in the depot. The objective of this section was to determine how susceptible both staff and management is to encouraging, implementing and sustaining change. This section comprises 15 questions which are listed:

- Staff are informed of changes before they happen;
- Staff are consulted regarding changes;
- The input of staff is considered during changes;
- Staff are allowed to change how things get done if there is no risk of a process violation;
- Staff is encouraged to suggest improvement ideas;
- Management is receptive to the improvement ideas provided by staff;
- Improvement ideas are discussed in department toolbox talks;
- Improvement ideas are implemented;
- There are clear channels for communicating improvement ideas;
- Implemented ideas are sustained by management and staff;
- Training for new procedures is provided for staff;
- Management offer guidance to staff in order to cope with change;
- The results of initiatives implemented are documented;
- The results of these initiatives are communicated to all staff;
- Only the benefits of these results are communicated.
The main driver behind Lean is change, which is rooted in continuous improvement. In pursuit of improving performance, the organization must become flexible in its approach to dealing with daily challenges. This inevitably means empowering staff to make decisions on a daily basis and encouraging a culture of change and the pursuit of continually searching for the best way of doing things. It is of critical thus important to understand the readiness of the organization for change management and staff’s ability to suggest, implement and sustain change.

4.6.1.4 Operational Effectiveness
The fourth and final part of the questionnaire dealt with operational effectiveness.

- I know what is expected of me;
- I have the required tools to perform my duty;
- I have been trained to perform my daily tasks;
- When problems occur they are quickly resolved;
- Problem solving is encouraged among staff members;
- Management is supportive of employees taking initiative;
- There is a healthy team spirit in the depot;
- I work in a positive team environment;
- I get sufficient support from my team leader;
- Good performance is recognised publicly by management;
- Management reacts appropriately to poor performance;
• I understand the customers’ expectations from the depot;

• I understand my role as individual to contributing to the satisfaction of customers;

Lean is ultimately about improving the operational effectiveness of an organization by holistically looking at all aspects of an organization and integrating them within the Lean management philosophy. This involves an organization-wide commitment to operational excellence. It is therefore important to gain an understanding of the current operational culture to ascertain compatibility for Lean implementation.

4.7 SAMPLE CHOICE

According to Collis and Hussy (2003:56), a sample is a subset of the population and should represent the main interest of the study. Leedy and Ormrod (2005:207) indicate that as a basic rule a larger sample is better, and offer some guidelines for selecting a sample size:

• For a small population of a few hundred, sampling is of little value. The researcher is encouraged to survey the entire population;

• Fifty percent of the population is to be sampled if the population is about five hundred.

This study the researcher aimed to sample every staff member working at the depot, irrespective of whether they were permanent or temporary staff. The questionnaire was distributed to all 44 depot employees, permanent and temporary staff with a covering letter informing them that their anonymity was guaranteed and including the researcher’s details and the purpose of the research. A total of
30 completed questionnaires have been received back from the 44 questionnaires distributed. This represented a 68% response rate as all 30 completed questionnaires were used in the analysis. From the 30 responses received back 18 were temporary staff and 12 were permanent staff. The staff members that chose to partake in the survey did so voluntarily and anonymously.

4.8 CONCLUSION
Chapter 4 gave an outline of the research design and methodology used. According to Leedy and Ormrod (2005:85), the research design provides an overall structure for the research procedures, namely, data collection and analysis. It is important in the research study that collected data is checked for validity and reliability.

Leedy and Ormrod (2005:105) advises that researchers should decide on the approach used based on the research problem to be addressed and the skills at their disposal. The researcher has to be able to adopt the correct approach for the research.
5. CHAPTER 5

5.1 INTRODUCTION
The previous chapter explained the design of the survey and the chosen research methodology for the empirical study.

The aim of chapter 5 is to analyse and interpret the results of the empirical study. The results of the questionnaire will be discussed according to its four categories, that is, demographic information, staff engagement, change implementation and monitoring, and operational effectiveness. These results comprise the feedback for the questionnaire issued to all forty four permanent and temporary staff members in the depot. The questionnaire was completed individually and anonymously by all those staff members who decided to part take in the survey.

5.2 HOW INFORMATION FOR THE QUANTITATIVE STUDY WAS SOURCED
The questionnaire was distributed on 1 July 2013 to all staff members working at the Grindrod Intermodal Stanbridge Road depot totaling 44 employees. The researcher made every effort to assure staff of the confidentiality of the questionnaire and that participation was on a voluntary basis. The deadline for collecting the completed questionnaires was 30 September 2013. The researcher sent weekly email reminders to all depot supervisors and management to ensure that as many staff members as possible completed the questionnaire.
Unstructured interviews were also conducted to gain insight into the thinking behind staff responses to the questionnaire (see Annexure 1.1). In addition, the movement of trucks in and out of the depot was monitored during the period 1 to 30 September 2013, and the time it took them to drive in and out of depot (see Annexure 1.2).

5.3 RESPONSE RATE AND ANALYSIS

Forty four questionnaires were distributed on 1 July 2013. At the time this was the total staff complement at the depot. A total of 30 completed questionnaires were received back by close of business on 30 September 2013 representing a 68.18 percent response rate.

5.4 RESULTS OF THE STUDY

The depot operates at Stanbridge Road and uses some additional space at Transnet Park in Ries Street. Containers are handled by five empty container handlers’ machines.

The data was analysed and interpreted following the questionnaire structure, namely:

- Demographic information;
- Staff engagement;
- Change implementation and monitoring;
Operational effectiveness.

5.4.1 Demographic information
The profile of respondents was obtained from the demographic information section of the survey.

Figure 5.1 Depot Gender Mix

The above graph shows that the majority of employees in the depot are male. Although the manager is female, it is a male dominated environment due to the technical and labour intensive nature of the depot operations.

Figure 5.2 Job Types
As shown in Figure 5.2 above, the main positions are 43 percent technical and 50 percent auxiliary while seven percent are professional. This indicates potential for skills development, since the skills gap in the depot is quite big.

**Figure 5.3 Employment Type**

Respondents were asked to indicate whether they were employed in a permanent or temporary capacity. From the above graph it can be observed that 60 percent of employees are temporary staff. Only 40 percent of employees were permanent. The key challenge with such a big component of temporary staff is that it results in a high staff turnover rate, as these employees do not enjoy the job security that permanent staff does. During interviews with temporary staff, they indicated that not being permanent is a major concern for them and that they can be told at any time that they are no longer required.
The above graph indicates that 43 percent of depot staff does not have a Senior Certificate and 47 percent do. Seven percent have a diploma and three percent a degree. Due to the technical nature of the depot operation and the minimum requirements for artisans and technicians, the depot is seriously challenged, since having or not having the requisite skills can be a major benefit or disadvantage to the depot.

The above graph indicates that 47 percent of staff have been employed for less than a year, 33 percent for one to five years, 13 percent for six to 10 years and three percent for 10 to fifteen years.
and over sixteen years, respectively. The significance of this is that given the complex nature of depot work, there seems to be limited experience amongst the staff.

5.4.2 Staff engagement

The second section of the survey dealt with staff engagement and comprised seven questions.

Figure 5.6 I find the work I do stimulating

According to the above graph, staff does seem to be stimulated by what they do as 30 percent indicated strongly agree and 57 percent agree. In other words, in excess of 85 percent of depot staff found the work they do stimulating. Ten percent of staff disagrees and three percent strongly disagree. Those who disagree could potentially influence other workers, suggesting that this is an area that needs attention.
Figure 5.7 I feel that I am being helped in improving my abilities to perform my duties

As shown in Figure 5.7, twenty percent of respondents strongly agree and 57 percent agree that they are being helped. Seventeen percent and seven percent disagree and strongly disagree, respectively, which represents nearly 25 percent of respondents. This could mean that development is focused on only certain areas of the operation, or that certain key skill and capacities are being targeted. It could also imply that respondents do not understand their own role in their personal development.

Figure 5.8 I have the freedom to contribute to improving the work environment
The responses shown in Figure 5.8 clearly demonstrate a positive response: 13 percent and 67 percent of employees indicated strongly agree and agree, respectively. The negative responses were 13 percent and seven percent disagree and strongly disagree, respectively. Communicating with the 20 percent who responded negatively, could change their view regarding contributing to improvements.

**Figure 5.9 I regularly get feedback on my personal development and how to improve as an individual**

![Bar Chart](chart.png)

Interviews established that staff are mainly shown how to do things better in the work environment, but are not given personal feedback.
Figure 5.10 I have made changes in my workplace which I am proud off

The graph above indicates that 17 percent and 67 percent of respondents strongly agree and agree, respectively, that they have made changes in the workplace that they are proud of. Thirteen percent disagree and three percent strongly disagree. Due to the high level of auxiliary staff working as general workers, the likelihood of all staff making major changes in the workplace is slight. The high percentage of positive responses indicates that workers are generally allowed to suggest changes that will improve operations.

Figure 5.11 I am encouraged to be part of a team culture
The graph above depicts a largely positive response to the question: more than 80 percent of staff agreed positively with the question. Interviews revealed that temporary staff felt that they could at any time be told they are no longer required and they therefore have difficulty regarding themselves as part of the team in any real sense.

**Figure 5.12 I am willing to assist with duties outside the scope of my normal duties**

![Graph showing the distribution of responses to Question 7](image)

As shown in Figure 5.12 When interviewed, staff revealed that they were generally multi-skilled and work flexible, and were rotated between various jobs within a day. Staff generally indicated a willingness to be rotated, as it provides scope for learning new skills. The negative responses related to being remunerated for extra work.

### 5.4.3 Change implementation and monitoring

The third section of the survey dealt with change implementation and monitoring and comprised 15 statements that the respondents had to agree or disagree to.
Figure 5.13 Staff are informed of changes before they happen

The graph above indicates an equal split between staff responding positively and negatively to the statement. This indicates an opportunity to improve communication and focus on removing communication barriers, since a large number of staff do not have a Senior Certificate and all communication is done in English. This could be a major barrier to communication as the majority of staff speaks English as a second language.

Figure 5.14 Staff are consulted regarding changes

As indicated in Figure 5.14, 57 percent of staff responded positively to the statement and 43 percent responded negatively. Interviews ascertained that not having a union or forum does not adequately cater for a consultative process among staff. Mainly yard staff raised the issue of a union, while administrative and technical staff did not.
Figure 5.15 The input of staff is considered during changes

**Figure 5.15** indicates that staff input is considered during changes. The high positive response indicates that staff input is taken into consideration with regard to change. It should also be noted that not all ideas translate into viable implementable ideas.

Figure 5.16 Staff are allowed to change how things get done if there is no risk of a process violation.

As can be seen in Figure 5.16—seventy six percent of staff responded positively to the statement, mainly because the work they do is of a technical nature and how they choose to do repairs is largely at their discretion, although repairs to containers are done to certain industry specifications. The 23 percent negative response should also be seen in the context of the fact that the customer prescribes
how certain work in the depot should be done, and not necessarily the result of depot management not being willing to allow staff to make changes.

**Figure 5.17 Staff is encouraged to suggest improvement ideas.**

![Bar chart showing responses to Question 12](chart1.png)

Staff responded positive to the question and agrees that suggestions for improvements are encouraged by depot management.

**Figure 5.18 Management is receptive to the improvement ideas provided by staff.**

![Bar chart showing responses to Question 13](chart2.png)

Question 12 and 13 are similar and upon further interviews with staff trying to ascertain why the different responses to such a similar question it was revealed that not all ideas are feasible at the end of
the day despite employees feeling their ideas not taken serious when provided. It is evident that inviting or creating a climate where employees generate ideas does not mean all ideas will be implemented.

**Figure 5.19 Improvement ideas are discussed in department toolbox talks**

![Bar chart for Question 14](image)

The graph indicates a positive response to the statement that improvement ideas do get discussed in department toolbox talks. The negative response of 27 and 10 percent disagree and strongly disagree respectively could mean in some departments these talks does not take place.
As Figure 5.20 shows that improvement ideas are implemented at depot. Thirty percent of employees responded negatively. This could be because certain employees provided ideas that were not suitable for implementation at the time they were suggested.

As the above graph shows there was a significant positive response of 87 percent of employees who strongly agree and agreed with the statement, and a 13 percent negative response (disagree and strongly disagree), which indicates that there are clear channels in place for improvement ideas to be communicated.
**Figure 5.22 Implemented ideas are sustained by management and staff**

Figure 5.22 shows that sustaining new ideas implemented are not as vigorously pursued as implementation and communication of ideas. The negative response of 40 percent suggests that while improvement is encouraged, implementing and sustaining any change seems to be a problem.

**Figure 5.23 Training for new procedures is provided for staff**

The graph above indicates a positive response of 57 percent for strongly agree and agree, which indicates training is provided. The graph also indicates a 40 percent (disagree and strongly disagree) raises concern, as it is significant. In this regard, management could consider more targeted training communication.
Figure 5.24 Management offer guidance to staff in order to cope with change

Figure 5.24 indicates that management does offer guidance to staff in order to cope with change. It should be noted that not all staff would be keen to change at all times given the high negative response of 43 percent (disagree and strongly disagree).

Figure 5.25 The results of initiatives are documented

As shown in Figure 5.25, the results of initiatives are documented. The positive responses indicate that initiatives are documented. Follow up interviews with depot management confirmed that standard operating procedures are documented and that all staff have access to the documents. The standard operating procedures are also regularly updated as and when changes are made to procedures.
The graph above indicates the results of initiatives are communicated to all staff. While results are documented, they do not seem to be communicated effectively. Interviews revealed that not all employees have email and that the standard operating procedure is a large document, which is not easily transmitted to all employees, particularly those without email.

There seems to be a strong view that depot management only communicates the benefits of initiatives. The graph indicates a 63 percent positive response to the statement and a 37 percent disagreement.
5.4.4 **Operational effectiveness**

The last section of the survey dealt with operational effectiveness and comprised 13 statements.

**Figure 5.28 I know what is expected of me**

[Graph showing responses to Question 23]

The graph above clearly shows the majority of depot staff knows what is expected of them. Interviews revealed that all staff had job descriptions and knew what was expected of them.

**Figure 5.29 I have the required tools to perform my duty**

[Graph showing responses to Question 24]

The graph clearly shows a positive response to the statements. A 70 percent positive response was received. However, the 30 percent negative response is cause for concern. Given that the core
business of the depot is container repairs, tools play an important role in the daily activities of staff.

**Figure 5.30 I have been trained to perform my daily tasks**

The graph above shows a positive response of 90 percent to this statement, which indicates that training, occurs.

**Figure 5.31 When problems occur they are quickly resolved**

Figure 5.31 indicates a positive response of 73 percent from respondents. Since the statement encompasses problems, a 26 percent negative response is not to be taken lightly. The problems may be of a serious nature and the positive responses may have
referred to minor issues that were dealt with while shying away from the more complicated problems.

**Figure 5.32 Problem solving is encouraged among staff members**

The graph above shows a positive response of 83 percent for strongly agree and agree combined. This is largely due to the nature of the work done in the depot: Repairs and data capturing tasks are carried out at the discretion of employees with regard to how they will be done and what timeframe will be needed as per interviews with staff.

**Figure 5.33 Management is supportive of employees taking initiative**
The graph indicates a positive response of 56 percent for strongly agree and agree. It also shows a high negative response of 43 percent for disagree and strongly disagree. Given that Lean is primarily based on searching for the best way of doing things it is a result that depot management should look into as taking initiative is directly link to improving the operations.

**Figure 5.34 There is a healthy team spirit in the depot**

The response from respondents confirmed that a healthy team spirit exists in the depot. The graph indicates that a team spirit is present in the depot. The negative responses could be influenced by the fact that temporary staff members do not always feel part of the team given their indicating that they can be let go at any time.

**Figure 5.35 I work in a positive team environment**
The graph above shows a 70 percent positive response for strongly agree and agree combined, which suggests most staff experience a positive team environment. There is a 30 percent negative response for disagree; however, not a single respondent chose strongly disagree.

**Figure 5.36 I get sufficient support from my team leader**

![Bar Chart](image)

Figure 5.36 shows a significant positive response of 77 percent for strongly agree and agree. The 20 percent negative response for disagree, given that there are 6 team leaders in the depot, could indicate areas where certain sections of the depot staff do not enjoy good support from a team leader or team leaders.
Figure 5.37 Good performance is recognised publicly by management

The graph above shows a combined (strongly agree and agree) 70 percent response that good performance is recognised publicly. Thirty percent of employees responded negatively. Perhaps management is more prone to provide recognition in certain functional areas than in others.

Figure 5.38 Management reacts appropriately to poor performance

Figure 5.38 shows a positive response of 50 percent for (strongly agree and agree). This may indicate management is more keen to praise good performance publicly than to deal with poor performance publicly.
**Figure 5.39 I understand the customer’s expectation of the depot**

Figure 5.39 shows a positive response of 97 percent between (strongly agree and agree). The result clearly indicates staff understanding customer expectations.

**Figure 5.40 I understand my role as an individual contributing to the satisfaction of customers**

Figure 5.40 indicates a 93 percent positive response between (strongly agree and agree) for the statement of whether employees understand their role as an individual contributing to the satisfaction of customers. The low negative percentage indicates that staff is aware of their role in the depot.
5.5 DEPOT RESOURCE UTILISATION

While the survey concentrated on staff and the four areas that most affect them, namely, demographics, staff engagement, change implementation and monitoring and Operational effectiveness, there are factors that also influence depot operations significantly, that is, container handlers and their effective utilisation, and truck turn around.

These variables have a significant impact on customer satisfaction levels, as there is a direct link between container handlers utilisation and truck turn around. The fewer container handlers are available for operation, the longer it takes to load and off load trucks. This has the potential to seriously impede service delivery to clients resulting in disgruntled customers and their transporters.

5.5.1 Container handlers operational

There were a total of five empty container handlers observed over the period 1 – 30 September 2013. One is new machine, another has been refurbished and the others are in excess of five years old. As can be seen from figure 5.41 below, machines are not always operational due to breakdowns.

Figure 5.41 Container handlers in use versus on hand
From follow up interviews with handling equipment drivers it was revealed that some machines break down frequently due to the age of the machines. It was also revealed that some machines do not have maintenance contracts with little to no preventative maintenance being done. The impact of these frequent breakdowns is that it affects the service depot render to clients negatively. The breakdowns also causes longer standing time for trucks at depot.

5.5.2 Truck turnaround at depot

The measure for client service at the depot is how long it takes for trucks to be turned around. Clients almost never pick up or deliver the containers to the depot: this is done by their suppliers: transport companies lose large amounts of money owing to idle time at depots. This places a great deal of pressure on depots to perform, as transporters generally report having to wait to the depot client, who in turn puts pressure on the depot to perform.

Figure 5.42 shows the number of trucks visiting the depot to either deliver or collect containers or do both. The figure depicts the number of trucks that were visiting the depot for September 2013.
Figure 5.42 Trucks to depot daily for September 2013

The number of trucks visiting the depot daily was taken from the in and out records collated by staff at the depot for the month of September 2013. The graph above shows that trucks calling at the depot range from 100 to 250 per day.

Table 5.43 shows the time spend by trucks that was observed in the depot during the period 1 – 30 September 2013. The purpose of the observation was to get an understanding of truck turnaround times at depot.
### Table 5.43 Truck queue times at depot daily for September 2013

<table>
<thead>
<tr>
<th>Date</th>
<th>Time In</th>
<th>Time Out</th>
<th>Time Spent</th>
</tr>
</thead>
<tbody>
<tr>
<td>13/09/02</td>
<td>08:20</td>
<td>10:10</td>
<td>01:50</td>
</tr>
<tr>
<td>13/09/03</td>
<td>12:05</td>
<td>12:55</td>
<td>00:50</td>
</tr>
<tr>
<td>13/09/04</td>
<td>13:15</td>
<td>13:40</td>
<td>00:35</td>
</tr>
<tr>
<td>13/09/05</td>
<td>09:00</td>
<td>10:40</td>
<td>01:40</td>
</tr>
<tr>
<td>13/09/06</td>
<td>11:05</td>
<td>13:15</td>
<td>02:10</td>
</tr>
<tr>
<td>13/09/09</td>
<td>10:22</td>
<td>11:32</td>
<td>01:10</td>
</tr>
<tr>
<td>13/09/10</td>
<td>08:30</td>
<td>11:15</td>
<td>02:45</td>
</tr>
<tr>
<td>13/09/11</td>
<td>13:15</td>
<td>15:10</td>
<td>01:55</td>
</tr>
<tr>
<td>13/09/12</td>
<td>14:05</td>
<td>16:20</td>
<td>02:15</td>
</tr>
<tr>
<td>13/09/13</td>
<td>11:15</td>
<td>13:50</td>
<td>02:35</td>
</tr>
<tr>
<td>13/09/16</td>
<td>14:50</td>
<td>15:55</td>
<td>01:05</td>
</tr>
<tr>
<td>13/09/17</td>
<td>09:30</td>
<td>10:20</td>
<td>00:50</td>
</tr>
<tr>
<td>13/09/18</td>
<td>08:05</td>
<td>09:07</td>
<td>01:02</td>
</tr>
<tr>
<td>13/09/19</td>
<td>09:15</td>
<td>09:55</td>
<td>00:40</td>
</tr>
<tr>
<td>13/09/20</td>
<td>11:45</td>
<td>12:20</td>
<td>00:35</td>
</tr>
<tr>
<td>13/09/23</td>
<td>12:25</td>
<td>14:08</td>
<td>01:43</td>
</tr>
<tr>
<td>13/09/24</td>
<td>13:20</td>
<td>15:58</td>
<td>01:38</td>
</tr>
<tr>
<td>13/09/25</td>
<td>15:40</td>
<td>18:25</td>
<td>02:45</td>
</tr>
<tr>
<td>13/09/26</td>
<td>14:10</td>
<td>16:20</td>
<td>02:10</td>
</tr>
<tr>
<td>13/09/27</td>
<td>13:35</td>
<td>14:50</td>
<td>01:15</td>
</tr>
<tr>
<td>13/09/30</td>
<td>15:55</td>
<td>16:10</td>
<td>00:15</td>
</tr>
</tbody>
</table>

The above table shows truck waiting times at the depot observed during the period 1 – 30 September 2013. The researcher handed the sheet to depot staff and collected it daily.

It was mentioned in a previous chapter that depot clients measure the level of service rendered to them according to how quickly and accurately they receive the containers they require. During the period of the study, observations were made on management of equipment, turnaround of trucks and staff utilization.

In the depot queue, management is about managing the time trucks spend waiting. What was found during the period of observation was
that queues were not managed to the benefit of clients, or the truck drivers coming into the depot as is evident from the waiting times of trucks (shown above). The highest waiting time was two hours and 45 minutes.

A waiting time approaching three hours for a truck at a depot is clearly not sound business: it is a direct loss of productivity to that business, and a productivity loss to the depot. There is no standard waiting time set at the depot for staff to strive towards; however it is certainly not acceptable that a truck should wait for nearly three hours to either collect or deliver a container at the depot. This long waiting period results in unhappy clients and their suppliers opting to collect or deliver containers at alternative depots.

The first point of entry at the depot is the tracking office where all containers, whether incoming or outgoing, get tracked into or out of the depot. It is important to have a knowledgeable person carry out this function to reduce queue lengths. There is also a clear correlation between the number of machines operational and the time trucks spend waiting. Maintaining and improving the operating methods of machinery would also substantially contribute to reduce waiting times.
6. CHAPTER 6

6.1 INTRODUCTION
The previous chapter discussed the results of the empirical study. This chapter focuses on the conclusions and recommendations. With reference to the main research problem, namely, how the operations of Grindrod Intermodal container depot in Stanbridge Road can benefit from the implementation of Lean.

6.2 THE FIRST SUB-PROBLEM
What does the literature tell us about the application of Lean in the service environment? An extensive literature review was conducted in order to address this particular sub-problem. The various Lean concepts, definitions and guidelines were reviewed with a view of gaining an understanding of its various applications within the service environments.

6.3 THE SECOND SUB-PROBLEM
To determine what factors i.e. people, operations or change management could impede implementing Lean at Grindrod Intermodal Stanbridge Road depot? Chapter 2 dealt with the core theories and principles of Lean as a management philosophy. Chapter 3 was giving an overview of the Grindrod Intermodal Stanbridge Road depot operations and structure. Chapter 4 gave an outline of the research methodology to be applied and the survey method. Chapter 5 analysed the results of the survey and identified shortfalls and inefficiencies of the current depot operations.

The findings from the survey, while generally positive, raise challenges for the depot from a Lean implementation perspective.
From the 35 questions in the survey the positive responses between strongly agree and agree ranges from lowest 47 percent for question four, I get regular feedback on my personal development and how to improve as an individual to 97 percent highest for question 34 I understand customers expectation from the depot.

6.3.1 Factors that could impede Implementing Lean at Stanbridge Road depot

From the results of the survey the factors that are most likely to impede implementing Lean at the Stanbridge Road depot are as follows.

Table 6.1 shows the top 10 factors that could impede Lean implementation at Stanbridge Road depot.

Table 6.1 Top 10 negative responses that could impede implementing Lean at Stanbridge Road depot

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. I regularly get feedback on my personal development and how to improve as an individual</td>
<td>23%</td>
<td>30%</td>
<td>53%</td>
</tr>
<tr>
<td>8. Staff are informed of changes before they happen</td>
<td>40%</td>
<td>10%</td>
<td>50%</td>
</tr>
<tr>
<td>21. The results of these initiatives are communicated to all staff</td>
<td>40%</td>
<td>3%</td>
<td>43%</td>
</tr>
<tr>
<td>19. Management offer guidance to staff in order to cope with change</td>
<td>30%</td>
<td>13%</td>
<td>43%</td>
</tr>
<tr>
<td>18. Training for new procedures is provided for staff</td>
<td>27%</td>
<td>17%</td>
<td>43%</td>
</tr>
<tr>
<td>9. Staff are consulted regarding changes</td>
<td>30%</td>
<td>13%</td>
<td>43%</td>
</tr>
<tr>
<td>12. Staff is encouraged to suggest improvement ideas</td>
<td>30%</td>
<td>13%</td>
<td>43%</td>
</tr>
<tr>
<td>28. Management is supportive of employees taking initiative</td>
<td>30%</td>
<td>13%</td>
<td>43%</td>
</tr>
<tr>
<td>33. Management reacts appropriately to poor performance</td>
<td>33%</td>
<td>7%</td>
<td>40%</td>
</tr>
<tr>
<td>17. Implemented ideas are sustained by management and staff</td>
<td>37%</td>
<td>3%</td>
<td>40%</td>
</tr>
</tbody>
</table>
The above table shows the top 10 negative responses from the survey. It would be advisable for depot management to address these 10 negatives in order to facilitate a possible Lean implementation at the depot. Although these are the major negatives of the survey, it should be noted that the positives far outweigh the negatives. It is encouraging that only two questions drew negative responses in excess of 50 percent. This leads the researcher to the conclusion that the depot is well positioned to effectively implement various Lean tools and adopt Lean as a management philosophy. From the survey results, there does not seem to be any factor that would significantly impede the successful implementation of Lean at the depot should senior management support such an initiative.

Table 6.2 shows the top 10 positive responses from the survey conducted in the depot with depot staff.

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>34. I understand the customers’ expectations from the depot</td>
<td>27%</td>
<td>70%</td>
<td>97%</td>
</tr>
<tr>
<td>23. I know what is expected of me</td>
<td>37%</td>
<td>57%</td>
<td>93%</td>
</tr>
<tr>
<td>35. I understand my role as individual to contributing to the satisfaction of customers</td>
<td>23%</td>
<td>70%</td>
<td>93%</td>
</tr>
<tr>
<td>25. I have been trained to perform my daily tasks</td>
<td>13%</td>
<td>77%</td>
<td>90%</td>
</tr>
<tr>
<td>1. I find the work I do stimulating</td>
<td>30%</td>
<td>57%</td>
<td>87%</td>
</tr>
<tr>
<td>7. I am willing to assist with duties outside the scope of my</td>
<td>30%</td>
<td>57%</td>
<td>87%</td>
</tr>
</tbody>
</table>
normal duties

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>5. I have made changes in my workplace which I am proud off</td>
<td>17%</td>
<td>67%</td>
</tr>
<tr>
<td>6. I am encouraged to be part of a team culture</td>
<td>13%</td>
<td>70%</td>
</tr>
<tr>
<td>27. Problem solving is encouraged among staff members</td>
<td>10%</td>
<td>73%</td>
</tr>
<tr>
<td>3. I have the freedom to contribute to improving the work environment</td>
<td>13%</td>
<td>67%</td>
</tr>
</tbody>
</table>

The survey results and analysis in chapter 5 show that the majority of statements generally received positive responses. This places the depot in a favorable position to implement Lean and benefit from the range of Lean tools.

Implementation of Lean will assist management in recognizing good performance and dealing with poor performance where there is deviation from set standards. The survey results for statements 32 and 33 highlighted that although management deals with good performance publicly, there seems to be a reluctance to deal with poor performance in the same manner.

An opportunity is identified to use Lean tools such as 5S, total productive maintenance, flexible resources, value stream mapping, queue management, Kaizen and waste elimination. Implementing these Lean tools will assist management in better engaging the employees of the depot through continuous improvement, which will directly address the negative responses revealed in the survey, as staff indicated that they have a clear desire to be more engaged and involved in the day to day improvement of the depot operations. Staff also indicated their willingness to engage in work beyond the scope of their daily tasks and understood what both management and customers expect of them.
6.3.2 Choice of Lean tools

The Lean tools chosen for recommendation to depot management are:

- **5S** – due to its ability to create order and keep employees focused and productive. Given that from the survey communication regarding change and personal development being documented and communicated to all employees got negative responses. This will assist in maintaining an orderly workplace where all information will be stored in designated areas and be easily accessible to all staff.

- **Total productive maintenance** – Looking at the high levels of equipment failure and taking into consideration the large percentage of employees (30 percent) who responded negatively to statement 24 “I have the required tools to perform my duty” total productive maintenance will greatly assist in reducing depot transit times, which was identified as a major problem in depot. Given that the depot business is mainly the repair and handling of containers with failing machines and poor tools the depot can only benefit from implementing this Lean tool.

- **Flexible resources** – As ascertained in the survey, staff responded positively to various questions about their willingness to work beyond the scope of their daily tasks. It was unanimously stated by respondents responding to statements 34 and 35, that they understand customer expectations and their role in satisfying customers. An area of concern is the response to statement 31 I get sufficient support
from my team leader”. A 23 percent negative response could mean that because staff is rotated, certain staff receives support from team leaders, while others do not. Flexible resources could balance out poor support as staff would then inform one team leader of the approach of another.

- Value stream mapping – given the current inefficient layout of the depot and the seven wastes (identified in chapter two), value stream mapping would. The negative turnaround time of trucks clearly illustrates the importance of utilizing this Lean principle, which will bring about greater flow in the depot as discussed in chapter three with reference to figure 3.2 and figure 3.3.

- Queue management – from the survey of trucks visiting the depot and the time they spend there, it is evident that the depot has to look at a simplified queue management system that will facilitate flow. It is unacceptable for a truck to spend two hours and 45 minutes in the depot queue by any standard. Trucks regularly spend more than an hour waiting to be serviced. Queue management has the potential to unlock this bottleneck in the depot and bring about flow, waste elimination and ultimately, more satisfied clients.

- Kaizen – Through their responses, staff clearly demonstrated their willingness to contribute to the improvement of depot operations. The majority of respondents answered positively to implementing change and process improvement. They also positively indicated that they are allowed to bring about changes within the depot operation. Therefore Kaizen would be an appropriate Lean tool to harness the willingness of staff to
improve depot operations, since Kaizen has continuous improvement at its core.

- Waste elimination – depot staff responded positively to taking the initiative and therefore a waste elimination program would be the ideal Lean tool to target waste to create value. Staff indicated that they had been trained to do their jobs and take part in providing suggestions on how to improve output program.

6.3.3 5S
According to Bicheno and Holweg (2008:50), 5S is one of the most popular Lean tools. The process is easy to implement and creates positive results in a short space of time due to its ability to bring about order in what could otherwise be a chaotic workplace. 5S implementation normally gives management an opportunity to see how sincere staff is about getting involved in the changes taking place. The main focus of 5S is keeping the workplace neat and tidy and putting everything in its appropriate place. This gives employees the satisfaction of being responsible for keeping their work area clean and organized.

6.3.4 Total productive maintenance
To enhance turnaround time and facilitate greater flow in the depot, the management team should introduce TPM for all equipment within the depot operation. According to Bicheno and Holweg (2009:70), TPM can be regarded as integral to Lean. It is inconceivable to effect Lean implementation with the high levels of breakdowns evidenced from the results of the empirical study.
TPM goes beyond breakdown issues and addresses issues relating to availability, performance, quality, safety and capital investment through best use of equipment, which results in extending the economic lifecycle of the equipment (Bicheno and Holweg, 2009:70). The poor state of equipment has a direct bearing on the depot turnaround times of trucks, as a clear correlation between reduced availability of handling equipment and truck waiting time is evident. Staff do not have a Senior Certificate, that there are a large number of temporary staff and staff who work for less than one year could also contribute to poor equipment handling. Poorly trained, inexperienced staff handling equipment incorrectly results in a high rate of breakdowns leading to lost productivity and high maintenance costs.

6.3.5 Flexible resources
Flexible resources include both people and equipment use. The depot will benefit greatly from utilizing staff and equipment as and when needed. Through the multi- and up-skilling of staff, depot management can derive greater efficiency and waste elimination through increased productivity from both staff and equipment. Although the survey results show staff to be flexible in doing more than simply work related to their jobs, the demographic information has highlighted a large number of employees who do not have a Senior Certificate, not permanently employed and have less than one year of service.
According to Russel and Taylor (2003:512), the flexible resources approach critically reduces waste in the form of inventory and scrap. A flexible workforce that can engage with more than one machine or function at a time is a requirement of Lean (Russell and Taylor, 2003:512).

Management should devise comprehensive training programs to ensure staff is trained to the levels required for flexibility: training will result in minimal idle time, as staff can be moved to where they are required to operate at any given time. Training should include the handling of equipment and machinery so as to bring about greater flexibility in staff utilization. It is also important to note that whilst for statement 2 a higher positive result was obtained from respondents then for question four where it was found that while staff are generally shown how to do work better there is not a similar emphasis on personal development where the feedback on the individual needs improvement.

6.3.6 Value stream mapping
According to Bicheno and Holweg (2009:94), value stream mapping’s real purpose is to design the future state, which is a visualization exercise done by establishing priorities for Lean implementation, short and medium term. Mapping for many staff members is their first practical exposure to Lean outside a classroom, or after a 5S exercise, which is also an excellent tool for idea generation (Bicheno and Holweg, 2009:94). The section of the survey dealing with change management was encouraging: idea generation, teamwork and communicating, and documenting improvements
scored reasonably highly with respondents. This emphasizes the potential to harness employees to contribute to the improved future state of the depot.

According to Randor, Walley, Stephens and Bucci (2006:22), value stream mapping is a tool to analyse and identify critical process activities in order of sequence, speed, and time to determine whether or not value is added. The Stanbridge Road depot management needs to understand the key requirements for mapping and implementation as follows:

- A ‘Lean promotion office’ or a supporting organization of expert facilitators or alternatively, a Lean consultant or sensei;
- Team leaders and supervisors from the depot, including administrators;
- Staff from different shifts both operational and clerical;
- Other key staff from various support functions, that is, quality, maintenance and account;
- Key customers or suppliers if it is decided that they should be involved;
- One or two outsiders to ask the ‘silly’ questions and learn the concepts for their own use later on;
- Middle management involvement is highly desirable and the wider Lean’s scope, the more necessary.
6.3.7 Queue management
According Bicheno and Pieterse (2008:127), to ignore variation would be inviting disaster in the service environment. The greatest challenge for service and administration is that it is impossible to store capacity. If the average demand is known, it is possible to forecast the probability of a certain number of clients arriving. In service queues matching capacity with demand is a major challenge. In the case of the depot, demand is mainly seasonal, which puts added pressure on resource planning.

The management of the depot has different queue planning techniques at their disposal depending on the level of variation in and out of season. The consistent application of these initiatives will bring about a shift in culture to one of continuously striving for the ideal way of doing things. This will improve productivity, encourage staff participation and boost staff morale.

6.3.8 Kaizen
According to Imai (1997:1), Kaizen is about improvements that include everyone within the organization with relatively minimal expense to ensure a culture of continuous improvement. The depot management team should introduce Kaizen initiatives. Improvements under Kaizen may seem small and insignificant, but over time they bring about dramatic results.

According to Imai (1997:10), a suggestion system as an integral part of Kaizen boosts employee morale and participation. The survey results clearly indicate that improvements through employee
suggestions and initiatives are encouraged at the depot. This will facilitate the implementation of Kaizen as employees already participate in improvement and change initiatives.

According to Bicheno and Holweg (2009:192), quality begins with the customer, but the customer’s view changes continuously and standards are rising. Consequently, continuous improvement is required in small increments at all levels: everybody has a role to play from top management to shop floor employees (Bicheno and Holweg, 2009:193).

Quoting Imai, Bicheno and Holweg (2009:193) note that there are several guiding principles to the philosophy of Kaizen. These include:

- Questioning the rules - standards are needed, but work rules are “there to be broken” and should be broken over time;
- Developing resourcefulness – a management priority is to develop everyone’s participation and resourcefulness;
- Get to the Root Cause – this involves trying not to solve problems superficially;
- Eliminate the whole task – question whether a task is necessary;
- Reduce or change activities – be aware of opportunities to combine tasks.
6.3.9 Visual management
The management of Stanbridge Road depot would benefit from implementing visual management. The results of the survey for statements 20, 31 and 33 dealt with the results of initiatives being implemented and documented. “I get sufficient support from my team leader and management reacts appropriately to poor performance” drew negative responses. Visually displaying performance indicators could address the negative responses. According to Bicheno and Holweg (2009:82), visual management or control by sight is a key theme in the Lean operations. According to Imai (1997:98), visual management is a powerful tool that can motivate workers to achieve managerial targets, assist in identifying problems, and highlight discrepancies between targets and what is actually being achieved.

Imai (1997:96) notes that visual management’s first reason for existence is to make problems visible, and the second reason is to assist staff and management to stay in direct contact with what is happening on the shop floor. Visual management highlights when operations are under control and sends warnings when there is a problem. The Stanbridge Road depot management could use visual management to highlight progress on cost, quality, productivity, safety and profitability.

6.4 RESOLUTION TO THE THIRD SUB-PROBLEM
In chapter 2, death with Lean philosophy, tools and implementation which apply to different situations and environments. A few of the recommendations by Bicheno, and Holweg, (2009:43) is appropriate for implementing Lean at the Stanbridge Road depot.
An appropriate implementing strategy for the depot would require the following:

- Senior management buy-in and support;
- Senior management understanding the concept and its benefits;
- Management embracing the continuous improvement philosophy and supporting implementation;
- Training employees about the Lean philosophy;
- Identifying and committing resources to improvement opportunities;
- Taking a phased approach to avoid conflicting priorities from clashing;
- Taking a project management approach;
- Starting with quick wins which will motivate and assist in further selling the concept.

6.5 THE RESOLUTION FOR THE RESEARCH OBJECTIVES

The aim of the study was to investigate how Lean manufacturing tools can be used to improve efficiency and customer service and enhance the embedding of a continuous improvement culture in the Grindrod Intermodal Stanbridge Road Depot.
Through solving the sub-problems the research objectives were met. The data gathered in the literature review was analysed and interpreted. An empirical study was conducted, which enabled the researcher to conclude that the Stanbridge Road depot of Grindrod Intermodal in Deal Party, Port Elizabeth could improve its efficiency, customer service, profitability and embed a culture of continuous improvement among staff by adopting the Lean philosophy and using Lean tools. The survey results clearly indicate positive responses from staff in the areas of staff engagement, change implementation and monitoring, and operational effectiveness.

6.6 CONCLUSION
Due to the competitive nature of the business environment today organizations have to find effective strategies to utilize their scarce resources. It is incumbent upon companies to search for more effective ways to conduct their business through the appropriate implementation strategies and to sustain change for continuous improvement. Given that the Stanbridge Road depot operates in a fiercely contested and competitive market, Lean could provide the depot with an enduring competitive advantage.

Implementing Lean as a management philosophy to deal effectively and efficiently with the depot operations will immediately identify areas where waste can be eliminated and turned into value. In chapter 2, the 7 wastes were identified. After studying the operations and processes at the Stanbridge Road depot all the 7 wastes identified. Combined with waste elimination, a 5S initiative
will most certainly augment a waste reduction program culminating in value being added.

The idea is to create an environment where staff members can share knowledge and experience freely. This would include encouraging ideas and suggestions from staff in order to contribute to a continuous improvement culture in the depot. The result will be better utilization of staff and equipment bringing about faster turnaround and reducing trucks waiting time at the depot.

In conclusion, Lean could be used in the Stanbridge Road depot to improve efficiency, customer service and profitability by eliminating waste and turning it into value. The outcome would be a culture of continuous improvement, driven by engaged and committed employees, as a result of being involved in the improvement of depot operations.

6.7 SUGGESTIONS FOR FURTHER RESEARCH

- It is proposed that a project focused on reducing the writing of and capturing of quotes and repairs and direct capturing at source with the appropriate IT platform be explored to reduce various duplications. This could eliminate non-value adding monotonous data capturing activities and free up staff for value adding activities.

- A project for setting minimum skills levels for technical staff and ensuring that they are trained to that level will guarantee that quality levels and minimum industry standards are complied with.
• A comparison of current Standard Operating procedures versus what is actually happening will identify gaps for improvements;

• It is proposed that a study concerning whether people behave differently during peak season than in off peak season be undertaken to determine whether there is a difference in behavior, and if so, what influences the difference, and what could be potential motivators be in the different environments. Should a difference be highlighted between peak and off peak, it would put management in a better position to plan for the different operational requirements.

6.8 RECOMMENDATIONS
• It is proposed that Stanbridge Road depot make effective use of morning toolbox talks at weekly and monthly meetings.

• It is recommended that depot operates on a single site.

• Drivers of handling equipment should be sent on the appropriate training to ensure machines are handled in the correct manner, aiding the improved maintenance and longevity of machines.

• It is recommended that a queue management system be implemented with minimum waiting times set as a standard to be achieved and maintained.

• It is recommended that all positions be filled with permanent rather than temporary staff.

• It is recommended that the layout of the depot be addressed to reduce all 7 forms of waste identified in chapter 2
• It is recommended that an internal audit process be implemented to ensure compliance with set standards.
7. LIST OF SOURCES


Leedy, P.D. 1997. Practical research. Planning and design. 6\textsuperscript{th} ed. Upper Saddle River, new Jersey: Merril/Prentice Hall.

Leedy, P.D. & Ormrod, J.E. 2005. Practical Research: Planning and design 8\textsuperscript{th} ed. New Jersey: Prentice Hall.


Annexure

1.1 August 2013

Dear Colleague

Research Survey: How Lean manufacturing tools as used in manufacturing enterprises can be used to improve the operations of Grindrod Intermodal Container Depot in Stanbridge Road.

I would like to invite you to participate in the survey for the purpose of investigating the implementation of Lean principles in the operations of the container depot in Stanbridge Road Deal Party Port Elizabeth. The outcome of the research will be submitted to the Nelson Mandela Metropolitan University (Business School) in partial fulfilment of a Master’s degree in Business Administration (MBA).

Your assistance is greatly appreciated. Could you please complete the questionnaire to the best of your ability, assuring you that every reasonable effort was made to limit the demand on your time and will only take a few minutes to complete? The anonymity of respondents is guaranteed and all responses will be treated in the strictest of confidence.

The purpose of the questionnaire is to determine your opinions of the Lean implementation and the benefits associated with such a system operated in the depot. Based on the information obtained from the survey, the researcher will apply the appropriate guidelines to determine the success and subsequent factors associated with a Lean manufacturing system implementation at the Stanbridge Road depot.
Should you require any additional information, please contact Ferderico Andrews at telephone number 041-4862224 or on mobile telephone number 0836615851 or via email at ferdericoa@grindrodim.co.za.

Thank you for your co-operation

Ferderico Andrews

Researcher

Questionnaire used for the survey study.

Demographic Information

1. **Gender**
   - Male
   - Female

2. **Age bracket**
   - 20 – 24
   - 25-35
   - 36-45
   - 46+

3. **Staff reporting to you**
   - 0
   - 1-5
   - 6-10
   - 10+

4. **Employment type**
   - Fixed term contract staff member
   - Permanent staff member

5. **Job category**
   - Academic
   - Professional
   - Technical
   - Auxiliary
6. **Highest qualification**

<table>
<thead>
<tr>
<th>Some Schooling</th>
<th>Matric</th>
<th>Diploma</th>
<th>Degree</th>
</tr>
</thead>
</table>

7. **Length of service**

<table>
<thead>
<tr>
<th>Less than a year</th>
<th>1–5</th>
<th>6–10</th>
<th>11–15</th>
<th>16+</th>
</tr>
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</table>

### Staff Engagement

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I find the work I do stimulating</td>
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<tr>
<td>2. I feel that I am being helped in improving my abilities to perform my duties</td>
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<td>3. I have the freedom to contribute to improving the work environment</td>
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<td>4. I regularly get feedback on my personal development and how to improve as an individual</td>
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<tr>
<td>5. I have made changes in my workplace which I am proud off</td>
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<td>6. I am encouraged to be part of a team culture</td>
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<td>7. I am willing to assist with duties outside the scope of my normal duties</td>
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<tr>
<td>Change implementation and monitoring</td>
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<td>--------------------------------------</td>
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<tr>
<td>8. Staff are informed of changes before they happen</td>
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<td></td>
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<tr>
<td>9. Staff are consulted regarding changes</td>
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<tr>
<td>10. The input of staff is considered during changes</td>
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<tr>
<td>11. Staff are allowed to change how things get done if there is no risk of a process violation</td>
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<tr>
<td>12. Staff is encouraged to suggest improvement ideas</td>
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<tr>
<td>13. Management is receptive to the improvement ideas provided by staff</td>
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<td>14. Improvement ideas are discussed in department toolbox talks</td>
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<td>15. Improvement ideas are implemented</td>
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<td>16. There are clear channels for communicating improvement ideas</td>
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<tr>
<td>17. Implemented ideas are sustained by management and staff</td>
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</tbody>
</table>
18. Training for new procedures is provided for staff

19. Management offer guidance to staff in order to cope with change

20. The results of initiatives implemented are documented

21. The results of these initiatives are communicated to all staff

22. Only the benefits of these results are communicated

<table>
<thead>
<tr>
<th>Operational Effectiveness</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>23. I know what is expected of me</td>
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<tr>
<td>24. I have the required tools to perform my duty</td>
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<td>25. I have been trained to perform my daily tasks</td>
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<td>26. When problems occur they are quickly resolved</td>
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<td>27. Problem solving is encouraged among staff members</td>
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<tr>
<td>28. Management is supportive of employees taking initiative</td>
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<tr>
<td>29. There is a healthy team spirit in the depot</td>
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<tr>
<td>30. I work in a positive team environment</td>
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<tr>
<td>31. I get sufficient support from my team leader</td>
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</tbody>
</table>
32. Good performance is recognised publicly by management

33. Management reacts appropriately to poor performance

34. I understand the customers’ expectations from the depot

35. I understand my role as individual to contributing to the satisfaction of customers

Annexure 1.2

Trucks time spend at depot

<table>
<thead>
<tr>
<th>Date</th>
<th>Time In</th>
<th>Time Out</th>
<th>Time Spent</th>
</tr>
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<tr>
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<td>08:20</td>
<td>10:10</td>
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</tr>
<tr>
<td>13/09/03</td>
<td>12:05</td>
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<tr>
<td>13/09/04</td>
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<td>00:25</td>
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<tr>
<td>13/09/05</td>
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<tr>
<td>13/09/06</td>
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<tr>
<td>13/09/09</td>
<td>10:22</td>
<td>11:32</td>
<td>01:10</td>
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<td>13/09/10</td>
<td>08:30</td>
<td>11:15</td>
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<td>13/09/11</td>
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</tr>
<tr>
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<td>Time 2</td>
<td>Time 3</td>
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