Master's degree thesis

LOG950 Logistics

Implementation Of Lean In The Public Sector: Investigating The Benefits And Drawbacks.
(A Case Study of Molde Municipality)

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DEDICATION

I dedicate this work to my husband, Bright Baffour Antwi and my son, Nana Yaw Baffour Antwi.

Preface

This thesis is submitted in partial fulfilment of the requirement for the Master's degree in Logistics at Molde University College – Specialized University in Logistics, Molde, Norway.

I would like to acknowledge Professor Judith Ann Molka-Danielsen, Molde University College, for her great supervision given throughout the work. I would also like to show gratitude to Jeanette Blikås – Lean Advisor to Molde Municipality, her immense contribution, the uncountable meetings we had with all the email correspondings, and guidelines gave me a lot of experience and knowlegde on how to go about this work.

Moreover, all the heads of units of Kvam school, Nordbyen School, Molde Adult Education Centre and Glomstua Care Center, all of Molde Municipality I say many thanks for giving me some time off your busy schedule to have meetings with me for the interview. Again, I wish to give gratitude to all respondents at Molde municipality for their support through answering of the survey. Your response made this work achievable.

Not forgeting Associate Professor Arid Hoff and Edward Deodat Mwesiumo, thank you both for your help.

Abstract

The issue of Lean in a public service is interesting, Lean management's philosophy focused on identifying and eliminating waste throughout a product's entire value stream. It originates from the manufacturing system of Japanese automotive manufacturer Toyota and attracted widespread attention worldwide due to its tremendous success. Lean promises significant benefits in terms of waste reduction, and increased organizational and supply chain communication and integration. Generally, in terms of operations and improvements, service companies are often far behind manufacturing industries. Transferring Lean management concept from the manufacturing shop floor to services might offer opportunities for improvements. Many manufacturing businesses have improved and profited by the use of Lean management methods and tools. Yet the benefits have not been as nearly as impressive for service industries applying Lean management principles.

In addition, implementing Lean and achieving the levels of employee autonomy, organisational commitment, and information transparency needed to ensure its success is a complicated task. This research looks into the different approaches to develop a speculative structure for implementing Lean management in public institutions. Based on a thorough theoretical outline for implementing Lean management methods in production and considerations about service management through the use of interviews and surveys, challenges of implementing Lean in a service environment is derived.

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1.0 INTRODUCTION

Considering where Lean as a concept originates being the automotive sector, the application of Lean without the accurate adaptation for service organisations has been the critiques of many (Arfmann & Barbe, 2014). The Japanese automotive manufacturer Toyota, only thought about how Lean can improve its processes when it was invented, which has attracted widespread of attention worldwide due to its tremendous success. Little did we know that there would be a time where service industries would also be interested in Lean management and embrace it in their lines of work. Lean as a philosophy has been concentrated on the identification and elimination of waste throughout the entire stream of a product. Lean originates from the Japanese automotive manufacturer Toyota, and have since attracted widespread attention worldwide due to its outstanding success (Damrath, 2012). Transference of Lean management concept from the manufacturing shop floor to services might offer opportunities for improvement (Damrath, 2012).

Countless number of manufacturing businesses have made improvements since the introduction of Lean management methods and tools. However, the benefits have not been as nearly as impressive for service industries applying Lean management principles. The absence of broad available references, which aids in Lean implementation in the service sectors, is a challenge (Damrath, 2012). Although some successful examples of Lean implementations in service businesses could be noticed in the past, no standardized framework or general guideline was solidified for implementing Lean management in service institutions. For example, how Taco Bell, one of the first companies on record to apply Lean service, which led to efficiency with low cost operations and flexibility and Southwest airlines' adoption of Lean services led to the elimination of services costs, seamless flow and speed of service delivery, and the creation of a service experience for customers (Higor & Guilherme, 2013).

Lean concepts have proven to be a principal idea for manufacturing industries globally. It has gradually become an integral part of service sector where it exhibit the potential to reap substantial benefits. Lean originated from the automotive sector and more specifically in the Toyota Motor Cooperation, which implies that the core principles and practises of Lean have been clearly designed for use in organizations involved in high volume, repetitive manufacturing environments (Liker, 2004). Since then, a wide range of sectors in

manufacturing, service, the private and public institutions have adopted Lean approaches in their various processes (Holweg, 2007). There is the need for companies who want to implement Lean to have systems where information is transparent and employees have sovereignty in order to ensure a successful implementation.

In addition, implementing Lean and achieving the levels of employee autonomy, organisational commitment, and information transparency needed to ensure its success is a complicated task. This research looks into the different approaches to develop a speculative structure for implementing Lean management in public institutions. Based on a thorough theoretical outline for implementing Lean management methods in production and considerations about service management through the use of interviews and surveys, challenges of implementing Lean in a service environment is derived.

1.1 Problem Statement, research purpose and research questions

The central point of this thesis is Lean implementation in the public sector with respect to the challenges that management and staff go through in the implementation process, moreover, this work will also take into account the associated advantages that Lean implementation brings to the public sector. The emperical setting that was used to conduct investigation for the thesis was Molde municipality with a selection of some of the units.

1.1 Objectives of the study

It is undoubtedly interesting to know how Lean can be implemented in service organizations, to consider the positive outcomes and the possible drawbacks. Service industry, as in many other industries is encountered with countless number of waste hidden in their normal processes. These kinds of waste if not adequately understood, and consequently not properly managed results in inefficiencies all the way through a particular process in the supply chain. These inefficiencies are not only because of wasteful practises in service processes carried out at the workplaces, but also occur as a result of wasteful practises due to organizational settings, employees' attitude towards change and the kind of strategic operational strategies put in place.

Administrative processes when analysed through the use of Lean concept and tools, increases transparency and helps in detecting several types of wastes within these processes, and opportunities for improvement on such performance and sustainability of each system, and ultimately for the whole organization.

Therefore, the focus of this thesis would be to investigate the processes, which is among the activities performed in the office environment of service organizations before Lean is implemented and after Lean is implemented.

The Objectives of this thesis is then:

- To examine the reasons behind Lean implementation in Molde municipality.
- To understand the tools, techniques and components that are more suitable for the application of Lean in the public sector.
- To examine the advantages and disadvantages with Lean application.
- To acknowledge the employees' attitude towards change.

1.2 Research Questions

Based on the above-mentioned problems, the thesis seeks to address the following research questions: this thesis is concerned with how the public sector is able to implement To achieve the objectives of this thesis, I decide to investigate the whole processes with these research questions:

What are the reasons for implementing Lean in the public sector?

What are the tools and techniques used in the public sector Lean?

What are the possibilities and limitations of using Lean in the public sector?

How is Lean able to transform work processes in the public sector?

1.3 Organization of the Study

This study comprises of six main chapters, this chapter deals with the scope of the research, the research objectives and research problem. Chapter two presents the literature review of Lean management. Chapter three caputeres the methodology used in the research. Chapter four discusses the case studies presentation. Chapter five is about the Discussions and

findings. and analysis of the research findings. The last chapter six, is the conclusion and limitation of the research.

1.4 Summary

This chapter contains the introductory body, followed by the research problem, the research scope and objectives of the study. It also include the outline of the whole research. The next chapter presents the literature review of Lean management, public sector and the Lean service.

2.0 LITERATURE REVIEW

2.1 Historical background of Lean

The concept started in the early fragment of the twentieth century, where Henry Ford of Ford Motor Company and Alfred Sloan who was then with General Motors, made a move in manufacturing from a craft industry. This required particular skill and knowledge of the individual worker, into a model of mass production. The Japanese manufacturer Toyota in the mid-twentieth century, made an improved development in their production technique known as the Toyota Production System (TPS), which has been popularly known as Lean manufacturing (Womack & Jones, 1996). The mass production model that was recognised in the automobile industry during the 1990s was quickly adapted in nearly all the automobile industries in North America and Europe (Womack, et al., 1990).

The Japanese industrial base needed to redevelop itself after the World War II. The industrial area had extensively been destroyed during the war and its productivity was far behind that of the United States. American productivity was nine times higher than that of their Japanese peers. The Toyota Production System, which focused on waste reduction and is said to be the foundation of Lean manufacturing is credited to Taiichi Ohno for its development (Keyes, 2013). Toyota developed various of the techniques that are now linked to Lean manufacturing through the use of waste reduction as a tool to reduce the productivity gap between Japan and the United States.

The original manufacturers of the Toyota Production System (TPS) describes it as a production system, which is stepped in the philosophy of "the complete elimination of all waste" revealing all aspects of production in quest of the most efficient methods (TOYOTA, 2016). Their way of making things, which has been termed as "Lean manufacturing system or Just-in-Time (JIT) system, has become a popular phenomenon studied worldwide.

2.2 Lean Manufacturing

Studies that concern Lean prompt numerous questions into the researchers' minds. You would want to know 'what is Lean? How do you define Lean? How does Lean and other management concepts able to identify with each other and many other issues.' (Pettersen, 2009). Lean manufacturing has countless definitions associated with it. Definition of Lean by some researchers apply specifically to the manufacturing processes for which it was intended for, whiles others attribute its meaning to cater for a variety of industries (Worley & Doolen, 2006). The main idea conceived with Lean has been to maximize customer value while minimizing all the wastes that come with that value. Lean has been identified as simply an approach of using fewer resources to provide a satisfactory customers' value. Lean production system was introduced by John Krafcik in 1988 in his review of the Toyota Production System, in their numerous publications about Lean manufacturing, Womack et el (1990), made the word popular with their publication ***The Machine that Changed the World*** (Keyes, 2013).

In another review, the term "lean" as a manufacturing approach was defined as:

"….compared to mass production it uses less of everything-half the human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time. Also it requires keeping far less than half the needed inventory on site, results in many fewer defects, and produces a greater and ever growing variety of products." (Papadopoulou & Özbayrak, 2005).

Iin the American Production and Inventory Control Society (APICS)….

"Lean Production is a philosophy of production that emphasizes the minimization of the amount of all the resources (including time) used in the various activities in the enterprise. It involves identifying and eliminating non-value adding activities in design, production, supply-chain management, and dealing with the customers. Lean producers employ teams of multi-skilled workers at all levels of the organization and uses highly flexible, increasingly automated machines to produce volume of products in potentially enormous variety." (Papadopoulou & Özbayrak, 2005).

The emphasis of Lean manufacturing is based on the idea that manufacturing only takes place when there is an order from the customer. As a result, Lean production uses a pull system for inventory and production control. Products produced under the Lean system are done 'Just-in-Time' – which gives the ability to reduce flow times within production as well as the time it takes to respond from suppliers to customers. The figure below portrays the Toyota House from the Toyota Production System, which describes all the elements in the Lean philosophy.

The Toyota House

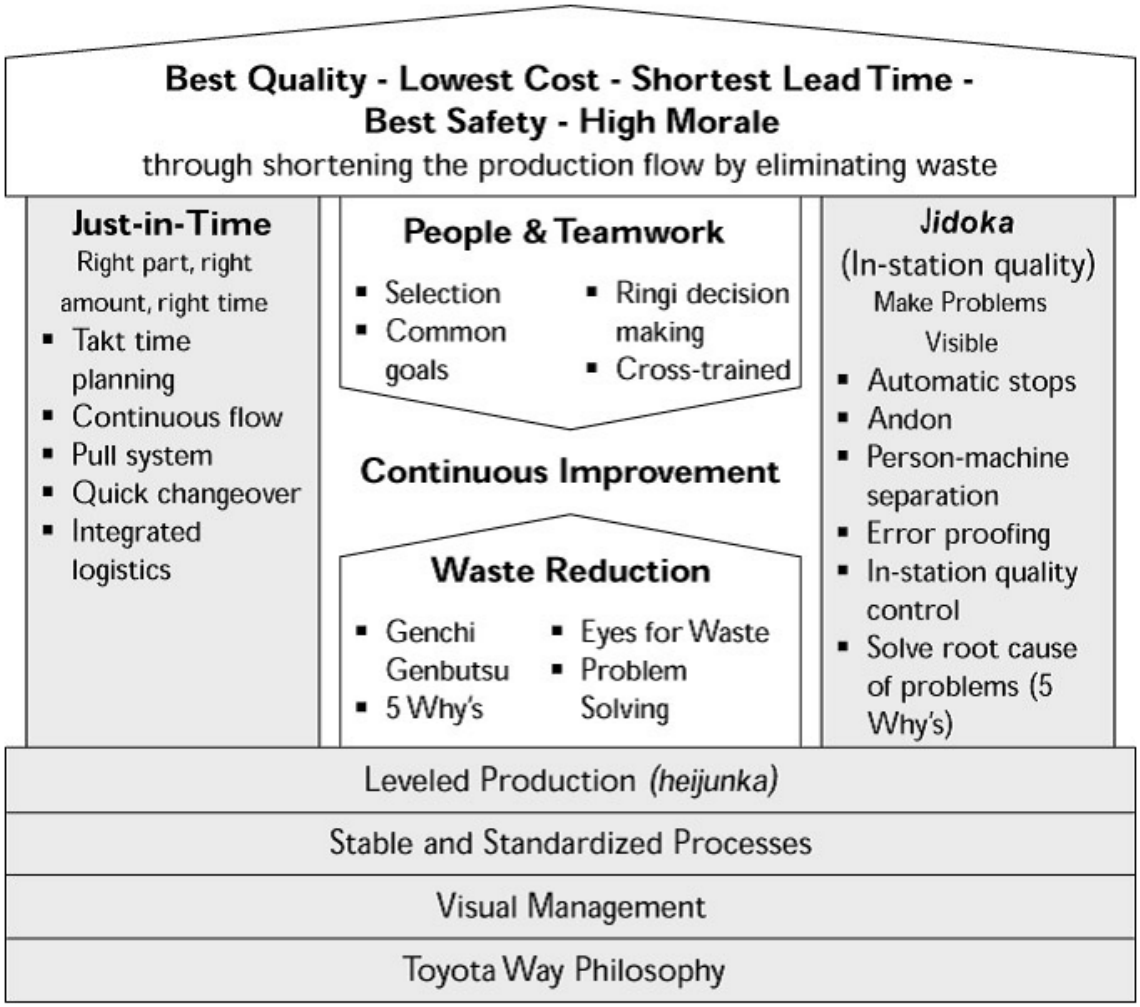


Figure 1-1: "The TPS House" (Source: (Liker, 2004)

2.3 Fundamental elements in Lean concepts

TOYOTA, indicates that continuous improvement has been the main basis on which the production control system is based, with the objective of 'making the vehicles ordered by customers in the quickest and most efficient way, so that vehicles ordered can be delivered as quickly as possible'. TPS was established based on two concepts: The first concept was "*jidoka*" (automation with a human touch) this concept was intended that the equipment used in the production stops immediately as soon as a defect in production is detected when a problem occur (Bucourt, et al., 2011). The second concept is popularly known as "*Just-in-Time*" production. With this process, the producers only produces the products that is needed by the next process in a continuous flow. It was based on these two basic philosophies that the Toyota Production System was able to be efficient as they were able to produce vehicles of good quality, which also met their customers' requirements and satisfaction (TOYOTA, 2016). The main idea for a Lean introduction is the elimination of waste.

2.4 Lean Thinking

The fundamental objective of Lean management is to have a continuous improvement systems, which eliminates wastes to its minimum and to make sure that all activities and processes that take place in any part of the organization adds value to the final customer. Transformation of materials and information into products and services to satisfy the customers' needs and wants are classified as value-added activities (Modi & Thakkar, 2014). Procedures that consume resources in terms of materials and or human activities, but do not contribute to the value added for the customers are all considered as wastes (Wahab, et al., 2013). *Muda* is a Japanese word for waste. Taiichi Ohno in pursuit of getting result for waste-driven approach identified "seven wastes" that afflict the seamless flow of activities that adds value to the customer (Bucourt, et al., 2011). Waste is always associated with Lean. The seven wastes identified were later added the "underutilized people" to Taiichi Ohno's original list by other authors. Conversely, the same type of waste has been termed as "unused employee creativity" (Wahab, et al., 2013). Many scholars and authors have pondered and agreed to the eight types of wastes discussed below.

2.5 The Seven wastes of Lean

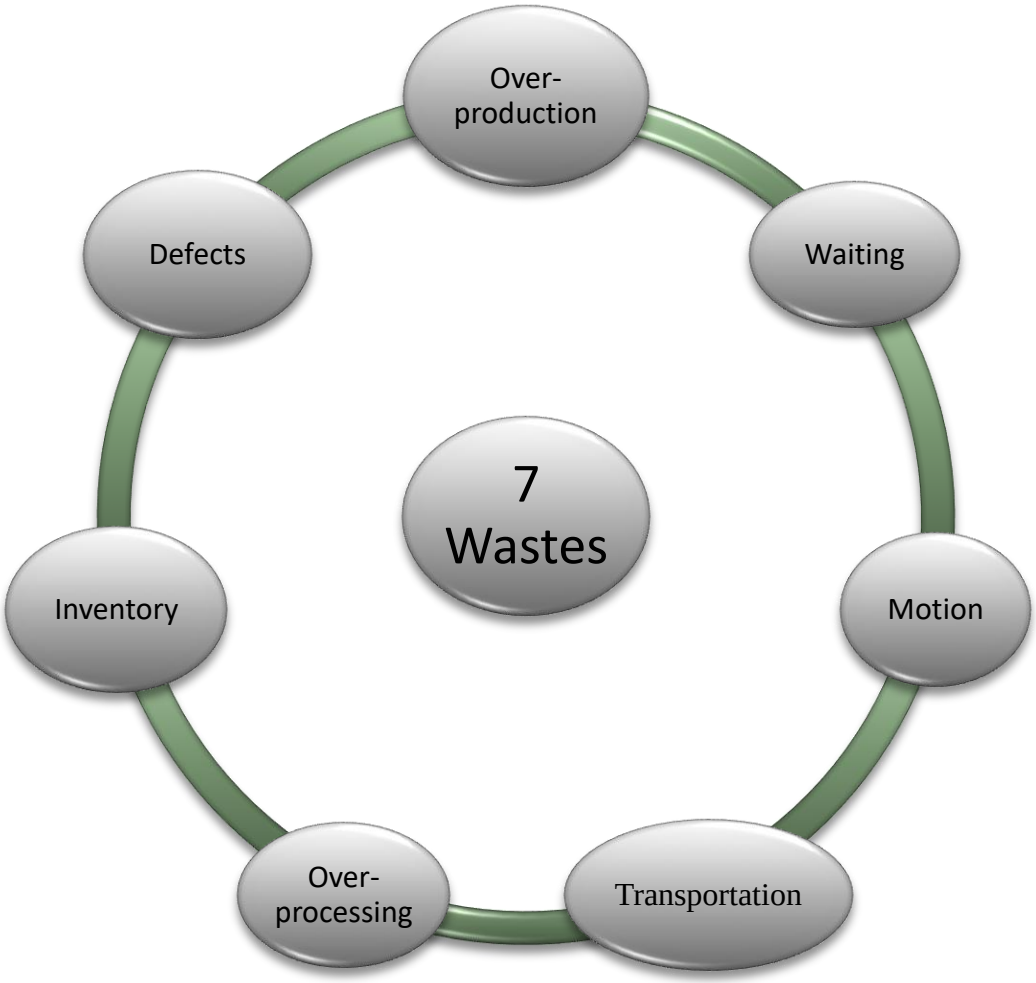


Figure 2: MUDA (Seven types of wastes) (Modi & Thakkar, 2014)

- **Waste of Overproduction**

Overproduction, which leads to waste, occurs when there is continuous operation of goods and services when they are made too early which results in excess. This type of waste is made with the "just in case" perception in mind during production instead of "Just in Time JIT" (Wahab, et al., 2013). In services, this type of waste can occur when management decide to print just too much of what is needed, the printed copies that will not be utilized by any member of the organization to benefit the customer becomes waste and eventually leads to costs and increase in unwanted inventory. Ohno has identified waste of overproduction as the most crucial wastes among the others as it is the creation of the problems within the organization (Wahab, et al., 2013).

- **Waste of Waiting**

When time is not used effectively, it leads to waste of waiting. Too much waiting interrupts the flow of products and services, which is one of the key underlying principles of Lean thinking. Waste of waiting in the service sector includes when a machine breakdown that requires an expert to repair before work can be in progress, when you need to get a response from a colleague in order to make a decision. Excessive waiting has been identified as the element that contributes to higher lead times, ineffective customer satisfaction and competiveness (Wahab, et al., 2013).

- **Waste of Motion**

Wasted motion has both the element of human and machine in it. The human elements of wasted motion occur because of ergonomics of the workplace. Poor office layout that leads to employees reaching out to files or items that are stored far from them when it can be easily located near to them, unnecessary movement, and twists that leaves the employee stressed (Wahab, et al., 2013). Safety, productivity as well as quality of work is highly affected by poor ergonomics of the workplace (Dennis, 2007).

- **Waste of Transportation**

The movement of things from one place to the other that does not add value to the final customer is considered as waste. This could be in the form of materials or actual customers. For instance, moving customers from one office to another office or from one desk to the other to complete a process is termed as unnecessary transportation, which is considered as waste.

- **Waste of Inventory**

Waste caused by keeping of unnecessary stock be it raw materials, work-in-progress, and or finished goods are classified as waste of inventory (Dennis, 2007). Inappropriate keep of inventory becomes waste when it hinders the seamless flow of work, increases space that would affect communication, increases lead time needed to serve customers, and prevent rapid identification of items when needed (Wahab, et al., 2013).

- **Waste of Process**

Failure to communicate customers' requirements to workers, poor understanding of what customers really need, and the inability to transform what customers requires into actual products. This type of waste happens when for instance reports are over-produced (too long, too elaborate) (Kavanagh & Krings, 2011).

- **Waste of Defects**

Time, money, materials and energy is wasted every time this type of waste happens. Rework causes the worker to do what has already been done mistakenly. Rework results in double costs, unsatisfied customers and sometimes total loss of customers. Toyota recalled more than 1.6million cars, which had defective airbags since the production in 2013. This costs them a lot and to some extent, the company's reputation.

- **Waste of Underutilized People**

These wastes refer to involving more people on the job, which is meant for less people. The failure to make full use of employees' knowledge, abilities and skills (Kavanagh & Krings, 2011). Giving a particular work that can be done by 2 people to 5 people to perform turns to underutilize some of the workers who would not actually get involved in the doing process. Employees are required to use their creative brainpower, they are to be inspired to their highest potentials, and their point of view needs to be recognized.

2.6 Lean tools and techniques

"Building blocks" are the term used for the tools and techniques used in Lean implementation (Pojasek, 2003). Wastes from the business processes, be it manufacturing or services can be reduced or eliminated using the right tools and techniques. There are different types of tools and techniques used in various companies; every company has adapted tools that fits best with its system. The most commonly used tools and techniques under Lean management are pondered below:

*Table 1**: Lean Tools_ Their Definitions_ and How They Help.***

Lean Tool	What Is it?	How Does it Help?
5S	Organize the work area: • Sort (eliminate that which is not needed) • Set In Order (organize remaining items) • Shine (clean and inspect work areas) • Sustain (regularly apply the standards)	Eliminates wastes that results from a poorly organized work area. Time wasted in looking for a file. (associated with the Waste of motion)
Gemba (The Real Place)	A philosophy that reminds us to get out of our offices and spend time on the plant floor / office floor – the place where the real action takes place.	Promotes a deep and thorough understanding of real-world manufacturing issues – through first-hand observation and talking directly with the ground employees
Continuous Flow	A manufacturing process where work-in-process smoothly flows through production with minimal (or no) barriers between steps of the manufacturing process.	Eliminates many forms of waste (for instance, inventory, transport and waiting time)
Heijunka (Level Scheduling)	A form of production scheduling that purposely manufactures in much smaller batches by sequencing (mixing) product variants within the same process.	Reduces lead times and inventory.
Hoshin Kanri (Policy Development)	Align the goals of the company (Strategy), with the plans of middle management (Tactics) and the work performed on the plant floor (Action)	Ensure that progress towards strategic goals is consistent and thorough – eliminating the waste that comes from poor communication and inconsistent direction.

Jidoka (Autonomation)	Design equipment to automate partially during manufacturing process (partial automation is typically much less expensive than full automation) and to stop automatically when defects are detected.	After Jidoda, workers can monitor multiple stations and many quality issues can be detected. This element reduces cost of labour and improves quality.
Just-In-Time	Pull parts through production based on customer demand instead of pushing parts through production based on projected demand. Relies on many lean tools, such as Continuous Flow, Heijunka, Kanban, Standardized Work and Takt Time.	Highly effective in reducing inventory levels. Improves cash flow and reduces space requirements.
Kaizen (Continuous Improvement)	A strategy where employees work together proactively to achieve regular, incremental improvements in the business processes.	Combines the collective talents of a company to create an engine for continually eliminating waste from manufacturing processes.
Kanban (Pull System)	A method of regulating the flow of goods both within the factory and with outside suppliers and customers. Based on automatic replenishment through signal cards that indicate when more goods are needed.	Eliminates wastes from inventory and overproduction. Can eliminate the need for physical inventories (instead relying on signal cards to indicate when more goods need to be ordered).
Key Performance Indicators (KPIs)	Metrics designed to track and encourage progress towards critical goals of the organization. Strongly promoted KPIs can be extremely powerful drivers of behaviour – it is therefore	The best service KPIs: - Are aligned with top-level strategic goals - Are effective at exposing and quantifying waste

	important in its selection as to get the ones that will carefully drive and desired behaviour.	- Are readily influenced by plant floor employees
Muda (Waste)	Anything that does not add value from the customers' point of view.	Elimination of all Muda (waste) is the primary objective of lean manufacturing
PDCA (Plan, Do, Check, Act)	An iterative methodology for implementing improvements: • Plan (establish a plan and execute results) • Do (implement the plan) • Check (verify expected results gained) • Act (review and assess; do it again)	Apply a scientific approach to making improvements: • Plan (develop a hypothesis) • Do (run experiment) • Check (evaluate results) • Act (refine your experiment; try again)
Poka-Yoke (Error Proofing)	Design error detection and prevention into production processes with the goal of achieving zero defects	It is difficult and expensive to find all defects through inspection, and correcting defects typically gets a greater impact on each stage of production.
Smart Goals	Goals that are Specific, Measurable, Attainable, Relevant, and Time-Specific.	Helps to ensure that goals are effective.
Standardized Work	Documented procedures for manufacturing that capture best practices (including the time to complete a task). Must be 'living' documentation that is easy to change.	Eliminates waste by consistently applying best practices. Forms a baseline for future improvement activities.

Value Stream Mapping	A tool used to map the flow of production visually. Shows the current and future state of processes in a way that highlights opportunities for improvement.	Exposes waste in the current processes and provides a roadmap for improvement through the future state.

Source: Adopted from (LeanProduction.com, 2013)**.**

2.7 Framework for Lean implementation

The different frameworks that have been suggested by different authors for the implementation of Lean is discussed in this section:

Five Principles of Lean Thinking

Lean production was originally a conceptualization of the Toyota Production System (TPS), made in the International Motor Vehicle Program at MIT, and was made known by *The Machine that Changed the World* (Womack, et al., 1990). Before then, research about Toyota Production System entailed descriptions on specific tools and techniques, such as the Just-in-Time (JIT) and Kanban (Monden, 1983) however, none of them considered the whole management system at Toyota (Holweg, 2007). Then, Womack et al. (1990) made a starting point for viewing Lean as a concept, which has continued to develop the knowledge of the principles and practices that has been behind Toyota's success.

The literature that includes important recurring issues can be summarized into six lean principles: define value; define value stream; flow; pull; standardization; and perfection. All these principles are derived from a manufacturing context (Pettersen, 2009); (Shah & Ward, 2007), however, the literature on lean in services remains scant. The lean principles are moderately abstract but do not discuss lean as a philosophy, a way of living or a culture. Neither are they tangible tools specifying how to implement lean in service organizations. Instead, they describe principles that reflect the broad variety of approaches to lean that exist today.

Breaking old patterns and giving the way to new initiatives are the core characteristics of Lean implementation. Old practises in the workplace have to be forgone to make way to new approaches. To make this a reality, an organization needs an all new set of tools and framework for applying the new tools. Several elements are combined to form the integrated system of Lean processes, which with the help of organization's efforts, make great impact (Institute of Management Accountants, 2006).

These five principles by Womack & Jones (1996) are antecedents that help organisations in curbing or eliminating the amount of wastes in their work processes.
The figure below demonstrates a well-known model, which describes Lean with the five principles developed by (Womack & Jones, 1996).

Five Principles of Lean

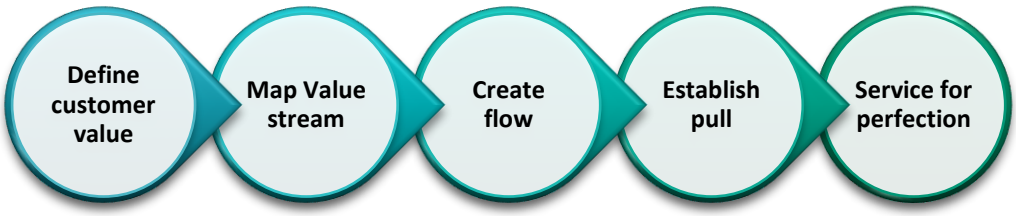


Figure3: Five Principles of Lean

Womack & Jones (1996).

Define Customer Value

A stronger customer perspective is commonly a principal aim of Lean production. Every product or service has its own value. From the manufacturer's perspective, value can be seen as the total cost of producing each unit. There is a subjective assessment of what customers' view as value. Customers prefer to choose products that give them the highest value in terms of the price, and what the products can offer than in relation to what they are paying for. Therefore, the first principle, as defined by Womack and Jones (1996), is defining the value from the customer's perspective, meaning specifying requirements of the product or service. In order to increase the value, both reducing wasteful activities and adding features that do not add value to the product or service (Hines, et al., 2004). Womack & Jones (1996),

emphasized that the value only can be defined by the ultimate customer, rather than by employees or managers within the company.

Define / Map Value Stream

The customer value serves as a basis for defining the value stream, which means planning and analysing the activities in the process and how they add value to the product. The aim of using value stream mapping is to identify the activities that a product follows throughout the entire supply chain so as to know the waste in the value stream to find the appropriate tools to eradicate it. Within the value stream are three types of activities: *Activities that add value to the product or service; activities that do not add value but are necessary for the value-adding activities; and activities that do not create value for the end customer* (Harmon, 2011). The two latter types of activities are defined as waste, but only the third type should be removed instantly. Mapping and analysing the value stream is often the first method when starting Lean work in public sector organisations.

Create Flow

To create continuous flow means to allow a streamline of products through the process rather than producing in batches that are moved between process steps (Womack & Jones, 1996), with no idling time between work activities. By creating a continuous flow, waste can be reduced in the processes. As waste is eliminated without mistakes, products are able to flow continuously and seamlessly from one step to another (Holden, 2011). In order to achieve a flow-based production, the boundaries between functions, departments and professional groups must be as decreased as possible, as well as increasing stability in the process. An important element in Lean is a levelled production, both with respect to the total production rate but also to the order mix (Monden, 1983). One tool for acquiring this is visual control, which is a way of making the process transparent to prevent overproducing and takes care of unexpected interruptions from workers such as absence due to illness and many other excuses (Womack & Jones, 1996).

Establish Pull

Pull means goods and services are only produced when the internal or external customer needs it (Womack & Jones, 1996). A pull system deals with the idea that when work is completed at one stage, it is not forwarded (pushed) onto the next stage, instead, work is pulled when the processes at the next stage is such that it is ready and set for it, this eliminated the pile up of work before it is done (Holden, 2011). A simple control method, preferably visible, regulates the connection between supplier and customer. *Kanban* is a common method to achieve this (Monden, 1983). Kanban system is used to achieve minimum inventory at any one, it is one of the tools under Lean manufacturing (Rahman, et al., 2013).

Strive for Perfection

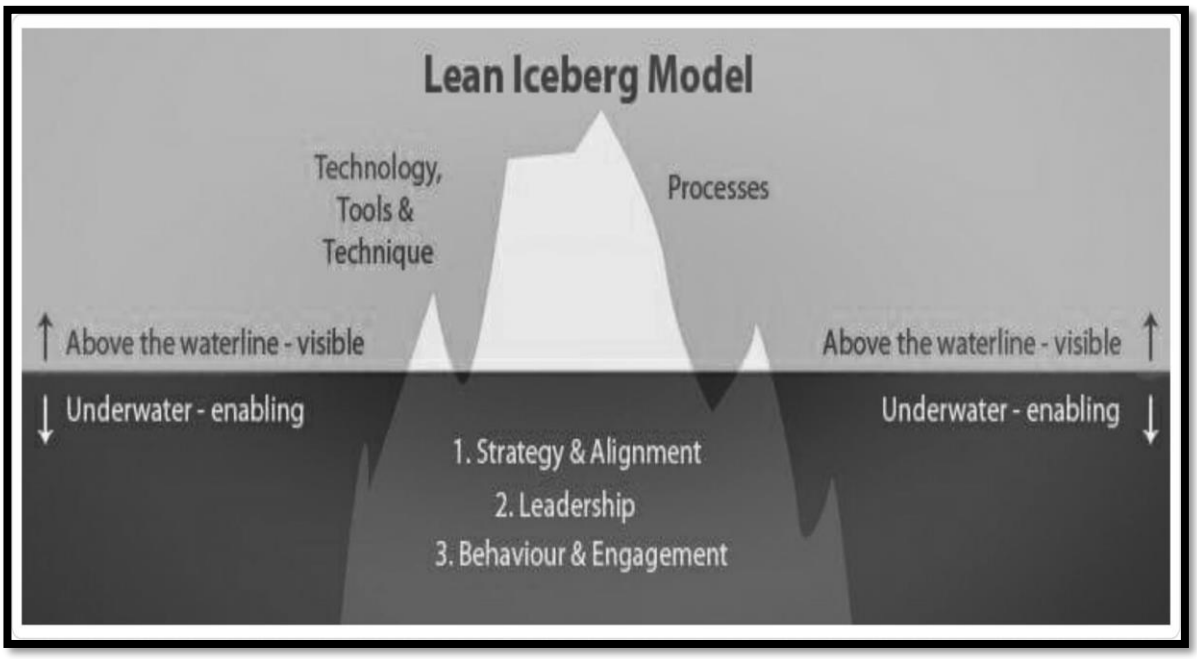
The pursuit of perfection is fundamental to Lean thinking. The objective for perfection is for everyone in the organization to focus on making additional improvement in their own processes day in and day out (Institute of Management Accountants, 2006). Deming described continuous improvement simply as "Improvement initiatives that increase successes and reduce failures" (Sundar, et al., 2014). Womack and Jones (1996) suggests that the principles that ensures continuous improvement should be seen as an iterative process leading to perfection. Hines et al., (2011) argue that continuous improvement is the most important aim for the long-term success of the Lean program, since the improvement capability increases with time. If there is too much focus on short-term gains, the improvement expected to be gained will fail, or decline. There is a positive interaction effect between the two drivers involved in Lean implementation development, that is, the organization and its employees. Empowering, developing and challenging employees to be their best is one of the important aspects of Lean implementation (Macduffie, 1995). The purpose is to develop the employee's capability for detecting and solving problems, the organization on the other hand, must have a system to reveal problems in order for the competent authorized employees to detect and solve those problems (Macduffie, 1995).

Krings et al. (2006) suggested a four-step approach through which Lean improvements can be implemented within the organization:

- Understand the needs of the organisation and how it operates by interviewing leaders and key staff members, gathering and analysing data and process observation.
- Develop a critical mass of Lean expertise in the organisation. Beginning with top managers so that they can really understand and get fully committed to Lean improvement.
- Implement improvements through Kaizen events over the short period or a longer term more guided approach to improvement. Both should use Lean continuous improvement tools, process measurement techniques and project management skills.
- Sustaining Lean is the most difficult aspect of implementations. To embed the Lean philosophy requires a culture of continuous improvement. This involves tracking key performance measures and coaching/mentoring Lean implementers (Radnor, 2010).

Another framework for Lean implementation known as "The Iceberg Model" introduced by Hines et al. (2008) is represented in the figure below:

Figure 4: The Lean Iceberg Model



Source: (Radnor, 2010) by (Hines, et al., 2008).

There are two different layers in this model which is represented by one above the water and the other below the water. Strategy and alignment, thus how organizations are able to understand and identify their mission and vision and align them with their goals. It also means that all employees and staff are aware of the organizational strategy being implemented and they understand them clearly. Secondly, there is an element called Leadership. Leadership role is vital as it brings together employees, inspire trust among employees and also motivate the workforce to get them involved with the business processes. Finally, is the third item which is called Behaviour and engagement. The need to get workers involved with business activities is also very important. Employee engagement leads to highly motivated staff who give their best to keep the organization going (Hines, et al., 2008). A number of tools are used throughout the model including: Plan, Do, Check Ac (PDCA), 5S and process mapping, visual management. Hines et al. (2008) suggests that, all these activities both in the one above the water level and the one below the water level needs to be achieved at not just at one department but in all levels of the organization.

Moreover, Rees et al. (1996) gives the assertion that, the techniques that management uses to introduce Lean and how the organization positions itself can also affect the way it is implemented. For example, the sector of the organization, the size, its legal framework, the present or the absent of unions, etc. "*therefore, Lean is not a homogeneous or invariable state but a context – dependent process*" Rees et al., (1996).

Nine all-embracing practices that was proposed by Nightingale (1999), gives a framework for Lean as developed by Massachustts Istitute of Technology (MIT):

1. Optimising the flow of products and services, either affecting or within the process, from concept design through point of use.
2. Providing processes and technologies for seamless transfer of, and access to, pertinent data and information.
3. Optimising the capacity and utilization of people.
4. Implementing integrated product and process development teams.
5. Developing relationships built on mutual trust and commitment.
6. Continuously focusing on the customer.
7. Promoting Lean Thinking at all levels.
8. Continuous improvement of processes.
9. Maximising stability in a changing environment.

Per these all-inclusive practices, (Comm and Mathaisel, (2005). also give a list of elements that need to be present for these conditions to be met:

- Environment for change.
- Leadership.
- Organizational culture – Employee empowerment.
- Training.
- Communication.
- Measurement.

2.8 Key Supply Chain Issues

Continuous improvement in operational efficiencies and the minimization of waste has been regarded as the main idea behind the invention of Lean (Gray, 2007). The highly differences between company culture, integrated technologies and employees who are trained on regular basis are some of the basic elements that companies are interested to pursue to achieve greatness. Understanding that Lean issues are all linked to these elements is an important block for companies to develop their own Lean implementation plan (Gray, 2007).

2.8.1 Lean Management Approach: Principles, Practices And Techniques

Many authors have given considerable amount of explanation on the Lean principles in their researches. Few of these authors often consider all the five principles whiles most of them take into consideration the element that contains mapping the value stream of products which makes way to achieve the seamless flow required (Ugochukwu, et al., 2012). Ugochukwu, et al., (2012) have elaborated the five principles of Lean and have suggested techniques that can be used to adjust their respective implementation. This is discussed in the table below:

Table 2: Lean principles with corresponding practices and techniques.

Principles	Practices	Techniques
1. Specify value from the end customer view	Source information on customer need	Customer involvement
	Value chain analysis and end customer focus	Value stream mapping
2. Map value to expose and eliminate waste	Value analysis	VSM
	Waste reduction	JIT, TPM, small lot size, 5S
3. Establish flow	System organization	5S, cellular manufacturing
	Strong and effective relationship	Supplier integration
	Waste reduction	JIT, Small lot size, TPM, and 5S
4. Let the customer pull the products	Production of exact customer needs only when needed	JIT, pull/Kanban
	Strong and effective relationship	Supplier integration
5. Strive for perfection	Problem search	VSM, 5Whys, employee involvement
	Problem solving	Training, 5Whys, employee involvement

Source: (Ugochukwu, et al., 2012).

2.8.2 Cultural Issues

Carrying out Lean practices means there is going to be an introduction of a revolutionary shift in the way work is done in the organization. There is a greater sensitivity between the relationship between Lean management and organisational culture. Culture has been seen in different forms as different countries have their own forms of customs, education, degree of development and industrialization. This gives an indication that when applying Lean production, it is up to companies to take these things into consideration. Cultural differences pertain mainly to internal resistance and openness to change (Bhamu & Singh, 2014).

Many at times, there is rush to a technological solution from companies, only to learn that by not addressing sound management fundamentals, the solution addresses the wrong

problems and is insufficient. Moreover, there is the need for companies to look inside the organisation, and outside the organization for the top-notch management capabilities that is required for change (Allway & Corbett, 2002).

Lean service implementation requires a smaller number of employees to take on a wider range of responsibilities, connecting the lines between formal work descriptions. It entails a strict and meaningful commitment to waste elimination, which in other words can mean changing work process that employees are familiar with and also changing the employees as well. The issue of culture here is not about where the different employees come from or their background, ethnicity or religion. Cultural issues as discussed here is what the individual employee is used to and goes through at his / her workplace. According to Guniat, et al., (2012) it is very important that companies involve their entire workforce in a change process as business transformation does not only focus on tools, technologies and techniques (Guniat, et al., 2012).

2.8.3 Employee Development

Existing business create a talent gap that needs to be filled as new business models are introduced to existing employees. Transformation within an organization can be greatly realized by aligning every aspect of the organization to achieve its goals, including employee commitment, workers motivation, talent management and continuous improvement at all levels of the organization (Guniat, et al., 2012). Success through managing change and building the routines and culture can be achieved by establishing strategic goals. Strategic plan of the organization must be laid out clearly for employees' understanding and execution. Moreover, management need to train employees on a regular basis and help them identify their full potentials as this contributes to the competitive advantage that the organization need to succeed (Guniat, et al., 2012).

2.9 Barriers to Lean Implementation

Despite the well known applause that Lean has exhibited over the years, there has been some critiques that need to be looked at as far as Lean application to the service sector is concerned. Transferral of manufacturing philosophies to service operations has gone from

being seen as ideal, to being described as totally inappropriate. Critiques who are said to be within the Lean movement and those outside, have both pointed out precisely to the various gaps in Lean thinking. The shortcomings of Lean has come about as a result of introduction of Lean thinking into different sectors and as Lean progresses on its initial sector (Hines, et al., 2004).

They stipulate that utmost importance should be emphasized on the forms of systems that allow employees to analyse situations, encourage employees to use their own knowledge in solving particular situations for improvement (Hines, et al., 2004). Some authors have criticized that these gabs identified in lack of inking lack sustainability in many of its transformation programmes These strategy formations and deployment tools necessary to achieve the desired solution is absolute not lied down properly in the service settings.

Moreover, there has been trends that exit with the use of concepts from the research conducted in the manufacturing process apply to that of the service sector.

When viewed from the Marxists lens, Lean has been labelled as exploitive and stresses the shop floor workers (Hines, et al., 2004). The human criticism aspect of Lean by the various critiques are linked to the fact that Lean is too focused on tools and techniques instead of focusing on human dimensions such as motivation, respect for people and employee empowerment. Eventually, even though there are numerous research and studies concerning Lean in the public sector, there are gaps in the field that need consideration.

2.10 Lean Management in the Public Sector

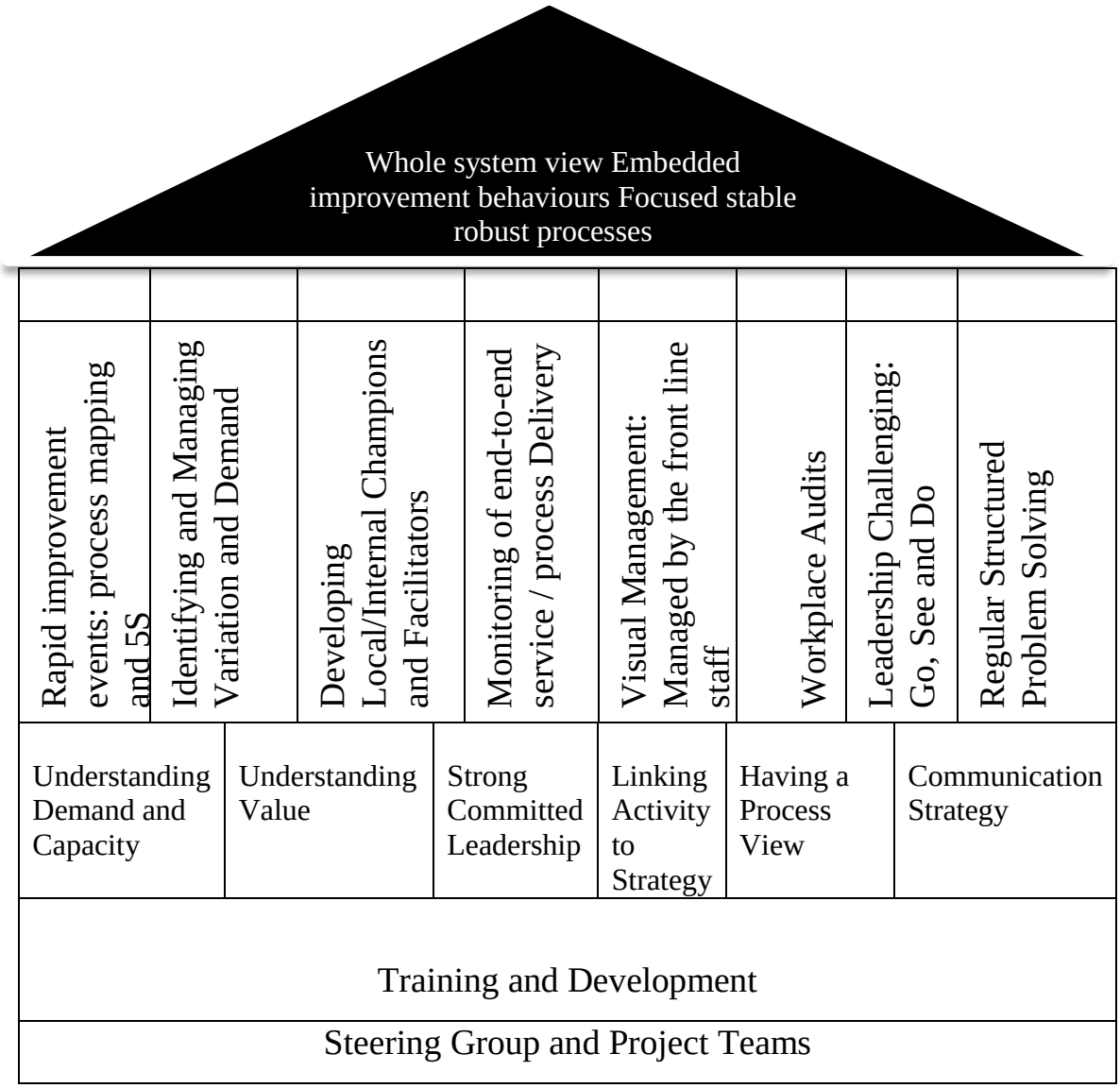
Eirian, (2013), states that irrespective of the sector, there is a great possibility that Lean thinking principles can be applied to that organization even though the principle originated from the automotive manufacturing sector. There has been successful improvements and little adaptation as Lean principles and techniques are being transferred to many sectors. Even though there are a lot of doubts as much as the application of Lean into other sectors are concerned, sectors such as distribution, construction, housing, financial services, healthcare and other public sectors services have all begun to implement Lean ideas in recent years (Eirian, 2013).

Lean works wherever there is a defined set of activities, either working to produce a product or service (Gray, 2007)

There is a greater possibility of obtaining better operational performance as Lean is being introduced in an organization. A lot of benefits have been identified by different authors which are as a result of adopting several Lean manufacturing practices such as Just-in-time, Kanban, 5S, Continous improvement kaizan and to mention a few. This can be done through cost reductions, getting a greater focus on the customer and making products with zero defects in accordance to what customers need (Jabbour, et al., 2012).

Figure 5 illustrates a framework that depicts how manufacturing production meets with services. This figure also summarises the varieties of characteristics that is possessed by both the manufacturing Lean and the service Lean applied in a network of fast food and restaurants, hospitals and an airline company. Levitt (1972) was one of the first authors to study the convergence of Lean organizational principles between the production and service organization (Higor & Guilherme, 2013). For the biggest and greater focus on creating value, it is important to concentrate on removing wasted time and effort. As value stream is seen to flow across several departments and functions within the organization, Lean thinking contends services must think strategically beyond its own boundaries (Eirian, 2013).

Figure 5:House of Lean for public sector



Source: Adapted from (Radnor, 2010).

Project Management Team (PMT)

A project management team is needed for Lean implementation in most cases when no schedule of training and development is outlined. The PMT becomes responsible for strategic planning and the carrying out of measurements in alignment with the company's goals and aspirations in order to ensure performance achievement. PMT are also formed to ensure the avoidance of resistance to change among the staff (Ikatrinasari & Haryanto, 2014).

Applying Lean to service sector: the various Phases (Allway & Corbett, 2002)

Given by Allway & Corbet, (2002), they believe that a thorough implementation process, an approach commonly found from the manufacturing companies and focused around a model area can be used to stream the implementation throughout the organization even though deploying the Lean approach in large scale financial, insurance, health-care and other service organisations may appear to be an intimidating task for management to handle (Allway & Corbett, 2002). They suggested different phases that Lean should go through in the public sector to attain accomplishments of goals pertaining to its implementation.

Detailed phases of transformation

Allway & Corbett, (2002), developed a five-phased transformation process for Lean in service, these different phases when applied throughout the organization, can yield a solid foundation and commendable improvement in systems and processes. The key phases of such transformation are listed below.

Phase One: Assessment of the Current State.

Phase two; determining the target state.

Phase three: stabilizing the operations

Phase four: optimizing the opportunities

Phase five: institutionalizing the lean approach

2.11 Features of Public Sector Supply Chain

Public sector supply chain management (SCM) focuses on the network of institutions, which are interlinked horizontally and vertically in order to add value (Ambe & Badenhorst-Weiss, 2011). Lean has been identified as a thinking principle that can be applied to any other sector. Intangibility, inseparability, variability and perishability and lack of ownership that have been accepted as the characteristics of services, needs to be considered when the framework for improving the service organizations' efficiency is being taken into consideration. Arfmann & Barbe (2014), gives indication about the different types of wastes in the manufacturing sector in comparism with the kind of wastes that can occur in the service environment. These wastes are summarised in the table below:

Table 3 Types of wastes in Manufacturing and Services

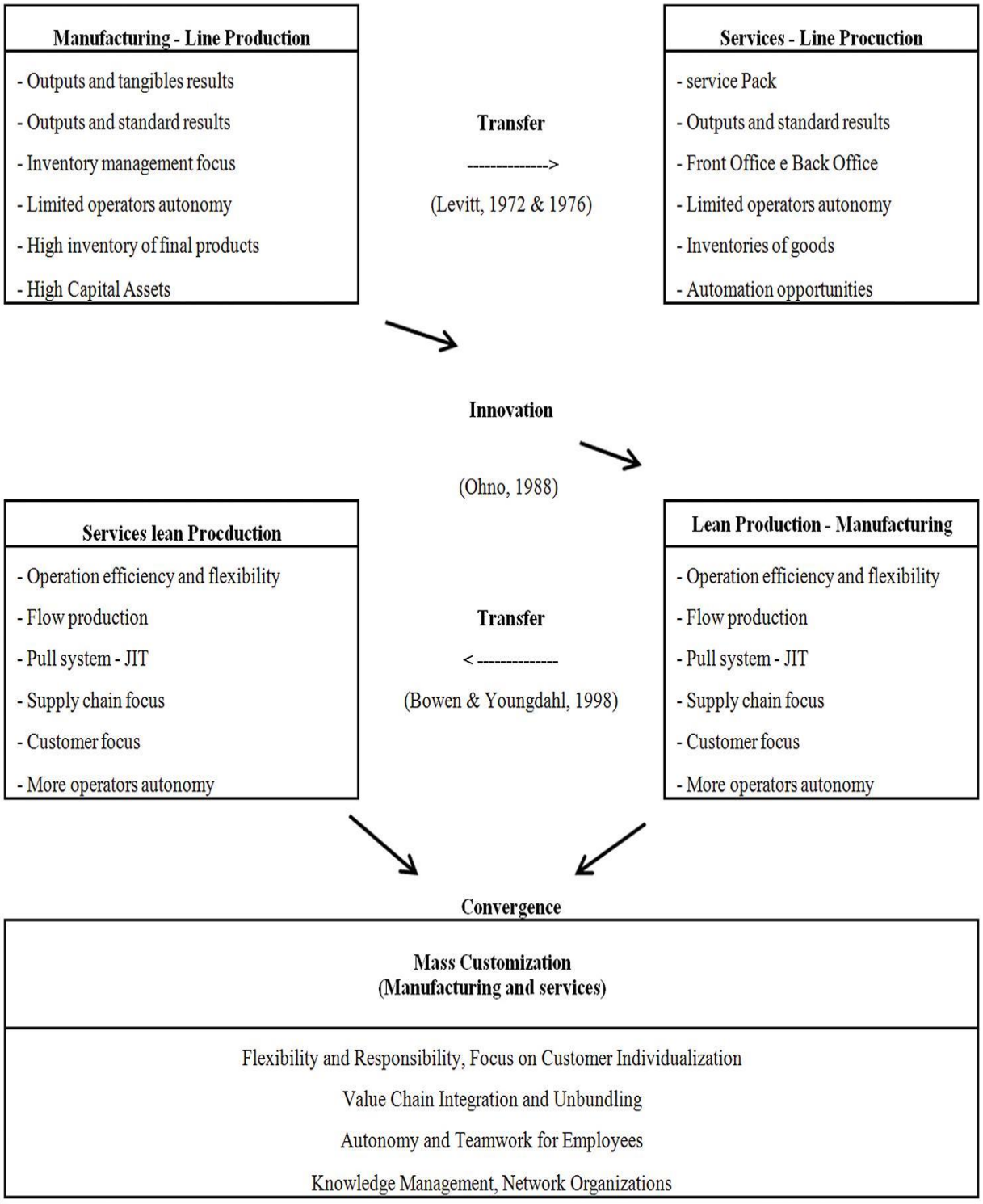
7 types of wastes in manufacturing	7 types of waste in services
Overproduction of goods not demanded by customers	**Duplication** like re-entering data, repeating details on forms and similar
Time on hand (writing) for the next process step, machine, or similar	**Delay** in terms of customers waiting for service delivery
Transportation of goods that is not necessary to create value	**Lost opportunity** to retain or win customers by ignoring them, unfriendliness or similar
Processing itself like unnecessary (quality) inspections within the process	**Unclear communication** with customers or internally leading to clarification circles
Stock on hand (**inventory**) that are simply waiting for further / future needs	**Incorrect inventory** being out of stock and hence not able to deliver
Movement of workers that is unnecessary is it does not add value to the product	**Movement** in terms of handling over orders, queuing customers several times and similar
Making defective products that cannot be sold or must be reworked	**Error** in the service transaction including product damages in product-service bundle

Adapted From: (Bicheno & Holweg, 2009)

SCM of the public sector is considered by Ambe and Badenhorst-Weiss (2011) to be complex, which is concerned with the cordination of all parties involved in offering a wide range of services to meet specific public sector requirement. As in other cases, there are certain types of customers that can be categorized under a particular product / sector, the 'customers' under public sector are the individual public citizen. In order to know customer demand, one has to take into thought what is considered as the public or the citizen's interest in public goods, for example education, healthcare, national security and so on (Ambe & Badenhorst-Weiss, 2011). This however, makes it difficult to calculate or make an estimation for customers' demand unlike in the manufacturing industries.

Figure 6: The convergence of services and guidelines of manufacturing production

(Bowen &Youngdahl, 1998)



Adapted from (Higor & Guilherme, 2013).

2.12 Public sector's approach to services

The issue of quality in the public sector remains striking. This has led to some criticisms from some writers who argue that the public sector is a persistent concern in many countries in terms of its quality management. The perception that arises out of this concern is that most of the public sectors are labelled as an unattractive employer for high-quality managers, with weak financial initiatives, inferior compensation which attracts less talented managers to the public sector, which eventually leave them to put no or very little effort in their job (Delfgaauw & Dur, 2010). Meanwhile, (McNary, 2008) made an important revelation that in a search on the database of for example ABI/Inform shows that the terms "Total Quality Management in the Government," "Total Quality Management in the Public Sector," and "Total Quality Management in Public Administration" produces just about 600, 289 and 116 documents respectively. However, the same terms when searched with "Private Industry and Manufacturing Sector" produces more than 119,331 documents (McNary, 2008). Clearly, the public sector have not been treated fairly, however, if researchers would focus a little bit of the attention they give to the private sectors and manufacturing industries to the public sectors, the perception about their quality standards would be improved.

A lot of scholars have agreed to the fact that Lean effect in the service industry are not valid. This assertion come when Arfmann & Barbe (2014) who in their argument stated that the pull system which facilitates the movement of goods from the manufacturing sectors to the customers does not have any relevance in the service sector since the service organizations do not produce and store goods.

2.13 Service Quality

In the present day, many researchers have come to consensus that quality schemes in the public sector has had a strong positive impact on employees' performance and motivation within the public sector. The table below gives a summary of the characteristics that operate under the service sector.

Table 4: Service Quality Dimensions

Tangibles	This dimension refers to services' physical component. Facility attractiveness, equipment, well-groomed employees, written items are among these tangible factors.
Credibility	Ability to do the services undertaken to deliver certainly and accurately in the promised time, in fact, this dimension, originate from commitment to deliver the services, pricing, handling the complaints and etc.
Responsiveness	Tendency to help the customers and quick service delivery, this dimension emphasized on the personal attitudes based on attention and care about demands responsiveness – customers' complaints and inquiries.
Reliability	Politeness, personal courtesy and potency to build trust and confidence in customers are considered in this dimension.
Empathy	Problem understanding – empathy and personal attention to the customers, this dimension emphasized on considering the customers as human being.

(Source: Adapted from Parasuraman, et al., 1988; (Azizzadeh, et al., 2013)

Parasuraman designed SERVQUAL tool in such a way that it can be applicable to a wide range of service workplaces with minimum reduction and improvement. In the quest to achieve what customers' needs and expectations are, this model provides the public sector and related decision-making sectors managers with current customers' perception and helps with the understanding of that (Azizzadeh, et al., 2013).

2.14 Customers in the Public Sector

Customers as defined by other institutions such as the private sectors and the manufacturing sectors are quite different from the way public sectors define it as it does not have a clear dimension in that area (Drotz, 2014). In the case of education, customers to a school is not only the students, but also the parents, caretakers, guardians, and so on, in the same way, when you come to healthcare, customer could also be decision-makers, taxpayers, caregivers, and family members, not just the patient. This make the real definition of customers in the public sector quite problematic to define.

2.15 Advantages of Lean implementation:

There are some benefits that can be expected in the public sector when Lean is applied, some of them can be:

- Drastically reduction or total elimination of build-ups in business processes
- Elimination of unwanted practises within processes / reduction of complex processes
- Improvement in employee morale
- Increases process transparency to internal and external stakeholders.
- Improvement in quality in delivery process and consistency of work.

2.16 The public sector challenge / barriers to lean implementation

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"the willingness to try new things and accept changes, both in the nature of jobs and in the manner in which they are performed, is critical to transformation but not always an easy adjustment for people to make" (Allway & Corbett, 2002).

Lean has been pivoted to eliminate wastes that occurs due to variability and flexibility. Even though it originates from the manufacturing industry and different authors that it can be implemented into other sectors have identified the Lean concept, it should be clear that there is no such thing as a 'one-size-fits-all Lean template. Lean project in an organization is driven by the organization's goals and values. However, there are some important topics and principles of Lean approach that is been identified as challenges to the public sector organizations (Bhatia & Drew, 2007). These factors on the other hand, can also be considered as the critical success factors that need to be in place for a successful implementation and sustainable Lean processes.

2.16.1 Management Support

Although the success of Lean implementation may be affected by many variables, total commitment by top management can be agreed by many researchers to be one of the most important elements. Determinations set by a company to implement Lean without the total embrace of management may end up being disrupted intentionally or unintentionally. Total commitment and leadership should not only be revealed by management, there is the need

for everyone within the organization to be involved and this should be made possible through the interest shown by top management through communication (Worley & Doolen, 2006). Successful Lean implementation can also be affected if top management refuse to show a little bit more interest on their side for the employees to appreciate. These leave the employees demotivated and their desire to drive Lean to its successful end weakens. The only way to create a true Lean transformation is with a strong leadership at the top of the organization, and shows commitment. Lack of management support, both intellectually and physically, may lead to a host of other issues including limited access to resources, lengthy decision-making processes and breakdown of communication (Jadhav, et al., 2014).

2.16.2 Employee Training And Education

A company that invests in training and development generally tends to have satisfied employees. The roles played by each employee on the effort of joining together to achieve the goals of the organization, gets to be more effective when they are offered training and education in the course of executing their job (Zhang, et al., 2012). In order to improve the competence and competitiveness of employees, education and training becomes a collaborative affair, which needs to be a top priority by all concerned. (Netland, 2015), made an indication in his report on the most common reported critical success factors compiled from the different written literatures among that contributes to Lean improvements. Training and education of both employees and management turned to be the second most important element that need to be put in place for a successful implementation (Netland, 2015).

2.16.3 Communication

Effective and sustainable public sector reforms are what is required to ensure governance improvement. There is no doubt that communication when uttered rightfully brings forth better understanding of company's policies and improves in policy implementation (The World Bank, 2011). Lean projects are easily terminated, lack of team autonomy and lack of organizational communication. When the benefits that has been obtained from Lean are not well communicated to employees, the motivation leaves and the will to continue becomes very low making the Lean process to collapse eventually. Employees need to be properly informed of the changes that are being administered in the organization (Jadhav, et al., 2014).

2.16.4 Workers' Participation

This is known to be one of the biggest barriers that the organization needs to break before Lean can be implemented successfully. The main aim of implementing Lean management is to eliminate waste from the business process and create value to the end customer, employees usually are faced with the 'fear factor' of losing their jobs when they realise that their jobs do not add any values. Employees get to be reluctant to new implementations (such as Lean) because they know this may result in staffing reduction (Jadhav, et al., 2014).

A study conducted by Radnor et al. (2006), supports this challenge. In their research, they highlighted the challenges that leads to failure of Lean implementation in the Scottish public sector. It came out that the less involved both management and employees are, the more likely that Lean would be successful. Management and employees sometimes feel that the 'new approach' Lean they want to adapt is some how just another approach aimed at improving processes, this makes them feel resistance and sceptical of what Lean benefit they can possibly get (Asnan, et al., 2015). The outcome of the study was that, whiles it is significant to management commit to full implementation of Lean processes, the engagement of everyone in the process of change is also very important especially in the early stages (Asnan, et al., 2015).

2.16.5 Organizational Culture and Readiness

The application of tools and techniques are not the only requirement for a successful Lean transformation. At all levels of the process, and within the company, there is a requirement of a change in organizational culture. For a successful and sustainable Lean implementation, the availability of a supportive organizational culture becomes an essential element for implementation (Achanga, et al., 2006). A framework that public institutions can adapt to ensure an effective change in their organizations have been developed by Kotter (1996) and this model has been proven to be a key literature when it comes to organizational change. Even though the effectiveness of this model does not only apply to public services but also in other entities such construction. (Kotter, 1996) indicates that no matter the size of change you want to make, whether big or small, it must be emphasised that 'major change will not happen for a long list of reasons'. For its many reasons, the inward culture of the individual and the entire organisation affect the transformation of change in one way or the other.

The Kotter's model is discussed below:

2.16.6 Kotter's model of change

The model by Kotter gives three-part framework that when there are concerns for organizational change management can follow. Organizational change in a broader way is looked into, and the controls that are necessary for a successful change is also catered for in the model. The model contains three elements which includes: 1-Defrost the status quo, 2-Take actions that bring about change, and 3- Anchor the changes in the corporate culture.
In the first element 'defrost the status quo', which means to make changes to the existing practices of the business process. This element contains four essential steps. Leaders must establish a sense of urgency. There must be a clear reason(s) why employees have to change their processes, typically, people will not change unless they see the need to do so. The second phase is to create a guiding coalition. Management need to understand that the existing hierarchy does not have the capacity for the change needed, therefore, the need to create a new group that have enough energy and power to lead the organisation through the change processes. There is also the need to generate a vision and strategy. This entails making plans clear on what the change is about, the reasons for the need for change, and the systems or mechanisms put in place to achieve it. The final step in this process is the communication of the change. Take all the available opportunities to make the workers know why the organization need change, what the change is about, and how the change will be implemented. Communication of the vision is very important (Appelbaum, et al., 2012) (Ballard, et al., 2007).

The second fundamental element of the model is the empowerment of the people involved in the change process: this is to get people involved in the decision making processes concerning the change, get all employees involved let them be concerned about how effective the change would be for their organizations and how to achieve it. This step also means that leaders must allow employees to be innovative in their ideas by giving them the chance to express themselves, and that is the first step under the second element in the model. The relevance to create short-term wins becomes the next step. Management need to appreciate employees and to give them acknowledgements when they perform well. Employees efforts towards the change must be recognized. Finally, which is eventually

generated from the second element is to consolidate growths and make more change happen (Appelbaum, et al., 2012).

The final element in the model is to Anchor the change into the company's culture. This step is very essential to long-term goals, moreover the step gives recognition to the previous efforts made towards the change process since its initiation. (Appelbaum, et al., 2012).

It must be emphasised that change is not an easy thing to do, it is difficult and complex, however, it is not impossible.

Framework for implementing Lean in the public sector

The five lenses that Lean management methodology in the public sector looks at change according to (McKinsey&Company, 2012).

Figure 7: The five lenses that Lean management methodology in the public sector looks at change

Source: (McKinsey&Company, 2012)

Commitment for Change

Service companies that deploy the Lean approach rapidly gain control of the key processes that deliver customer service, apply sustainable breakthrough improvement to their processes, and generate tangible advantages for the organization as well. Senior managements' commitment to change is very critical before Lean implementation. Recognition that the organization lacks the 'Lean' discipline, and the need to believe that change is absolute is also key (Allway & Corbett, 2002).

3.0 METHODOLOGY

This chapter describes the research approach used in this thesis, the data collection and analysing methodologies on which the work is being presented.

3.1 Presenting design

This research process takes the form of an emperical research as it involves the collection and analysis of data. The work pursue a descriptive research with an inductive processses, that is questions, descriptions/observations and analysis. Information and characteristics of some of the appropriate issues of Lean management's implementation in public organizations was identified and gathered.

3.1.1 Case Study with Qualitative Research Strategy

The case study approach, through the use of qualitative methods is the research methodology applied in this thesis. The subject matter of this work is to examine the possibilities and limitations of the implementation of Lean in the public sector. There is the need to investigate how the Lean perspective fits-into the perspective of the public sector. Baxter & Jack, (2008) indicates that qualitative case study methodology provides tools for researchers, which gives them the opportunity to study complex phenomena within their contexts. Program evaluation, developmental interventions and valuable methods for health science research, which leads to theory developments can be achieved when qualitative case study approach is applied correctly (Baxter & Jack, 2008). Qualitative research relies on the integration of data from a variety of methods and sources of information, a general principle known as a triangulation – the use of various hypothesis and theories to examine a particular situation or occurrence (Hales, 2010). The idea of triangulation, which is the collection of data from different sources (field notes and interviews) or from different surveyors in different places, is that the credibility of the data collected is highly enhanced with the use of multiple sources as the information produces similar results (Fink, 2003).

Four instances under which a case study method can be applied as indicated by Yin (2003) is, when the study is focused on answering a "how" and "why" questions; when the researcher wants to cover contextual conditions because of its relevance to the phenomenon under study; when the researcher cannot manipulate the behavioural antecedent of the participant (Yin, 2003)

Qualitative research strategy reduces the risk of making conclusions based on only systematic basis or limitations and allows researchers to gain a better assessment of the validity and overview of the explanation that is being developed. The main form of this research is qualitative research, which deals with explanations, description and analysis of cases. Qualitative research as indicated by Leedy & Ormrod (2005) "is definitely not the approach to take if you are looking for quick results and easy answers" (Leedy & Ormrod, 2005). The need for further inquiry to better understanding of a particular situation is needed through constant observation, interviews and periodic emails with enthusiasm and determination are involved order to achieve accurate results (Njie & Asimiran, 2014).

Case studies have often had the criticism for its lack of possibilities to generalize conclusions (Flyvberg, 2006). The formal generalization is not as valuable as the experience of a single case study. In this thesis, numerous cases were conducted, which means that there is an increased possibility to find patterns leading to validity and the chances of being criticized due to artificial conditions or uniqueness of the case is reduced (Yin, 2009). Case studies enable researchers to gather data from a variety of sources and converge the information to illuminate the case under study (Baxter & Jack, 2008).

3.1.2 Survey

A survey has been described as the best way that researchers use to gather information and feedback from their respective correspondents (Office of Quality Improvement, 2010). Creswell (2003) asserts that a survey provides a quantitative or numeric description of trends, attitudes or opinions of a population by studying a sample of that particular population. The survey's purpose was to establish some knowledge on how the individual employee has been influenced by Lean in their work places.

Information was gathered from the heads of the various units concerned through face-to-face interviews, which were recorded. In addition, a set of questionnaire was designed to test the familiarity of the staff of those units on the existence of Lean in their processes and how it affect their daily operations- the purpose of this was to establish some kind of knowledge on how Lean has influenced the individual employee in consideration to their work places and procedures.

Table 5 gives a summary of the 'comparative' strengths of the case study and survey methods. From this Table, it can be observed that many of the strengths of one method compensates for the weaknesses of the other.

Table 4:Relative Strengths of Case Study and Survey Methods

	Case Study	**Survey**
Controllability	Low	Medium
Deductibility	Low	Medium
Repeatability	Low	Medium
Generalizability	Low	High
Discoverability (explorability)	High	Medium
Representability (potential model complexity)	High	Medium

Adapted from (Gable, 1994)

An in-depth description based on one or multiple cases can be analysed, with the unit of analysis being the study of an event, program, an activity of more than one individual (in this case unit), data analysis can also be based on description of the case and themes of the cases (Creswell, 2007).

3.1.3 Interviews

Interview method is one of the methods used in collecting data in qualitative studies as indicated by (Burnard, 2004). The interviews carried out were done by the researcher, which was later followed up by emails to the units' heads that was interviewed. All interviews were recorded, with permission of the heads of units being interviewed. *Semi-structured interviews* were used (see appendix 2), this was because each of the units had their own period within which their experience on Lean implementation was adopted, and it deemed it necessary that they get questions, which is aligned to their experiences in Lean respectively. Respondents were given the assurance that their identity and the units they represent would remain anonymous in all subsequent reports. Therefore, code names have been given to represents the units that were interviewed. For this reason the names Alpha, Beta, Gamma and Delta have been used to represent the repective units. The recordings were later transcribed into files that translates what emerged at the interview. Interviews has been

regarded as a data collection tool which gives the interviewer the space to make room for concentration and the build-ups that the interview offers (Brinkmann & Kvale, 2015).

Table 5 ***Table of interviews***

Date	Department	Interviewee's Position	Duration of interview	Minutes
21.01.2016	**Molde Municipal**	**Lean Advisor**	**09:00 -10:00 1hour**	**60**
05.02.2016	**Molde Municipal**	**Lean Advisor**	**09:00 -10:00 1 hour**	**60**
15.03.2016	**Alpha**	**Head of Unit**	**16:00 – 17:20**	**80**
15.03.2016	**Delta**	**Head of Unit**	**10:00 – 10:55**	**55**
17.03.2016	**Gamma**	**Head of Unit**	**09:00 – 10:15**	**75**
18.03.2016	**Beta**	**Head of Unit**	**09:00 – 10:25**	**85**

Source: Field work, 2016

Direct Observation

As I was given the opportunity to interview head of units at their various work places, I was able to observe some behaviours of the staff in some of the units. These observations were also included in the data analysis and findings.

3.1.4 Data Sources

In order to test the proposed theories and address the research problem in a more scientific manner, both primary and secondary data was used in this thesis.

Primary data characterises data collection techniques where information is gathered directly from the field. This kind of data is generally concrete as the researcher mostly observes it. In this case, the primary data collected in this thesis was based on face-to-face interviews of the heads of units in the selected units under Molde municipality and the information collected from the staff, email-surveys and questionnaire (see appendix I). According to Churchil and Brown (2004) a questionnaire may be administered by mail, on the telephone, faxed or even in person (Churchil & Brown, 2004). The questionnaire distributed to the various units were administered through mail.

Nonetheless, **secondary data**, which are data collected from already published research works are just as important in researches, were also obtained from such sources as journal articles, books, conference papers, previous documents and annual reports from the Molde municipality and other internet-based resources.

3.1.5 Population size, case study and sample selection

The population in this study was focused on five selected units under Molde municipality, which included different levels of staff members who belong to the units / sections under consideration. Taking into consideration the time and resource constraints related to research, this work brings together the experiences of head of units and their staff from Nordbyen school, Kvam school, Adult education centre (Voknopplæringsenter) and Glomstua care centre since getting the whole units under the municipality would be more time consuming. A common technique of one-to-one interviews were used to get information from the heads of units and questionnaires were used to collect data from the the staff.

Table 6: Response rate of questionnaire

Name of unit	Size of unit	No of survey given	Number of respondents	Response rate
Kvam School	27	28	10	37.04%
Glomstua Care Center	64	172	8	12.5%
Nordbyen	40	49	11	27.5%
Adult Education Center	51	69	10	19.61%
Kviltop School	34	60	4	11.76%
	216		43	

3.1.6 Data Analysis

Data collection and analysis in qualitative research study occur simultaneously (Baxter & Jack, 2008). The kind of analysis used depend on the type of case study. Yin (2003) briefly describes five techniques for data analysis: pattern matching, linking data to propositions, explanation building, times-series analysis, logic models, and cross-case synthesis (Baxter & Jack, 2008). Enormous amount of qualitative research are as a results of subjective and richly detailed data, which come from the interviews and observations represented in the study conducted.

Qualitative survey collects information on how people attach meanings to the experiences that they have had and also the ways they express those experiences (Fink, 2003). This type of survey also gives way to open-ended questions, which was one of the survey instrument used.

3.1.7 Data analysis approaches

The approach used in this research to analyse the data collected, was based on inductive research. One data analysis approach that was used to see how the information acquired from the interviews relates to each other. There are two fundamental approaches used in analysing qualitative data (although each approach can be handled in a variety of ways), these approaches are known as the deductive and the inductive approaches. When the researcher uses a structural or a theoretical way to analyse data in a predetermined structure it is described as deductive approach. These structured data is what the researcher bases on to analyse the interview transcripts (Burnard, et al., 2008).

3.2 Validity and reliability

"A reliable survey instrument is consistent: a valid one is accurate" (Fink, 2003). Having a logical test of variability and reliability of the research strategies that has been planned is required in developing criteria for evaluating case study methodology (Schell, 1992). Validity and reliability are two important aspects of all research. When particular attention of these two elements are given in a research, there is high credibility and trustworthy given which makes the research acceptable (Brink, 1993).

Different instruments used in this research were modified from the various literatures adopted to the reform of Lean implementation in the public sector perspective.
Reliability refers to a research method's ability to yield the same results over repeated testing methods when used consistently (Brink, 1993). Selltiz et al (1976: 182) denotes that it is concerned with the consistency. *Reliability is the extent to which repeatedly measuring the same property produces the same results* (Office of Quality Improvement, 2010). Stability and ability to repeat what the respondents have accounted as well as the researchers' ability to collect and record the given information accurately (Brink, 1993).

Yin (2003), outlined, the various categories that validity and reliability can be achieved. The use of multiple sources as data collection establishes chain of evidence which makes this work valid constructively. There was pattern-matching in the data analysis where similar information were found in the different units – this also gives the internal validity. Moreover, reliability is acknoledged where case study procedure were observed.

3.3 Data collection impediments

- Quite a few employees were willing to respond to the survey that was sent out.
- It took a very long time to get the acceptable number of response for analysis, in some case, emails had to be sent out couple of times as a reminder for employees to be aware that their responses are needed.
- Interview scheduling also took a lot of time as many of the interviewees were on a busy schedule all the time and they had to reschedule the time which was one of the reasons why this project encountered some delays along the way. Many of the emails sent to request for interviews to the various heads were cancelled, leading to a limited amount of data to be dealt with in this research.

4.0 CASE STUDIES PRESENTATION

Molde municipality delivers complex services to about 26,000 residents on a daily basis. The municipality has major responsibilities in civic and service development. The municipality employs about 2000 employees. By focusing on continuous improvement and involvement of each employee and their various units, the municipality has been working to resolve both operational and developmental tasks with respect to each unit, their users and the resources that they manage. It is important to emphasize that the implementation of Lean has made improvements in most of the units affected by its implementation. Through continuous improvement which has been the main focus of Molde municipality when it comes to their quest to maintain Lean. The goal of continuous improvement according to Molde municipality is to develop a culture of improvement, where they consciously and actively strive to find better solutions (Molde Municipality, 2015).

Motivation for picking Molde municipality

The idea about this project is to find out about how Lean implementation has been successful in the public sector. The choice of Molde municipality as the research case was because the municipality have adapted Lean processes in some of their units, and the main idea behind this project as mentioned above, is to identify the ways through which public sectors adopt to Lean, the advantages and disadvantages associated with it and whether it was feasible. Molde kommune is a public service institution, it has started with Lean Programmes, and it makes it the best public service case for this project.

4.1 Vision statement – Molde municipality

Molde municipality sticks out; it has a clear symbolism of beautiful roses protruding all around the whole of the City. It gives a symbol of the willingness of doing something extra, including the practice of the municipalitity's values. There is a philosophy called '*ROSE'* and that is what the municipality bases it's vision upon. The ROSE then becomes an acronym for Respect (*Respekt*), Caring (*Omsorg*), Cooperation among all different actors (*samarbeid som samlet skal gi*) and effectiveness (*effektivitet*).

You may want to know what does a ROSE got to do with the municipal's vision statement? How this relates to the vision statement, is that it can be linked to the pun in many contexts within the municipal service production and other works they provide. It begins from the

top of the organizational chart of the municipal management system and gives direction to the agreed goals, the strategies and plans of the municipality.

4.2 Goals, main target areas and strategies of Molde municipality

The goals, target areas and strategies of Molde municipality is subjective to the different structures and units under the care of the municipality.

- *The municipality shall be the driving force for the growth and cooperation in the region.*
- *They aspire to have growth and development in the whole region.*
- *The municipality shall see to an active public health.*

The municipality as a service provider:

- *Shall see to the delivery of goods and services to its general public.*
- *Primary school in Molde will be among the best ones in the country.*
- *It shall be offered to everyone in need.*
- *Home care and around-the-clock care services to be available when the need arises.*
- *All activities will be characterised by good service and user satisfaction.*
- *Education from kindergarten to elementary school and high school will be properly correlated.*
- *All municipal services should contribute to promoting good health and disease prevention.*

- *The organization of the daily activities of the municipality shasll be flexible, adaptable and cooperation in line with the ROSE philosophies. There shall be competent and participating employees through employee taking responsibilities and management giving it. Moreover, openness and good communication shall be the hallmark of all the municipal's activities.*

"A good quality and management system helps to ensure that the overall objectives and plans are implemented, reported and followed up" – Molde Municipal

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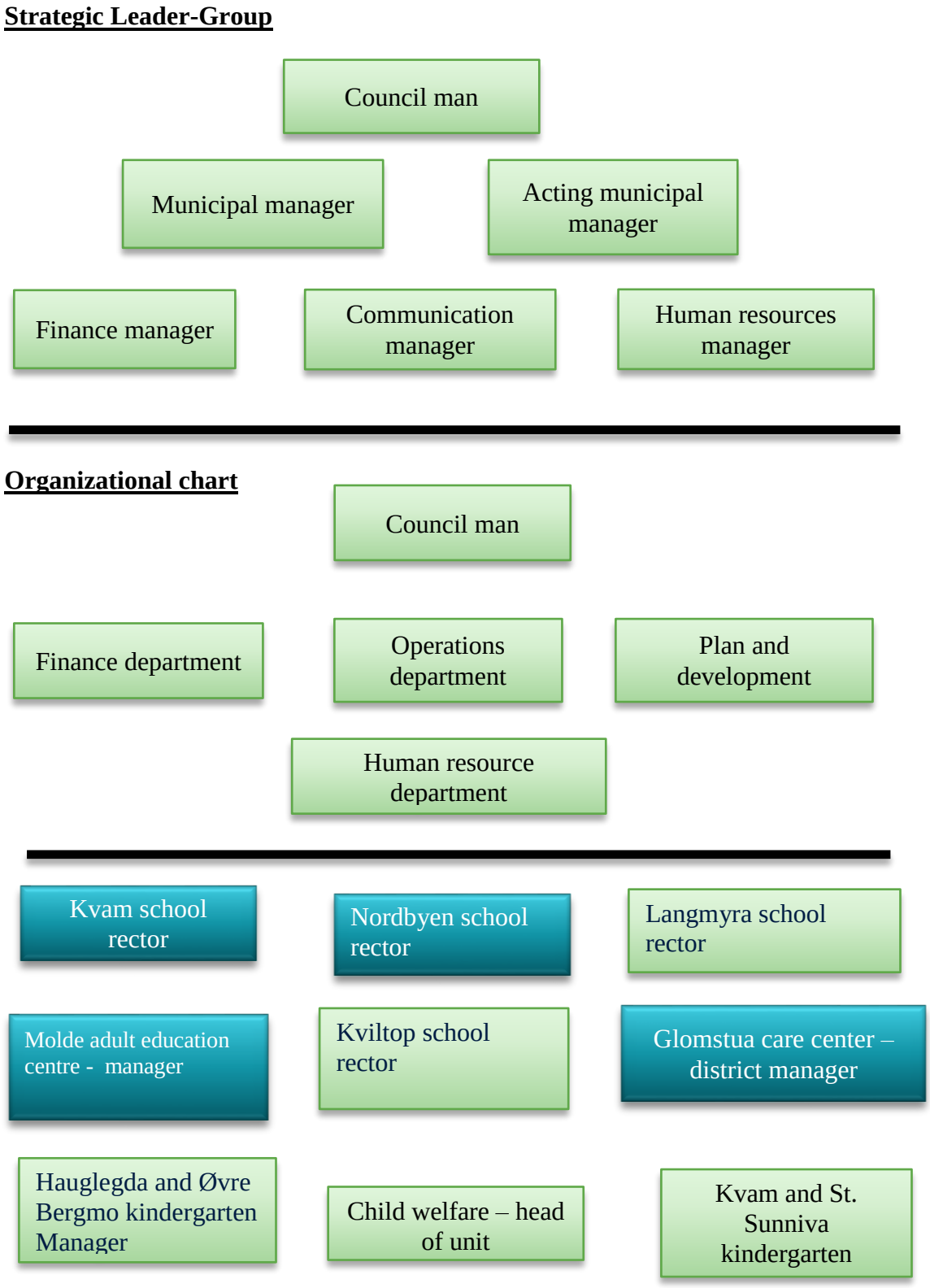
Figure 8: The organizational structure of Molde Municipality



Source**:** (Molde Municipality, 2014)

It should be noted that there are a lot of other units under the organizational chart, however, only the ones that matters in this thesis were presented.

4.3 Why did Molde municipality choose Lean?

In the last decade, there has been an ongoing debate between practitioners and researchers on public administration on the best way to rejuvenate the olden bureaucratic style of public services. The introduction of the New Public Management (NPM) which began in the late 1970s and the early times of 1980s, is “an approach in public administration that employs knowledge and experiences acquired in business management and other disciplines to improve efficiency, effectiveness and general performance of public services in modern bureaucracies.” The NPM has been proven to give recognition in determining the extent that the growing needs of the public can be identified by its stakeholders (Vigoda, 2003). This has brought an increasing pressure on municipalities in Norway to streamline their activities in recent years. It was for this reason that there has been a more focus on Lean in Norwegian municipalities (Molde Municipality, 2014).

5.0 ANALYSIS AND FINDINGS

This section talks about the units that were interviewed, and provides the information that was gathered from the interviews. Interviewees were given the assurance that their identity would be kept anonymous. Therefore, they were represented by special names as **Alpha**, **Beta**, **Gamma** and **Delta**.

5.1 Alpha

This is one of the schools under Molde municipality, the implementation of Lean in this unit was done in the 2015. In the latest part of 2014 was training the various heads under this unit. The Lean process here is done on making improvements for people who come to inquire about how they can get to be customers in their unit.

Files, pictures and learning materials that are used by the various staff under this unit used to be scattered within the 'system' that is intended to be used by all the staff became difficult to manage. This happened as a result of the staffs creating their own files under the system that was supposed to be used by all. " *I think that Lean is not an easy job to implement, as it involves a lot of people especially in this unit*" – Head of Unit. The main idea behind the implementation of Lean in this unit as among other Lean implementors, is the elimination of waste – in terms of reducing the time used in searching for files (waste of motion), and eventually leading to the waste of rework. Since the document is not able to be retrieved and needs to be redone. The flow of things around staff in the course of performing their duties becomes a challenge. This challenge is as a results of staff moving from one room to the other to get information (data, marker, chalk, pen etc.). These activities tempers the seamless flow of services to the customers, it increases delays and increases costs.

The concept of **continues improvement** is one of the tools that drives the staff in this unit. To be able to maintain the good results of what they have achieved in the meantime. Management also believe that training staff regularly and assigning different staff members to other tasks and responsibilities makes the staff feel involved and get to do what they are being told.

Behaviour towards change:

It is a challenge for many staff to neglect their traditional way of doing things and accept the Lean (which they presume to be new and somehow nerve-wracking) "The human behaviour

is such that it takes time to respond to change, especially the kind that does not affect them physically."

5.2 Beta

This unit is also an educational unit which takes care of about 169 pupils. Lean in this unit is also in its initial phase. Waste of time used in searching for documents was a big problem in this unit. Whenever pupils go out to play, they need to change their clothes to suit the weather outside, the process of finding their clothes when they return from the play-ground became such a long process such that, it became difficult to determine which who owns what. This was substituted by a common room with the kids names on the some portion that is sorted.

"I believe Lean is to be seen as a way of life, it is believed to be part of our everyday process. It is only through this that an improvement can be be achieved." – Head of Unit.

Ideas about lean tools: the Lean tool that is mostly used in this unit is '***go to gember*** technique', in this case, the head of the unit

Management have adopted a system where they meet teachers about Lean and remind them of their processes and how they can work together to achieve them. This process was later realised as 'waste of time and resources', therefore, it was later cancelled and instead of staff meeting every two weeks, it was consented that the information would be mailed to each member in order to eliminate the time that could have been wasted if they were to meet. This was seen as one of the improvement achieved through Lean implementation.

Challenges: some of the teachers think the process takes too much time, and they feel like they are not ready for such change. Moreover, the value of Lean implementation has not been visible. Employees feel that they need to see the real benefits of Lean implementation in the processes adapted. Staff are a bit reluctant in this unit as well.

5.3 Gamma --nodbyen

This unit is also one of the schools that was interviewed, Lean tool : as explained by the head of this unit, they have a schedule for the week which tells management the where about of the workers, when they are available or will be absent or present.

"*It is not difficult to change something for just some few weeks, however, it seems to be a little difficult when it is scheduled to be a long-term" – Head of Unit.*

Staff attitude towards change is bit quiet divided when it comes to change, it should be noted that the head of unit in this sector started working in this unit six months before the interview. Lean tool: basically, the Lean technique that is being used in this sector most is ***standardization.***

5.4 Delta

This is a care unit under Molde municipality. This care centre is responsible for all nursing and care services which includes home-based services, day centre, housing and institutional care. Lean in this unit started with a small group, management stated that taking into cosideration the number of Lean projects that have been taking place in Norway, the amount of money spent on this unitthrough their monthly / annual budget will reduce in a significant amount if Lean is inculcated in their processes. Lean in this centre is in the young phase. Management and staff as want this centre to try Lean and see how it is able to reduce the amount of money used in that particular centre. It is believed that with Lean implementation in this centre, the staff would be able to keep their inventory in order and make it easy to identify things kept in the warehouse.

"In this unit, we believe that trainig our staff is an important step to achieving. This unit is identified to be one of the units that can benefit from the implementation of Lean. Management and staff are going to be trained and educated on the processes needed to be done at one step at a time. In this case, one division at a time." – Head of Unit.

5.5 DISCUSSIONS

From the fieldwork after interviewing the numerous heads of units, these are the summary of what was assessed after the interviews with all the units. This summary also gives the answers to the research questions that this thesis was set to accomplish. That is :

- **To understand which particular tools, techniques and components are more suitable for the application of Lean across the public sectors.**
- **To examine the reasons behind Lean implementation in Molde municipality.**

The main objective behind the implementation of Lean in these sectors was summarised into two:

1. To improve the working environment for the employees: that is to create a more precise working environment at the various units in order to be able to eliminate 'wasted times' in the course of delivering courses to the students / caring for the patients.
2. To make sure that the output that the students gain from learning is increased: this was also to endure that the students have a lot of time to earn and the teachers have enough time to teach, and with the health-care centre, patients have enough time to rest and that the care-takers are willing to make them feel comfortable.

All together means that the main purpose of implementing Lean in the education sectors was to make the outcome of learning to be more effective and efficient so that students can get the best out of the learning process.

5.5.1 Lean tools used by Units

The main Lean practices that the units are based on are:

1. 'Kaizen' - Continuous improvement,
2. 5S - workplace organization,
3. Standardization of best practices of teaching,
4. Gemba (The Real Place).

5.5.2 'Kaizen' – Continuous Improvement

All the units head made an emphasis on having a regular meeting with the employees every morning to discuss about the daily activities that is required of them, and if they are facing any problems they could all put their heads together and come up with a better solution. Employees in the various units also embark on regular meetings to enable them to identify the key performance indicators (KPIs) that they need to apply during the time being in order to achieve the improvement they desire. This action was mostly done on a illustrative board popularly known as the Improvement Board (Forbedringstavle). This strategy gives the employees a better way to work together and collaborate among themselves to proactively solve problems that are relevant to the continuous improvement goals.

5.5.3 5S – Workplace Organization

Maintaining an effective and organized workplace which is done by the employees (teachers) with the use of 5S –

Sort (seiri)- keeping only necessary items in the workplace,

Set in order (seiton) – arranging items such that they promote efficient workflow.

Shine (seido) – cleaning the workplace to make it clean and tidy.

Standardize (seiketsu) – to set standards for a consistently organised workplace.

Systematize (shitsuke) – maintain and review standards regularly.

The main idea about the 5S is to get rid of all the unwanted items in the workplace, and create a system in such a way that there is a place for everything and all the necessary items are in their places. This was to avoid repetitive work and the waste of time and resources used in searching for the right items in the wrong places.

5.5.4 Standardization

Standardization of the teaching process, has been one of the Lean tools used by the units in regards of Lean implementation. With this technique, the processes that needs to be followed is defined to all employees and they get to know what it is and can follow it. Each unit has a set of work procedures that must be followed in order to achieve their purpose for that particular period and remove variabilities and maximize performance while minimizing waste. Standardization gives precision to important information on content, the sequential order it needs to be performed, the time it would happen and the place of the activity. When these information are communicated properly, it gives standardization the ability to eliminate waste of motion and waste of overproduction.

5.5.5 Gemba (The Real Place)

Gemba, which is a Japanese term that means ‘the real place’ is an idea that basically means that in order to know the actual cause of waste in your work processes, there is the need for you to go out to where the event is taking place and get involved. The heads of unit used is tool and they leave their office and go to the classroom where the teaching is going on in order to have a real feel of how the teacher is going about this. This activity from the report has been very fruitful as they have been able to identify some waste activities on the teachers’ side and have been able to correct them / improved upon them.

Table 7 Lean tools / techniques used by the units

Uints	Standardadization	Continuous improvement	5S	Gemba
Beta	✓	✓	✓	✓
Alpha	✓	✓	✓	
Delta	✓	✓	✓	
Gamma		✓	✓	

Source: Field Work 2016.

5.6 Benefits of Implementation

5.6.1 Recognition of Waste

Training on approaches for Lean implementation through daily employee-management meeting before the start of the day's duties, activities that can be easily seen and read of the improvement board (forbedringstavle) in each unit and the numerous seminars that is organized by Molde municipality for the heads of units, has given more knowledge to the employees and staff with how to put their processes together. This has also given the employees and staff more information about Lean management and the posible waste that can be eliminated with its implementation. It must be noted that to be able to recognize that this activity or that activity is waste is a greater step in the accomplishment of the Lean journey.

5.6.2 Increased Worker Participation

Through the addaptation of best practices of Lean in Molde municipality, many of the staff who felt reluctant in the beginning of the Lean journey now gets to be participative. Initially, some of the staff had the idea that the introduction of this new business process in their workplaces is going to cut them off their job. Some had the notion that Lean was mostly about the system and not the "people", meaning they feared getting involved with the belief of being replaced by the system. This was due to lack of education on what precisely Lean was about and what it intends to bring to their workplaces. After numerous training and information giving, the staffs have accepted the fact that Lean is here to stay with them, and that the processes gets much better when all employees and management get on board.

5.6.3 Improved Visibility of Operations

Before the implementation of Lean in these units, from the interview, all the heads of the units who were interviewed made pointed to how difficult it was to find documents and files when there is the need to work with them due to the lack of orderliness in the arrangement of their workplace environment. Waste of overprocessing, waste of motion and waste of inventory was mostly due to the invisibility and improper arrangements of items at work. After Lean was implemented, units ***Alpha*** and ***Gamma*** gave their experiences about how quick and easy it is to find documents on the common room, teaching equipments and files on the computer which is shared by all. Unit ***Beta*** and ***Delta***, also talked about how quick it has been to move around whiles undertaking their daily responsibilities at the workplace.

5.6.4 Increased Competitiveness

Reduction of waste as a result of removing bottlenecks and making work flow brings about an increase in productivity which allows organizations in cost reduction and defect rates whiles running at capacity. In one of the cases followed, the manager made known the new lean implementation system that allows the individual student to identify their clothes, shoes and playing equipment in no time due to the way it has been arranged. The arrangement is such that there are no or little obstacles in the way as they try to identify and reach for their clothes/items. Waste of waiting has been reduced drastically and they are in the pipeline of making complete elimination of this type of waste.

5.7 Drawbacks to Lean implementation in Molde municipality

Despite the enormous benefits gained from Lean implementation, there are a lot of challenges that companies face while incorporating Lean into their systems. According to the research conducted, Molde municipality has had some few challenges that keeps hindering the best outcome of Lean that they can possibly get. These barriers were identified as what has been pulling-back a better implementation of Lean is discussed below:

5.7.1 Management Support

Leaders in the various units have to take it upon themselves to involve employees in their decision to implement Lean. Moreover, there is the need for an implementation plan from top management, which involves all employees and their various duties respectively – this goes on to make the employees feel involved and get motivated to put in their best. There should be clear information on the reasons for such initiative and why it is necessary. Time and the resources needed for employees to execute their Lean journey must be provided by top management in order to aid in the seamless flow of their activities. From the survey, it was released that employees' expressions towards management were positive as they suggested their involvement with top managements' decisions.

5.7.2 Communication

There was an indication from the survey that, there used to be repetitive work done by different employees. For example one department incited that they used to take too much time searching for documents before the introduction of Lean. The implementation has affected their communication in a sense that, now it take them quiet some few seconds to retrieve the same file which earlier took them minutes to obtain. There was evidence from the survey which suggests that information about Lean principles and techniques were not something most employees are familiar with. All the units heads who were interviewed exhibited more knowledge towards the identification of Lean tools and techniques that they are familiar with, however, some of the employees did not understand what they are meant or what they are used for. This was not surprising as the Lean implementation process in all of these departments interviewed were still at their beginning phases and not too much has been done on working as an organisational unit with a common goal.

5.7.3 Waste identification in the service sector is difficult

In the context of manufacturing, identification of waste is relatively easy since it is visible. The visibility under manufacturing processes makes it easy to identify wastes easily and measures are taken in place to eliminate or reduce those kinds of wastes through the use of the value stream mapping tool. However, in a service organisation such as Molde municipal, where processes are aligned with the services being rendered, it becomes difficult to identify wastes that come from invisible provision. As a result, high degree of expertise is required

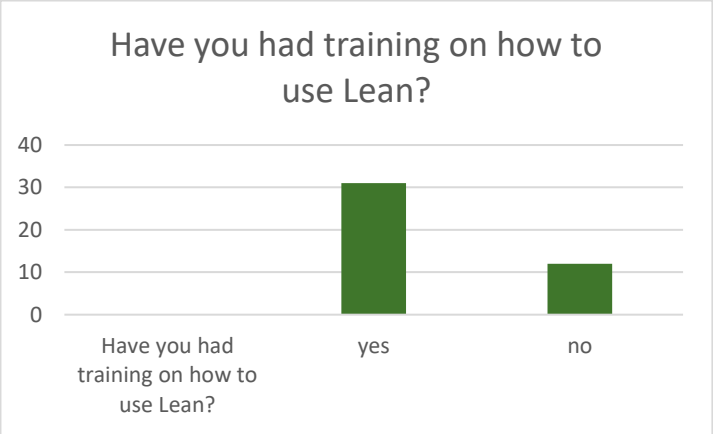
such as being able to identify the voice-of-customer, work-arounds and complexity manifestation.

5.7.4 Employee Commitment

The total pledge from employees has been seen as one of the biggest challenges for companies that want to learn from Toyota. Almost all the heads of the units that were interviewed empasied on the reluctant level that employees show when they were introduced to Lean processes, with no fault of theirs, management realise that it is quite difficult for most of them to adopt to new changes in their own old environment. *One observation was that some of the employees feel threatened by the new changes and somehow they think that by the use of 'LEAN' means 'employee downsizing', which is going to make them loose their jobs. This is one of the reasons why giving education to employees on Lean management is required.*

5.7.5 Little knowledge of Lean service

Unlike our fore-starters in the manufacturing sector, practitioners of Lean services do not have ready success stories that they could refer to since they are new to the system. Books of knowledge that people could buy to exploit Lean are very few on the market and are hardly available. It is in this regard that management should take it upon themselves to train the employees on a regular basis in order to get them updated on the Lean processes being adapted into the organization.



Source: Survey 2016.

Many other's expressed that, they do not know why there is the need for Lean implementation, whiles others also say they have not had any Lean training before.

Table 8: Percieved Acheivement After Implementation

Uints	Prefered Lean tool (s)	Percieved Improvement
Beta	Standardization, Continuous improvement, 5S and Gemba	Increased worker participation, Enhanced communication between staff and management, Improved visibility of operations.
Alpha	Standardization, Continuous improvement and 5S	Improved visibility of operations, Increased worker participation, reduced waste of motion.
Delta	Standardization, Continuous improvement and 5S	Improved utilization of resources, improved employee commitment, improved visibility of operations.
Gamma	Continuous improvement, 5S and Gemba	Increased worker participation, Enhanced communication between staff and management, Improved visibility of operations

Source: Field Work 2016

6.0 CONCLUSION

It can be deducted from the research that, Lean can fit any business model. There is a flow in processes and within every organization which can be analysed and improved and this goes with the public sector i.e. Molde municipality. Working to eliminate the waste processes in any systems goes a long way to improve on the organisational output. This does not matter whether the system is under a manufacturing company or a service company.

Again, there is an evidence from this research that, even though it is necessary for organisations to give information to employees on how to implement Lean and the various tools and techniques available from the manufacturers' point of view. There is also the need for the organization to align these tools and techniques in such a way that it becomes applicable in line with the organisations goals and mission.

Moreover, there was an indication that was evidence from the research, which run through all the units interviewed, top managements, in this case head of the units play an important role when it comes to Lean implementation in their units. They should be the stronghold members for Lean in the organisation. As the ones encouraging employees, giving them motivation on the long-term benefits of implementing Lean. They are supposed to show commitment and be involved in the Lean processes. From the research, management commitment is not an issue for consideration, this is because, all the heads of the units shows a lot of obligation in their work execution and with the Lean implementation as well.

Lean training for staff is an essential part in realising the optimal success from its implementation throughout the organization. There is the need for Molde municipality to organize continuous training programs and seminars on Lean management for the management and all of the employees who are involved in the Lean journey as a constant reminder to accomplishments.

The empirical results found from this project show that all the units investigated gained some significant improvements in their work processes and work areas due to the implementation of Lean, which also led to a general improvement in saving space and resources. By concluding the results, it can be noted that Lean services do not have one particular model of tools or practices that is uniform for implementation. Different authors have used a

‘mixture’ of tools and practices that in their own opinion, works best for the operation in discussion. This was also evidence in the cases where different Lean tools were used in different, however they were able to achieve some level of improvement.

Even though there are lack of set standard which indicates the time and place for which a Lean tool can be used in services. It can be observed that large number of economic and financial results can be yield, and employees’ behaviour improved when the right and best managerial practices are adhered to.

6.1 Limitations and Future Research

The research on Lean management that has emerged through the various studies with both exploratory and empirical studies has led to many frameworks with divergent views. These different views can be put together in order to create some standard framework for lean implementation especially in the public sector. Different views that are lacking concepts are being brought about because of high number of managerial practices

Initially, it was my aim to collect as much information from different heads of units as possible, I sent out many emails for interviews, some of them were denied, others were not responded to. Many of the heads of units that I wanted to interview were usually busy; I was therefore limited to only four units’ head who were able to find time within their busy schedule to be interviewed. Moreover, the survey that was sent out to the employees did not get the quick responses as expected. It took months with different email reminders to achieve the number of respondents that was acquired for this purpose.

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8.0 Appendices

8.1 Apendix I

QUESTIONNAIRE

Dear Respondent,

SURVEY TO EXAMINE THE ADVANTAGES AND DRAWBACKS OF LEAN IMPLEMENTATION IN PUBLIC SECTOR. A CASE STUDY OF MOLDE MUNICIPALITY

I am a Master's Degree student currently conducting a survey on the topic above, under the supervision of Professor Judith Molka-Danielsen at Molde University College – Specialized University in Logistics, Molde – Norway. The main objective of this survey is to determine a more appropriate technique, tools and components that are suitable for the public sector's (Molde Municipal) application of lean.

This survey is made for the staff and management of Molde Municipality, therefore your response is extremely important. Kindly take a few minutes to complete the questionnaire below by answering all questions accurately regarding your understanding of Lean, its principles, and implementation in your company (unit).

All information gathered in this survey is strictly confidential and will not be representative of any individual respondent. The answers to every question will be combined to aid in the final analysis of the information provided in this study. Therefore, there is no potential for tracing an individual respondent on a given information.

Thank you very much for taking your time to respond to the survey. Your contribution to this study is appreciated greatly.

Kind Regards,
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Survey Questionnaire in English

Question1: What is your possition in Molde municipality?

Leader 

Staff 

Other 

Question 2: Which unit do you belong to?

Question 3: how long have you worked with Molde municipality?

Question 4: Where did you hear about Lean for the first time?

From the municipal leaders 

From unit leaders 

From staff / collegues 

In a conferense / seminar 

Question 5: When was Lean implemented in your unit?

Question 6: Are you familiar with Lean tools?

Yes 

No 

Question 7: What kind of Lean tool or techniques do you use in your unit/department?

Question 8: Which Lean principles does you/your department / unit uses?

Question 9: Have you had training in how to use Lean?

Yes 

No 

Question 10: How often do you get training in Lean?

Question 11: Why was there the need for Lean implementation in your unit?

Question 12: What is your understanding of Lean?

Question 13: Was there a common understanding of the need for introducing Lean? (Thus between management and staff in your unit?)

Yes
No

Question 14: Are there any example of improvement (s) since the implementation of Lean in your unit?

Yes
No

If Yes, can you give some example (s)?

Question 15: To wat extend do you believe that Lean can give improvements in your workplace?

To a large extend
To a limited extend
To a lesser extend
No improvement

Question 16: From your understanding of Lean,

a) How do you define customer value?

b) In your own opinion, in what way can you create customer value?

c) In your own opinion, how do you eliminate waste in the workplace, and how do you establish “pull” in service delivery?

d) What systems are in place to bring about continuous improvement?

e) How do you know that your workplace has achieved continuous improvement?

8.2 Appendix II: Sample of Intervew Questions

1. **How long have you been working in Molde municipality?**

……

2. **Where did you hear about lean for the first time?**

   From management
   From Staff
   From Conference

3. **When was lean implemented in the municipality?**

   Year……

4. **When was lean implemented in your unit?**

……
……..…

5. **Are you familiar with lean tools?**

   Yes
   No

6. **What kind of lean tools are used by your company?**

7. **Has lean techniques been implemented in your unit?**

8. **Do you follow the Lean principles and techniques?**

   Yes
   No

9. **What principles and technics do you use?**

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10. Are you trained on how to use the principles and techniques you use?

Yes
No

11. How often do you get training on lean principles?

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12. Why was there the need to introduce Lean into your organization?

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What is your own understanding of lean?

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13. Was there a common understanding about the need for LEAN introduction? (thus between management and staff)

Yes
No

14. Are there example(s) of improvements that have been achieved in your unit since Lean implementation?

Yes
No

If Yes, what are some of the example(s)?

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15. **Do you think it is possible for your unit to bring about (change) the improvement that you are expecting?**

    Yes
    No

16. **For how long do you intend to continue using Lean in your unit?**

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……
……

17. **How is your employees' reaction towards change?**

18. **Are they always ready to accept new things?**

19. **How do you cope with employee resistance to change?**

20. **From your understanding of Lean,**
    a. **How do you define customer's value?**

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In what way are you able to create flow in a customer service industry such as yours?

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How do you establish pull of the customers you serve?

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How are you able to know if you have achieve perfection?

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How do you know you have achieved continuous improvement?

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21. What are the systems put in place to achieve continuous improvement?

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