APPLICATION OF LEAN THINKING TO BUSINESS PROCESS MANAGEMENT: THE CASE OF KENYA REVENUE AUTHORITY

By:

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DECLARATION

This project is my original work and has not been submitted to any college nor has it been copied from other source.

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This research project report is being submitted for examination with my approval as the student's supervisor.

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DEDICATION

This project is dedicated to my fiancée Martha and mother Anne with love.

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I want to give special acknowledgement to my supervisor Ernest Akelo, for adding many ideas to this research project. I also wish to thank my family and friends for having to cope with my absence most of the times during my studies.

ABSTRACT

The objectives of this study included identifying Lean practices employed in process management, establishing the extent of adoption of Lean thinking as well as the challenges of adoption of Lean thinking in process management for which KRA was taken as the case for study.

The study employed both qualitative and quantitative research techniques. Qualitative research was done using unstructured in depth interview guides with the heads of departments while the quantitative phase employed the structured self administered questionnaires to a representative number of employees in each of KRA's four departments.

The findings of this research indicate that Lean management and application of related tools, equipments and techniques is a continuous process at KRA highly driven by the need to improve service delivery and tax collection while netting those evading taxes. The definition of Lean is clearer among the senior staff despite general agreement to the use of the tools, techniques and equipments associated with it. Among the cited tools, ETR, simba system and use of technology e.g. networked computerisation were the major mentions to Lean implementation. The extent of application of Lean involves all departments and all employees being targeted through communication, training and reviews among other means which have turned out to be successful.

Despite benefits of Lean management being realized at KRA, organizational culture and resistance to change, backlogs and work pressures, lack of awareness and knowledge about lean and illiteracy in IT have been the major bottle necks towards implementing Lean and the related tools equipments and techniques.

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LIST OF ACRONYMS

BPR – Business Process Re-engineering

DMAIC – Define, Measure, Analyze, Improve and Control

ERM – Enterprise Resource Management

ETR – Electronic Tax Register

FMS – Flexible Manufacturing Systems

HIV – Human Immune-deficiency Virus

ISO – International Standard Organization

IT – Information Technology

JIT – Just In Time

KRA - Kenya Revenue Authority

KRAS - Kenya Revenue Authority Support

SPSS – Statistical Products, Services and Solutions

TQM – Total Quality Management

UK – United Kingdom

US – United States

VAT – Value Added Tax

CHAPTER ONE: INTRODUCTION

1.1 Background

1.1.1 Lean Thinking

There are many views of what constitutes "Lean thinking" or "Lean production" (Womack and Jones, 1994). Although most people recognize the roots of Lean thinking in the Toyota production system, there has been considerable development of the concept over time. Womack and Jones (1990) are regarded by most as the originators of the concept. They developed five core principles to represent Lean which includes specifying the value desired by the customer; identifying the value stream for each product and providing that value while challenging all of the waste steps; making the product flow continuously; introducing pull between all steps where continuous flow is impossible and managing toward perfection so that the number of steps and the amount of time and information needed to serve the customer continually falls.

Lean is a philosophy and within it, there are some fundamental principles and concepts. Making Lean operations successful requires a number of tools, techniques and approaches often referred to as the 'Lean toolbox' (Bicheno, 2004). In practical terms, one of the underlying assumptions made by Lean is that organizations are made up of processes. This therefore means that improvements made in a Lean context optimize the process or customer's journey, rather than optimizing individual departments. This perspective, which is widely applied in industry, is sometimes referred to as the "process-based view" of organizations (Jones and Womack, 2004).

Hines et al (2004) present Lean from two perspectives; the strategic and operational levels. The strategic level focuses on the principles of Lean while the operational level focuses on the tools and techniques often associated with Lean. This relationship in the research becomes an important distinction when assessing the use of Lean within the Kenyan public sector organizations and specifically targeting KRA.

The public sector, largely offers services. Given the origin of Lean thinking in the automotive sector, its application in the service sector without appropriate adaptation has been widely questioned (Dean, 2000). Whilst Bowen and Youngdahl (1998) demonstrate that Lean principles can be applied within the service sector, Dean highlights a number of key criticisms associated with gaps in the Lean philosophy. These criticisms include: concerns about the increased vulnerability of Lean systems to errors or resource shortages; suggestions that Lean systems do not cope well with demand variability; potential failure to address human dimensions of work content and work environment; and a lack of strategic perspective when implementing Lean tools and techniques. Related to the last criticism, some practitioners and writers of Lean see it as a holistic strategy that provides the adopting organization with a coherent and consistent set of practices.

Once rare outside the factory, lean tools are increasingly applied in the service sector, with governments being the latest to adopt them. Under unprecedented pressure to deliver value for money, governments are finding that lean strategies can help them deliver more and better services on smaller budgets. However, governments instituting lean processes must tackle challenges such as the absence of a profit motive, lack of competition, and civil-service rules that may limit the flexibility of the workforce. Lean programs can succeed, but only if public-sector managers align the interest of government workers in holding meaningful jobs with the need to accomplish more things with fewer resources (Bane, 2002).

1.1.2 Kenya Revenue Authority (KRA)

The Kenya Revenue Authority (KRA) is the tax collection agency of Kenya. It was formed on July 1, 1995 to enhance tax collection on behalf of the Government of Kenya. It collects a number of taxes and duties, including: value added tax, income tax and customs. Since KRA's inception, revenue collection has increased dramatically, enabling the government to provide much needed services to its citizenry like free primary education and HIV treatment to all. Over 90% of annual national budget funding comes from local taxes collected by the KRA (Oyugi, 2005). KRA undertakes to implement different strategies to enhance its revenue collection. Some of these strategies include, partnering with various banks as National Bank

of Kenya to facilitate efficiency of tax payments (National bank of Kenya, viewed 20 June 2007, http://www.nationalbank.co.ke).

KRA has also introduced Electronic Tax Registers (ETRs), machines that would improve efficiency in tax collection by minimizing or eradicating tax evasions (Oyugi, 2005). Philip Ondenyi, the KRA regional tax manager indicates:

"The Kenya Revenue Authority has intensified its campaign to enforce the use of Electronic Tax Registers. The Tax Authority is currently conducting countrywide tax clinics to educate traders on the benefits of using the machines in a bid to realize its revenue target of 336billion shillings this year. All traders were required to have installed Electronic Tax Registers by January this year in a new move by government to eradicate tax cheats and improve VAT compliance… increased tax collection will reduce reliance on donor funding. With 95% of this year's budget being financed from domestic taxes KRA will heavily depend on the success of the ETRs' to realize its revenue target" (Kenya Revenue Authority, viewed 20 June 2007, http://www.kra.co.ke).

KRA management in their project Kenya Revenue Authority Support (KRAS, 2005-2006), indicated that:

"Kenya Revenue Authority (KRA) is implementing a reform programme to re-engineer and implement simple, transparent and up-to date procedures and processes based on the principle of self-assessment, supported by Information Communication Technology (ICT) risk management and audit based controls and managed by competent staff. KRA's management and the Ministry of Finance have requested donor support for this programme. This specific project is a building block towards the implementation of the integrated reform programme. This project is referred to by KRA as Change Management and Communication and Information Technology Support Project".

1.1.3 Economic forces acting as drivers to Lean

The major economic forces affecting countries, businesses and organizations (both public and private) over the decades have been liberalization, privatization and globalization (Seddon, 2002). Seddon says that these forces have led to a number of influences and pressures on

national economies. Chief among these are the powers of customers, information, global investors, market place, simplicity, and organization. He argues that the power of customers has been perhaps the most important factor shaping organizations. As a result, organizations have to continually learn, relearn and adapt to changing customers' choice, and requirement. This power compels an organization to move from a bureaucratic mode to a responsive mode of operation: to be flexible and lean, able to meet customer demands cost effectively. The power of information (largely arising from advances in communication and information technology) can help an organization in this continual learning and adaptation process. With the ability to transfer volumes of data globally from one organization to another, knowledge networking and knowledge management becomes possible. The power of global investors offers a range of opportunities, no longer bounded by regional or national boundaries. Organizations can also develop by sourcing materials and other resources from a much wider area.

He further argues that the power of the marketplace generates fierce time-based competition. This either motivates an organization to learn faster, to become better at providing quality and value or it causes the complacent organizations to fail. The power of simplicity is the move to streamline systems and procedures within the organization and the move away from a ritualistic culture to an empowering and autonomous structure. This involves the reengineering/redesign of business processes and the forging of organic partnerships to eliminate delays and bottlenecks and lastly the power of organization is the ability to use self-knowledge, technology, and modern business practices to change the shape of the organization. It is now possible to create much leaner, more agile organizations based on high performance teams (Seddon, 2002).

Seddon hence proposes that the influence on these economic forces can be realized through moving from bureaucratic modes to responsive modes of operation. This involves being flexible and lean, able to meet customer demands cost effectively, advancing in communication and information technology, empowering employees and having autonomous structures, reengineering/ redesign of business processes and the forging of organic partnerships to eliminate delays and bottlenecks. Lastly, the ability to use self-knowledge,

technology, and modern business practices to change the shape of the organization. It is now possible to create much leaner, more agile organizations based on high performance teams.

For the purpose of this research Lean is defined in a wider context i.e. good practice of process/ operations improvement that allows reduction of waste, improvement of flow and better concept of customer and process view. This has enabled other approaches to be considered in the literature review including business process re-engineering, six sigma and just in time in order to identify any relevant writings which may help in considering the application of Lean in the public sector in Kenya.

1.2 Problem Statement

There has been a low rate of success in lean initiatives and what many public service organizations have substantially employed in the implementation of lean management (Mora, 1999). Mora further argues that only some 10 per cent or less of companies succeed at implementing lean manufacturing practices. Sohal and Eggleston (1994) argue that only 10 per cent have the philosophy properly instituted, while Repenning and Sterman (2001) believe that companies use lean initiatives as a fad and argue that whilst the "number of tools, techniques and technologies available to improve operational performance is growing rapidly, and despite dramatic successes in a few companies, most efforts to use them fail to produce significant results". Ostensibly, less than 10 per cent of UK organizations have accomplished successful lean implementation (Baker, 2002; O'Corrbui and Corboy, 1999). Often organizations view Lean as a process whereas they should embrace it as a philosophy. The subsequent investigations subscribe to this concept since when seen as a philosophy it becomes a way of thinking whereas tactics or processes are mechanisms to action (Waterson et al., 1997).

The Kenyan service industry, just like service industries in other countries have scarcely employed lean management and the government has not been spared either. In a memorandum in the project KRAS (2005-2006), the management of KRA indicated that various aspects of Lean tools, equipments and techniques are essential for success in its responsibilities as indicated below:

"However, KRA has many problems. It is a very segregated organization with little linkage between its various departments and revenues. The lack of integration has impeded the development of common practices, procedures and a clear culture across KRA and has also inhibited the timely and efficient exchange of information…The other ICT systems lack critical functionalities and are not integrated…KRA's management considers that change management, communication and automation are essential components that will determine programme success…ICT is seen as a means of helping KRA management and staff to apply and utilize the attitudes and skills they develop".

In the Kenyan public sector just as Walley (2003) noted in UK, little research has been undertaken on this subject though there is a significant need to employ the tools and techniques of Lean to improve on the efficiency of service delivery to the public. The service industry in Kenya has scarcely employed technology to realize Lean and even where tools, equipment, technology associated with Lean have been applied in management, lean thinking is scarcely the driver towards it as with the case of KRA (KRAS, 2005-2006).

In KRA's project KRAS (2005-2006, it is indicative that the introduction of electronic tax registers has reduced tax evasions by greater percentages. The support KRA has offered to its staff to pursue further education and the training and development it has provided to its' staff has greatly led to improved performance in terms of increasing service quality and revenue collections. The networking of the regional offices and departments and the partnership with various stakeholders for instance National bank of Kenya provides a means for reduced costs of revenue collection, enhanced communication, improved service to customers, decentralization and enhanced decision making among others which are clearly consistent with Lean Thinking.

Many studies on Lean concept have been undertaken in the manufacturing sector with the public sector, which is largely service sector remaining relatively unexplored (Womack and Jones, 1990). This does not necessarily mean that Lean can not apply to the service industry but an indication of the understanding of Lean as a process rather than a philosophy (Waterson et al., 1997). In terms of public sector organizations in general, little application

and research has taken place with regard to Lean and the public sector to date, except in health where the philosophy has been used to generate a process-based perspective within the NHS Emergency Services Collaborative in England (Walley, 2003). This work studied the demand for emergency care within two health communities and made recommendations for the redesign of parts of the system. This innovation is responsible for substantial improvements to patient waiting times.

This study apart from establishing the understanding and application of Lean at KRA, will also try to link the contribution that technological advancement can bring in enhancing Lean and need for radical changes in the 21st century to embrace Lean as a philosophy in the service industry with the understanding that technology is becoming more complex yet cheaper and has a great potential in bringing radical changes.

1.3 Objectives of the Study

1. To identify Lean practices employed in process management at KRA.
2. To establish the extent of adoption of Lean thinking in process management at KRA.
3. To establish the challenges to adoption of Lean thinking in process management at KRA.

1.4 Importance of the Study

The result of this study will be of use to the following:

1. The Government

The findings of this study will help the Government to understand the application and the outcome of successful implementing of Lean in the public sector. It will also establish the correlation between the levels of application of Lean and productivity or improved service delivery in the public sector.

2. The Managers and Executives

The findings of this study will provide insights to the managers and executives on the role of Lean in enhancing service delivery and to be able to apply Lean as a philosophy in management to enhance the future continuous improvement culture. The trend by which

organizations management see Lean as being expensive will also be explained with justification of Lean tools and applications benefit to organizations success.

3. The Practitioners and Academia

The findings of this study will narrow the divide between Lean Management and the application of Information Technology and Business Process Re-engineering. A thorough understanding of these issues will substantially benefit practitioners and academia in being able to provide explanations for certain occurrence of events or demands of the organizations.

CHAPTER TWO: LITERATURE REVIEW

2.1 Overview / History of Lean

This section aims to give an overview of both the history of Lean and the development of the concept.

2.1.1 Lean Thinking/ Concept

The term "Lean" was first adopted in the 1980s (Womack and Jones, 1990). It was claimed that the implementation of Lean practices resulted in using less of everything (e.g. raw materials, labour, time, etc) compared to mass production. From Lean Enterprise came the idea of "Lean Thinking", which took the Lean idea further and is described as having five principles (Womack and Jones, 1996) that include specifying value of specific products; identifying the value stream for each product; making value flow without interruptions; letting the customer pull value from the producer, and pursuing perfection. These five principles of Lean Thinking have become the foundation to Lean and can be used in relation to all notions of Lean, Leanness and Lean principles. However, some writings focus on the organization (as in Lean Manufacturing or Lean Service), the supplier (Lean Supply) or customer end (Lean Consumption).

Syrett and Lammiman (1997) say that considering the fundamental ideas of Lean Manufacturing and Lean Thinking it is possible to develop the concept and ways of having Lean work or Leanness. This can be equally applied to a number of other management doctrines like BPR and TQM. They further argue that there are three common reasons for introducing Lean ways of working; to cut costs, to promote efficiency and to support growth and innovation. Using the muscle, fat, etc, connotations of the Leanness concept, it has been suggested that what is needed is "fitness" or "strive to be fit". They add that some organizations have embraced the notion of Leanness by adopting new working practices, including team working, project leadership, self-directed teams, empowerment, outsourcing, flexible working and the learning organization.

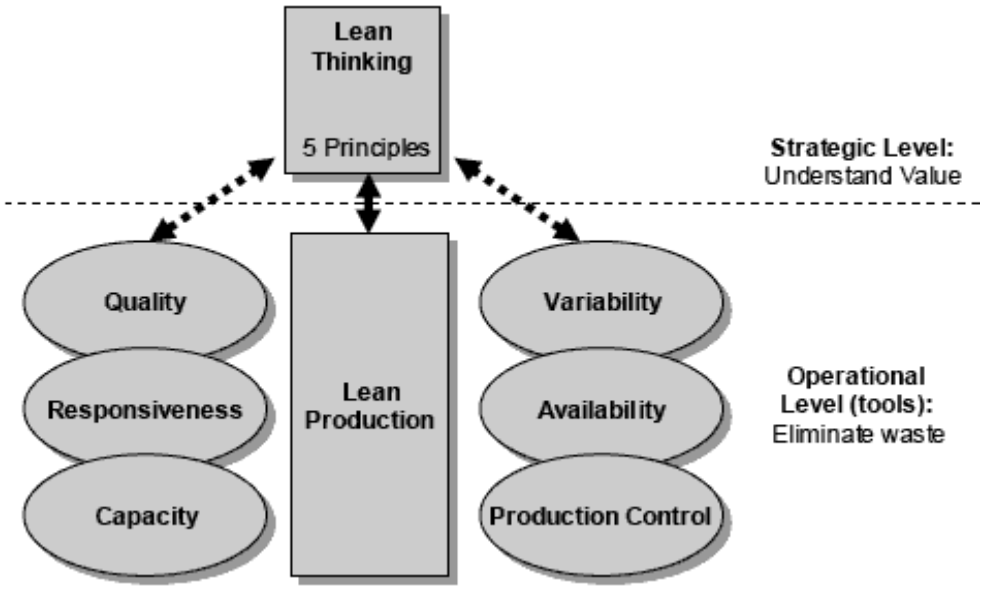
In the manufacturing sector, Lean concept is based on the Toyota Production System, which was developed in the 1950s after World War II (Cusumano, 1994; Oliver et al., 1994; Womack and Jones, 1990). The concept was introduced as an alternative to mass production techniques in the Toyota factory and led to increased productivity and quality levels by allowing the flexibility of "skilled" production with the volume efficiencies of "mass" manufacturing. The core characteristics of the Lean Manufacturing can be described as (Oliver et al., 1994): Team-based organization involving flexible, multi-skilled operators taking a high degree of responsibility for work within their areas, active shop floor problem solving structures, central to continuous improvement activities, Lean operations, which force problems to be surfaced and corrected, high commitment human resource policies, which encourage a sense of shared destiny, close, shared destiny relations with suppliers, typically in the context of much smaller supply bases, cross-functional development teams and close links to the customer.

In the service sector, there has been evidence of the transfer of manufacturing concepts of Lean to the service sector since the 1970s (Levitt, 1972). Arguments are that service characteristics are not an excuse for avoiding manufacturing methodologies as a means of efficiency gains (Bowen and Youngdahl, 1998; Levitt, 1972). Some studies argue that any organization can gain substantial benefits including improved quality, reduction in costs and increase responsiveness from at least some new practices (Waterson, et al., 1997). Indeed supermarkets have been adopting Lean techniques for improving the flow of customers for many years (Swank, 2003). There are strong benefits that can be gained from implementing Lean whatever the size or sector of the organization (Hogg, 1993; Pollman, 1993; Sohal and Egglestone, 1994; Swank, 2003).

Studies into the adoption of Lean practices in Japanese vehicle manufacturers have concluded that these companies have superior performance in terms of productivity and quality when compared to their European or North American counterparts (Oliver et al., 1992, 1994; Womack and Jones, 1990). However, even though European and North American manufacturing companies have taken on board some of the principles (Oliver et al., 1992;

Sohal, 1996; Sohal and Egglestone, 1994; Womack and Jones, 1990) very few have evidence of all aspects of the Lean Manufacturing model.

Figure 2.1: Lean Framework



Source: A framework for Lean (Hines et al, 2004)

Hines et al (2004) present Lean from two perspectives the strategic and operational levels. The strategic level focuses on the principles of Lean that include specifying value of specific products; identifying the value stream for each product; making value flow without interruptions; letting the customer pull value from the producer, and pursuing perfection. The operational level focuses on the tools, techniques and equipments often associated with Lean. These associated tools results in elimination of wastes through enhancing quality, responsiveness, capacity, variability, availability and production control. This relationship is shown in figure 2.1 above.

2.1.2 Lean Enterprise

During the 1990s, the Lean debate moved away from best practice production techniques in automotive to other techniques/approaches and sectors. The Lean concept was extended to develop the "Lean Enterprise" which is defined as a group of individuals, functions, and legally separate but operationally synchronized companies (Womack and Jones, 1994). Lean

Enterprises join together all the 'value-creating' activities from all the organizations and use Lean technologies and techniques. It is also claimed that the development of a Lean Enterprise aids the stimulation to innovate (Smeds, 1994).

"Lean Supply" and “Consumption” focuses on the need for closer relationships between customers and a small base of suppliers as a key characteristic (Lamming, 1996). Lamming continues to say that Lean supply considers the entire flow from raw materials to consumer, recognising that there is a cost associated with any departure from perfection in undertaking the tasks necessary to provide long-term customer satisfaction. "Lean Consumption" requires the integration and streamlining of the process of provision and consumption (Womack and Jones, 2005). Womack and Jones further record that the challenge is for service providers to consider total cost from the standpoint of the customer and to work with customers to optimize the process of consuming.

2.2 Lean in the Public Sector

This section particularly focuses on the evidence of Lean in the public sector, drawing on relevant ideas based on Lean Service. This evidence outlines how there are substantial efficiency gains to be made from the introduction of Lean practices and techniques in the public sector with improved customer service, quality and reduction unit costs (Porter and Barker, 2005; Lucey, 2004) as well as better planning of service operations (Levitt, 1976).

The public sector should look to manufacturing to learn about Lean. Although Lean will have to be modified to suit the peculiarities of these sectors, the principles are the same as are the lessons regarding the configurations of systems (Jones, 2004). However, some writers argue against the suitability of Lean practices outside of high volume manufacturing (Hines, Holweg and Rich, 2004). In addition, other writers have stated that Lean ways of working are affected by the organizational context into which they are introduced (i.e. size, sector, union presence or absence, greenfield/brownfield site and legal framework). Thus, Lean or Leanness is not a homogeneous or invariable concept but a context-dependent process (Rees et al., 1996).

Lean principles have been adopted in various public sector organizations, although the way that they have been implemented differs depending on the organization (Rees et al., 1996). This includes for example, the use of Lean production, flow, kaizen, process and value stream mapping, standardizing systems and root cause analysis in hospitals to improve emergency care services, intensive care units and operating units and to reduce waiting times (Anonymous, 2004; Silvester et al., 2004; Walley, 2004; Wysocki, 2004).

2.2.1 Relevance of Lean in the Public Sector

Despite the lack of concrete empirical examples of successful implementations in the public sector, some researchers do believe that non-manufacturing organizations can reap rewards from Lean approaches if they look past the manufacturing-associated labels and utilise the underlying concepts (Bane, 2002). The essential requirements of any organization, which might want to take advantage of these techniques, are patience, support from top management, and the presence of a change agent/champion. However, again others have questioned the application of the Lean philosophy within the service industry. Some key criticisms have included (Hines, Holweg and Rich, 2004).

In terms of human aspects, Lean systems can be seen as exploitative and high pressure to the shop floor workers. The long-term sustainability of any Lean programme is dependent on the human dimensions of motivation, empowerment and respect for people. Scope and lack of strategic perspective; there is a lack of discussion of strategic level thinking in Lean programmes leading to a lack of sustainability of many Lean transformation programmes. Lack of contingency; Lean thinking may encourage organizations to remove buffers which may not always be in use but are necessary for occasional or unforeseen factors. Coping with variability; various Lean approaches manage variability and create capacity by utilizing assets more effectively.

In many sectors however, as demand varies the ability of Lean production systems and supply chains to cope can become the main inhibitor to the implementation of Lean. Over-standardization, service organizations are under pressure to meet individual customer needs and standardisation of services to fit the Lean model can lead to accusations of

"McDonaldlisation". Inflexible and fragile; a truly Lean system lacks flexibility in terms of ‘space to experiment’ and `time to think'. Unable to deal with uncertainties; higher levels of Lean can remove essential levels of organizational slack, which are required to deal with uncertainty. It gives preference to efficiency over robustness and system reliability. In some respects the evidence that critiques Lean is probably greater than the evidence that proclaims the scale of improvements using Lean, mainly due to the lower levels of vested interest by those generating the criticism. However, the evidence tends to be case-based and does not involve extensive empirical data.

2.3 Empirical studies on Lean Thinking and their Outcome

This section presents the studies and possible outputs and outcomes that have been and can be achieved through the implementation of Lean. Due to the majority of writings and studies to date being in manufacturing organizations, the initial material presented in this section relates to manufacturing. However, as indicated in various sections above and some evidence below some writers indicate that equal, if not more benefit, can be gained in the public sector. By presenting the outputs and outcomes of Lean in manufacturing and service it can become a useful benchmark of possible achievement that can be attained. Although, of course, it should be noted that other writers claim that a like for like comparison should not be made due to issues of context and customer requirements.

2.3.1 The Manufacturing Sector

Common themes running through successful Lean implementation programmes in manufacturing are (Manufacturing Foundation, 2004): Receiving assistance to prioritize, select and define the focus and boundary of the improvement programme, high level of expertise in delivering implementation programmes using Lean practitioners with hands on process improvement expertise and relevant production management experience, going for quick wins is popular and does actually work, integrating accredited training and workforce development, change management and rapid improvement techniques, organizations use operational measures to quantify the success of their Lean programme, with an investment of £20,000, report it delivering benefits of £100,000 and networks and sharing of learning has been an important way of gaining information and knowledge on Lean.

The main qualitative results from surveys of manufacturing companies are (Manufacturing Foundation, 2004). It held that vastly improved customer focus was the main legacy of Lean implementation and of the new organization created. Successful companies conceived and executed a strategy for change to support the adoption of Lean, the initial implementation of Lean was usually piloted on a smaller scale prior to the investment in training being made to expand Lean outside of the pilot area, one methodology does not fit all applications of Lean and methodologies and tools need to be flexible enough to fit a variety of programmes.

The Lean toolbox is extensive with a very broad range of tools being used. Much of the support delivered to companies involves training in these tools and techniques, support provided by specialist consultancies, public sector support agencies was seen as effective, the most common areas for the application of Lean was in the production function, production planning, maintenance, supply chain management and purchasing/procurement, improvements in quality reduce process cycle time, cut production costs and were likely to improve delivery performance and customer satisfaction and companies found it very difficult to report on the level of investment that they had made in order to secure the cost savings they were reporting (Bicheno, 2004).

2.3.2 The Service and Public Sector

Studies undertaken in the US on related Lean principles concluded that there is lack of empirical research documenting Lean and JIT experience in the public sector. This can be attributed to lack of such experience and its relatively new adoption of Lean (Yasin, Wafa and Small, 2001). Another argument is that the public sector appears to be behind manufacturing and service organizations in terms of utilising innovative operational practices such as JIT, TQM and automation (Yasin and Wafa, 2002). Where hospitals are trying techniques first used in manufacturing as a means of improving performance, there are no examples of a hospital that has achieved comparable large-scale transformation (Yasin, Zimmerer, L., Miller and Zimmerer, T., 2002).

A study assessing the suitability of Lean Thinking in the UK health service looked at how a performance measurement system called the "flow model" was designed to identify key

performance indicators that measure changes towards Lean Thinking (Kollberg and Dahlgaard, 2005). The study concluded that Lean Thinking is applicable in health care settings, and that the flow model is a suitable tool for following up these initiatives. This has practical implications for health care practitioners, who may use the findings to develop measurements of the outcome of Lean Thinking initiatives on existing care processes. However, it is argued that the flow model needs to be balanced with other measurements in order to receive a complete picture of Lean Thinking performance (Kollberg and Dahlgaard, 2005). The same study also reported similar findings in a study of the Swedish health care system (Kollberg and Dahlgaard 2005).

In the UK, there are organizations aiming at developing and introducing the principles and practices of system thinking in the public sector (Seddon, 2002). Seddon further argues that these organizations specialize in the translation of these ideas into service organizations, and have developed the term "Lean Service". Using the experience and knowledge gained in local authorities, police forces, fire services and housing associations, the improvement of one particular system may be used to improve systems in other processes and departments. Every local authority has similar administration processes across different departments. If the time to make decisions can be halved and the service improved in one department, the same principles might be used to improve others.

Within some service organizations as they adopt Lean practices, there is strong evidence suggesting that costs fall, services improve and wastes are reduced. In addition, because the people who do the work have been engaged in understanding it from a different dimension and changing it, morale improves. And finally, because the system has been changed in particular roles and measures, there is the means for continuous improvement (Seddon, 2002). The following are quoted as examples of efficiency gains in the UK public sector where Lean principles have been applied: halving the end-to-end time for planning applications, halving the time for voids in council houses, cutting end-to-end processing time for high demand adaptations from disabled people from over 200 days to 12 days, payroll errors reduced from 75% to 2%, reducing backlog in lost and found departments by 80% and reducing the time taken in report production from 77 to 6 days in the Justice system (Seddon, 2002).

There is also evidence of other benefits in the public sector (Wysocki, 2004). Using the Lean approach, some hospitals have traced problematic infections in some patients to their source, prompting changes in the way that intensive-care units inserted intravenous lines. The result was a 90% drop in the number of infections after just 90 days of using the new procedures. It also made good business because the fall in infections led to savings of almost half a million dollars a year in intensive-care-unit costs. Reported outcomes from a kaizen blitz in another hospital case study include dramatic performance improvements by capitalizing on many hands and minds working together with a common focus. This includes 97% reductions in throughput time and 50% reduction in space required (McNichols, Hassinger and Bapst, 1999). The process, often led by practitioners, gives other benefits which help to demonstrate employee empowerment, development of cross-team synergies and provide lessons in best practice by actual use - e.g. process mapping.

A range of benefits were also listed in a study on initiatives, in which JIT approaches were used with the implementation of new Information Technology systems (e.g. Enterprise Resource Management (ERM)) to improve business processes in a large public sector organization (Dean, 2000). Accessibility; 39% decrease in reference to others for information and 56% increase in respondents indicating "frequent" or "constant" use of electronic resources. Productivity; 60% increase in respondents indicating a 75% or greater reduction in time required for accessing information and 61% increase in respondents indicating a 75% or greater reduction in time required for taking action on information and customer satisfaction; 95% increase in respondents indicating satisfaction with the new processes and 94% increase in respondents indicating preference for the re-engineered electronic processes.

2.4 Lean Thinking in Practice

This section builds on the five main principles of Lean Thinking outlined by Jones and Womack (2004) to highlight the other key concepts. These include managing the business from the customer definition of value, creating end-to-end primary processes to design, deliver and support this value, with minimum waste, together with the appropriate support processes, building a management system to develop, sustain and improve these processes over time and

being clear about the customer purpose before designing the processes; and then organizing the people to sustain this.

In order to apply Lean Thinking in the public sector, the literature builds on the definition of the Lean business system and the challenge of obtaining value from each process (Womack and Jones, 2004). However due to the specific nature of the public sector, the Lean concepts may need to be transferred into a more user-friendly language (Porter and Barker, 2005). Porter and Barker further argue that the standard Lean techniques and their applicability in the public service could include value; organizations need to determine what aspects of the service are critical to quality. They suggest that it may also be useful to identify who the real customer is and better understand their requirements, identifying the value stream and measuring how and when value is added helps to identify and remove waste.

In services it can be hard to see waste, work in progress and problems (Porter and Barker, 2005). They say that flow, adopting standard operations and identifying best practice can achieve the maintenance of a high rate of flow and quality through value chains. This allows the routine to run more smoothly, freeing up time for creativity and innovation. They further indicate that pull focuses upon the customer demand and trigger events backwards through the value chain thereby linking activity to customer needs. However, customer demand is not always clear in a service environment and effort is required early to understand this area and perfection; striving for perfection is an important element of Lean embedding continuous improvement in the culture. Continuous improvement ensures that non-value adding activities are removed from the value chain (Porter and Barker, 2005).

2.4.1 Lean Measurement in Health Care

In an evaluation of Lean Thinking in health care, some writers (Kollberg and Dahlgaard, 2005) have used the five elements of the Womack and Jones Lean model to discuss how applicable Lean is to health care and, in particular, how measurement can be used to reflect this application. Specify Value - putting the patient at the centre means measures such as medical quality, waiting times and patient satisfaction are key. Identify Value Stream (to eliminate "wasteful" activities) - they suggest that process mapping is key and the degree to

which this happens is a key measure, as is the amount of time spent by medical staff on patient contact, and waste in the referral process. Flow - measurement might include the number of times demand for care can be matched with capacity, the ability to smooth demand by scheduling, improving flow through the use of multi-skilled teams, and transparency through information; pull - waiting times and delays are key measurements of the effectiveness of this element and perfection - policy deployment is key, with measures feeding into a balanced scorecard.

This study examines how well the "flow model" used in the Swedish health care system provides measures which support all five Lean principles. The study found that additional measures e.g. policy deployment, patient satisfaction and continuous improvement are needed in order to fully capture the changes towards Lean thinking. The study also suggests that designing a performance measurement system that reflects Lean initiatives is one important phase in implementing Lean Thinking in the entire organization (Kollberg and Dahlgaard, 2005).

2.5 Organizational Readiness

The readiness of an organization to take on board change, and particular concepts like Lean, are critical in allowing successful implementation. Organizational readiness is concerned with the ability of an organization to take on board change, together with deciding which concepts to implement. It is related to organizational barriers although readiness could be considered as the point before implementation and so before the barriers may appear. This section considers studies on organizational readiness, drawing mainly on associated concepts such as Just In Time (JIT) and benchmarking. Lean has the potential to increase the operational efficiency, service quality and organizational effectiveness of the public sector, but there are several prerequisites for gaining such benefits. Therefore, this section will describe some ways for this potential to be achieved, related to how public sector organizations must modify their operating procedures, production systems and organizational culture.

A study of the application of JIT into the public sector suggested the consideration of the following issues in order to enhance its potential success (Yasin, Wafa, and Small, 2001).

Training of management and employees in order to create an organizational culture, which is consistent with the JIT organizational philosophy, establishment of new procedures for dealing with suppliers. These procedures should define the criteria for suppliers based on quality, cost and timing and analysis of operations to identify areas where standardisation, simplifications and automation are needed. Operational processes and procedures should be re-engineered based on this analysis prior to the implementation of JIT.

The following conclusions are drawn (Yasin et al 2004). System-wide pre- JIT modifications appear to reduce the potential for JIT implementation problems. This is especially the case for public sector organizations, which should learn the lessons from the manufacturing experience, pre- JIT modifications appear to enhance JIT success, especially for public sector organizations where both operations- and procedures-related modifications are associated with JIT success, top management should champion the initiation of the JIT effort, while leaving involvement in the details of the implementation process to other internal constituents and external partners such as customers and suppliers, organizations that follow a differentiation business strategy appear to have more success with JIT and industry leaders tend to have more success with JIT than others in their industries.

Benchmarking is fundamental in Lean implementation to aid organizational readiness. Benchmarking is the process of learning from others. It involves a comparison of one's own performance and/ or methods with those of others. Empirical studies provide actions that can be used by manufacturing, service and public sector organizations to reduce implementation problems and improve their chances of a successful benchmarking implementation. As the operating systems of these organizations share fundamental similarities, they can all gain significantly from cooperative benchmarking. (Morling and Tanner, 2002).

A benchmarking study by a public sector organization looked at the contribution business management systems make to achieving organizational objectives (Morling and Tanner, 2002). The aim of the study was to improve the architecture, management, control, communication and deployment of the organization by reviewing current best practice. The study concluded that benchmarking was not about just visiting other people but of the need to

align management systems and Lean improvement programmes with business strategy (Morling and Tanner, 2002).

2.5.1 Public Sector Experience

Drawing upon experiences in local government, the evidence suggests a need to drive continuous change through performance management through a bottom up approach (Sanderson, 2001). There is literature on how higher education institutes can be supported towards making the transition to managing and behaving commercially while continuing to focus on the provision and continuous improvement of an effective service (Cooper, 2004). Education of those within the organization is proposed as a means of moving the organization towards managing and behaving commercially without adversely effecting political ties and while continuing to focus on the provision of an effective service. However this is recognized as not being an easy task. There is also the need for the workforce within higher education institutes to trust their managers to help them understand their own organizational culture, its political frameworks and work practices, to work with them in order to build new relationships.

2.5.2 Recognition and Consideration

There has been a study looking at the standards of quality that can be expected from public services (Younis and Boland, 1997). This has highlighted a number of factors in improving quality where customer and suppliers influence the limiting factors. The fact that there are in-built limits can provide an excuse for doing nothing about quality. However the development of quality is an incremental and continuous process, which needs to be undertaken. Recognising and accepting these limitations means that expectations by service provider and customer can be realistic and shortcomings more readily accepted. Other considerations that should be taken into account when implementing Lean include (Ostrowski et al., 1996). The need to ensure that Lean does not mean a loss in human aspects of work i.e. over standardisation of the process so that little human ability is required, Lean should be appropriate to the organizational strategy and teamwork but should also take into account the productive capacity of the organization as well as the non-productive capacity, Lean should

be associated with fitness for purpose and Lean means having the optimal amount of particular resource for the circumstance in question.

2.6 Pre-requisites for Lean

In this section we explore and describe the pre-requisites for Lean both in terms of implementation process and the technical content of organization change.

Key Elements for Change Programmes

The implementation and embedding process of Lean can be considered as another critical element of the whole approach in order for the benefits to be realized (Sohal, 1996). This section presents the elements that need to be considered when embarking on Lean. However, in general it has been stated that the key lessons that have been derived from implementing change programmes, which consist of Lean, include (Sohal, 1996); need to change existing attitudes, behaviors and practices, full and ongoing support from top management, need for a champion to drive the change initiatives and maintain momentum. Lucey, Bateman and Hines (2004) also add realization by everyone that it will take a long time, engaging employees as much as possible in the planning, implementation and evaluation of changes and developing an environment of openness and trust through communication and sharing information as some factors that can help in Lean implementation.

Value Stream Mapping

Value Stream Analysis or Mapping is often cited as a technique that can be used in order to decide which tools to use to reduce waste in specific circumstances (Hines and Rich, 1997). This involves: Identifying the specific value stream to be reviewed, interviewing managers to identify the various wastes that should be removed and obtaining views regarding the complete industry structure. However, the model claims to have a practical and research use. For research, the model can be used to operationalize Lean production to study the change process properly. In practice the model can be used to assess the developments taking place in an effort to become Lean and as a checklist for what to aim at when implementing Lean (Karlsson and Ahlstrom, 1996). Further discussion on Value Stream Mapping and Analysis is in section 2.8

Kaizen Blitz

Another study has demonstrated how to implement a "kaizen blitz", which in turn implements Lean ideas in an organization, within two days and described how to achieve dramatic performance improvement with employee buy-in through this process (McNichols, Hassinger and Bapst, 1999). A kaizen blitz is a rapid improvement effort that emphasizes teamwork and innovation to increase employee ownership and productivity in both traditional and just-in-time cellular flow process. The process is best carried out by a cross-functional team of six to ten people - including suppliers, customers, and at least one person from outside the area under study to encourage out of the box thinking.

The process includes freeing participants of any other responsibilities during the blitz and informing those working around them that it is about to happen. This is followed by recording the as-is process performance, evaluating the process as it is now, developing a new work combination (workflow), redesigning the process flow, implementing the new process flow, re-measuring the new flow and reviewing the results.

Developing a Process Understanding

A complex health care system considered the implementation of a cellular approach, where 'families' of services are grouped together, in order to re design the tasks and make their impact more visible. Therefore, the design and implementation process undertaken was a series of stages (Walley, 2002) that included understanding the nature of demand volumes and seasonality, assessing the actual process sequence for the systematic sample of patients, clustering patients in segments of similar processes, identifying the process flow of each patient, designing the process flow, testing new flow for delays and assessing results and implementing improved processes. Walley (2002) continues to explain that a project was undertaken using this approach to help reach the target for an Accident and Emergency department to treat, discharge or transfer 90% of patient arrivals within 4 hrs. Relating this to Lean the project was undertaken with the objective to improve care, staff satisfaction and variability in the treatment process.

Developing Relevant Training and Involvement

For successful implementation Lean practice implies that a pre requisite is having the right employee in the right position which means, human resource practitioners need to review the reliability of their selection programmes for every level of the organization (Forrester, 1995). As a result, amended training needs imply: Replacing managerial development programmes with individual continuous development, competence based programmes, focusing on the skills individuals need as they climb the organization, broadening the training available to team members to include different processes and techniques, training in continuous improvement allowing individuals to alter their workplace and solve their own problems and industrial relations may become strained through the changes and improvements caused by Lean practices (Forrester, 1995). Forrester further says that there is need for managers to create trusting and open communication with trade unions.

Developing a culture that creates the involvement of everyone in the organization is a critical element of the Lean philosophy (Womack and Jones, 1990). Everyone in the organization needs to be trained in the Lean philosophy concepts as well as the planning, design, implementation and evaluation of the changes so that Lean is driven by all the people, usually through teams, in the organization not just the senior management (Hogg, 1993; Sohal, 1996; Sohal and Egglestone, 1994).

However, this development of team working and involving everyone in the Lean approach needs to be handled carefully as it can lead to team working characterized by significant responsibility being given to the team leader, rather than team members, and the use of continuous improvement techniques that make marginal improvement in standard operating procedures. A set of case studies looked at the introduction of team working in the Inland Revenue in the UK (Currie and Proctor, 2003), where team working was implemented to facilitate the introduction of a new tax regime in the face of reduced numbers of middle managers and clerical employees. In this study certain human resource policies and practices had an effect upon its implementation. The study concluded that because the primary motivation for introducing team working was economic, the scope for increasing the autonomy of team members was limited. However, the change in management style that came

with the implementation meant that there was increased autonomy, but that this resided with team leaders.

2.7 Organizational Barriers

Having discussed Lean in terms of its history and content this section outlines the studies of the public sector, which have highlighted various organizational barriers to the successful implementation of 'Lean principles' and associated techniques. Various studies have concluded that barriers to continuous improvement and increasing business excellence include (Hazlett and Hill, 2000; Silvester et al, 2004); public sector culture, lack of clear customer focus, too many procedures, people working in silos, too many targets, lack of awareness of strategic direction, lack of 'buy-in' by staff, general belief that staff are overworked and underpaid, domination by stakeholders and lack of understanding of the effect of variation, systems thinking and process flow.

Lack of Understanding of Variation, Systems Thinking and Process Flow

There are debates between the role of variation reduction in the service sector in contrast to that of manufacturing (McLaughlin, 1996), claiming that there is a need to accept greater variability in service outcomes and a need to develop ways of achieving necessary flexibility. A study evaluating lean techniques in the health sector examined the causes of excessive queuing in the NHS, which results in patient backlogs and long waiting times (Silvester et al, 2004), suggesting that the variation between demand and capacity is the major issue. Poor understanding of this leads to ineffective capacity planning. However these studies propose to eradicate queues in the NHS by advanced access systems, which emphasize the need to properly understand and manage patient flow. Many hundreds of NHS teams are already using these principles with promising results. Given concerted leadership action, staff capability building and new systems to match demand and capacity on a daily basis, it would be possible to develop 'low wait' or even 'no wait' services across the NHS.

Under the concept of "Lean Service", system thinking requires understanding work as a system. This leads to managing flow rather than function. It requires the development of different measures and methods. If this understanding does not exist it may cause a potential

barrier to full implementation and the realizing of benefits which can lead to a reduction in the number of steps, in end-to-end time, in waste, and cost but, overall an improvement of service (Seddon, 2002).

Lack of 'buy-in' from Staff

For the public sector similar barriers to the adoption of Lean tools and techniques exist due to the lack of the necessary skills, capability, experience and understanding (Porter and Barker, 2005). In studies looking at the adoption of Lean techniques in US hospitals, the following problems were highlighted (Wysocki, 2004): Hospitals are not factories, doctors, nurses and other hospital staffers do not think of themselves as assembly-line workers or their patients as a product under construction, there is a clash between the culture of efficiency and the culture of caring and doctors are skeptical and do not want to be told how to do things.

There have also been attempts to develop more effective public management and more efficient public services through continuous improvement, business excellence and other change management practices in Northern Ireland (Hazlett and Hill, 2000). This has highlighted that the public sector management sector is heterogeneous; concept of customer is contestable, issues relating to the provision of services rather than goods; and the political dimension especially around definition of quality and factors of performance measurement although attempts had been made through the Business Excellence (EFQM) model, the difficulties of measuring performance (e.g. the lack of an overall measure such as profit) have led to a lack of effective performance measurement.

Public Sector Culture

Specific employee-related barriers that organizations can come across when implementing change programmes, including continuous improvement and Lean principles, include (Sohal, 1996): Making employees aware that there were better ways of performing the tasks they had been doing for years, changing attitudes of people in the shop floor and making them realise that waste means lost time and money and developing and maintaining discipline especially getting operators to produce only the required quantities. Educating the employees is cited as being critical in overcoming these problems.

There are particular people issues that surround Lean techniques (Wickens, 1993). Unions see Lean techniques as intensifying the work effort, increasing management control and undermining the independence of trade unions. Kaizen is seen as appropriating workers' knowledge and employees will not work for improvements to which they fall victim. Therefore, any change needs to be non-threatening. The way to gain higher efficiency and higher quality of work and jobs is through "teamwork" and giving responsibility for standard operations to the production people. Also, eliminating waste does stretch the system and can create pressures. Therefore, the aim must be to create Lean "people-centred" production.

Improvement Implementation Issues in Higher Education

Studies looking into the adoption of TQM have had similar conclusions. A study into the implementation of TQM in three higher education institutions in the UK and the US highlighted a need to develop more market-based approaches in higher education. The professional (specialist) nature of employment within universities was also seen as a challenge for team-based working (Tang and Zairi, 1998). A survey of the practice of TQM within UK higher education institutions provides evidence of low adoption with some differences across colleges, new and old universities (Kanji, Malek and Tambi, 1999). Some organizations did not fill in the questionnaire, explaining that they lacked the quality management processes. TQM was only adopted in academic functions. The specific results were that only 4 organizations practices TQM, 72.5% of organizations define quality as "fitness for purpose". 5.9% of organizations show "customer awareness", 31% of organizations benchmark and 32 reasons for quality management were identified.

Improvement Implementation Issues in Government Departments

A case study of quality restructuring in local government and the trade union response highlighted that quality is essentially managerially driven and must be understood as part of the process of local government restructuring (Fitzgerald and Rainnie, 1996). There is no neutrality of quality management, nor can trade unions simply adopt it for their own purposes. Public sector managers and staff may have a joint desire for quality outcomes for service users but they do not share the same language of quality in relation to process. Workers' responses to quality initiatives may contain important contradictions. There may be confusion

between process and outcome, which can lead to support for quality as an undifferentiated "good thing". The actual experience of managerial quality strategies may be very different as they are often used to challenge traditional systems of job regulation.

2.8 Lean Associated Tools, Techniques and Approaches

2.8.1 Lean Tools and Techniques

It has been indicated in the literature that Lean is a philosophy and within it there are some fundamental principles and concepts (Bicheno, 2004). However, he adds that to make Lean happen there are a number of tools, techniques and approaches often referred to as the 'Lean toolbox' that must be employed. The Kaizen Blitz has been outlined but another one which is of relevance to public sector is Value Stream Mapping. Others include Business Process Engineering, Just In Time, Six Sigma and Agile Manufacturing.

Value Stream Mapping

There are tools like Value Stream Mapping from which it is possible to understand the components of a value stream and identification of waste to either remove or reduce them (Hines and Rich, 1997). The seven accepted wastes (Hines and Rich, 1997) are: Faster than necessary pace which inhibits quality and productivity, waiting resulting from inefficient use of time, transporting large amounts of goods can cause damage and deterioration, inappropriate processing with overly complex solutions for simple procedures, unnecessary inventory creating storage costs and hiding defects, unnecessary motion of workers, bending, stretching or picking up items and correcting mistakes are direct costs.

Reducing waste improves production, which results in Leaner operations and the ability to expose further waste and quality problems. The seven value stream mapping tools are; process activity mapping involving five steps. First an analysis of the process is undertaken, followed by the identification of waste. Then consideration of whether the process can be rearranged in more efficient sequence, whether there is a better flow pattern and whether superfluous tasks can be removed. Supply chain response matrix seeks to portray the critical lead times for a particular process from distribution, supply to retailer. Once the total lead-

time is understood, individual lead times and inventory amounts can be targeted for improvement.

The production variety funnel allows an understanding of how firms or supply chains operate, how complexities can be managed and the identification of similarities and differences between industries. This tool can be useful for targeting inventory reduction. The quality filter map identifies the three types of quality problems that can exist in a supply chain. These are defects with the finished product as noted by customers, service defects not concerned with the production of the product and defects picked up by internal inspection systems. Each defect can be mapped along the supply chain to target improvement activity. Demand amplification mapping assess how demand changes along the supply chain in varying time periods. The information can be used to redesign the value stream configuration, manage fluctuations or establish solutions to manage regular and exceptional demand.

Decision point analysis at the point in the supply chain where demand-pull gives way to a forecast driven push. Understanding where this point lies is useful for assessing processes upstream and downstream from this point and for designing what if scenarios to see the impact of moving the point that may allow for a better design of the value stream. Physical structure mapping is useful for understanding what a particular supply chain looks like at an industry level. This knowledge helps to understand how the industry operates and for directing attention to areas that may not be receiving sufficient development attention (Hines and Rich, 1997).

The Value Stream Analysis tool involves completing the sections on the wastes identified, the mapping tools available and the correlation between these tools and wastes. A high correlation is equivalent to 9 points, medium to 3 points and low to 1 point. Then identifying for each of the wastes the benchmark company in the sector (Section A), in order to get people to think about who is best at reducing waste. The next stage is to ascertain the individual importance of the seven wastes by assigning weights to them (Section B). The last stage is to create total weights for each tool in order to identify how useful each tool is in identifying the various wastes designated as most important by the organization. This type of

calculation is applied to each row so that scores are recorded for each individual correlation. The total scores for each column are then summed and recorded in Section C. The columns with the highest scores are those that contain the most appropriate tools. It is useful to choose more than one tool. Also make sure that the most important two or three wastes are being addressed by tools with which they are highly correlated. (See appendix 2)

Business Process Re-engineering (BPR)

BPR aims to organize people, materials, energy, equipment and procedures into specific work activities. Case studies of a public sector service organization implementing BPR focus on the practicalities of implementation and problems due to political and people issues (Blair and Taylor, 1998). There has been a study of BPR within UK hospitals, which examines a corporate change programme from a knowledge perspective (McNully, 2002). In health care doctors still control major process from admittance to discharge, while management plays a facilitative role. BPR was extended to four core processes of emergency entry, patient stay, patient visit and clinical support services. This generated new knowledge about the need to adapt and customize redesign methods to suit clinical contexts and communities within the hospital. The implementation of BPR was tailored to clinical situations, which meant that it could not be implemented in a mechanized fashion. This further led to the lead being given to managers for the implementation of the BPR programme. McNully (2002) says the approach proved to be inadequate and the infrastructure for external change agents was disbanded. It was found that managers could not necessarily direct a change in a clinical domain.

Another study reported on a BPR attempt where the need for change arose out of low customer satisfaction due to inefficient processes clogging up the supply chain. However, the technical, financial and political restraints led to only a hybrid version of the old and new system being implemented. Although internal people were used to drive the redesign these people still had a vested interest in preserving as much of the status quo as possible and suggested modifications were conservative. The main problems associated with BPR for this project were then concluded to be (Blair and Taylor, 1998), effecting culture change when staff felt threatened by redundancy, drawback of the team approach - can a specialist really do the work of a generalist, power in relations between management and employees and role of

management consultants - different techniques branded and accusations of oversimplification as a sales pitch.

Other research has stated that the critical factors in process re-design projects are (Hall et al., 1993). The redesign must address 6 "depth levers" - roles and responsibilities, measurement and incentives, organizational structure, information technology, shared values and skills, need to restructure all the organizational elements from layout of offices to skills required, process improvement can only produce lasting results if senior executives invest their time and energy, won't get level of return if the processes are too narrow and only 1 or 2 depth levelers are changed and success will only happen if true cost savings have breadth and depth. Therefore, a study of a number of companies concluded that successful redesign would only be achieved if an organization (Hall et al., 1993) set an aggressive performance target, commit 20-50% of CEO time to the project, conduct a comprehensive review of customer needs, assign an additional senior executive to be responsible for implementation and conduct a comprehensive pilot of the new design. The same study also highlighted the following ways to fail (Hall et al., 1993): Assign average performers, measure only the plan, settle for the status quo and overlook communication

Just In Time (JIT)

JIT philosophy adopts a make when needed approach in order to reduce non-value added waste. The advantages of JIT are (Yasin, Wafa and Small, 2001) that it has potential for increasing organizational efficiency and effectiveness and eliminating waste in production and material, improving communication internally within the organization and externally, potential for reducing purchasing costs, a major cost to many organizations, reducing lead-time, decreasing throughput time, improving production quality, increasing productivity and enhancing customer responsiveness, fostering organizational discipline and managerial involvement and integrating the different functional areas of the organization.

Studies looking at the application of JIT in the administrative functions of an organization, e.g. billing, order taking, financial tasks like accounting (Billesbach and Schniederjans, 1989). One of the techniques used is "under capacity scheduling", whereby any employee performing an administrative task should have time to identify the problems in the task and

provide a solution to improve productivity. Solutions include layout and merger of operations so that interrelated activities are close together, standardization of tasks and training of workers to increase flexibility and efficiency, worker centered quality control to trace task performance to an individual, finding factors that cause slowdown, by reducing workers involved in doing the tasks and cellular organization and grouping is also considered to increase ease of communication and better delivery of the task.

Six Sigma

Six Sigma uses the five-step Define, Measure, Analysis, Improve and Control (DMAlC) process to identify, define, characterize and resolve tough business problems by applying a combination of statistical thinking and Lean thinking (Watson, 2004). Define: Management works with its Six Sigma specialists to identify the business issue and define a significant project for close scrutiny. Measure: Determines the baseline business performance for the process, identifies all potential failure modes, characterizes the measurement capability within the process and also identifies both its current performance capability as well as the potential for improvement in both statistical and financial terms: Analysis: Identifies the variables that contribute the most variation to the undesirable outcome of the process. Improve: Optimizes process performance by defining the set operating conditions for best performance and testing these factors to establish the degree of performance improvement that is available on a consistent basis. Control Step: Prepares the process for routine operation at thee new level of performance and integrates the improvements in the business control systems.

By process mapping the value stream of the process, Six Sigma specialists identify unnecessary process complexity, eliminate unnecessary work, and minimize the process activities that do not add value. Lean production tools such are integrated with the quality tools used to produce a combined "Lean sigma" perspective of process performance that identifies both the Lean improvement opportunities as well as the statistically based improvement opportunities (Watson, 2004). Studies have shown that a significant number of organizations applying six sigma have not been in manufacturing, and have provided case studies in which six sigma was used to reduce student scheduling (timetabling) errors (Bane, 2002).

Six Sigma is being applied now to various sectors with government and healthcare applications joining manufacturing, financial, information technology and other sectors. In many instances the supporters of this approach (Edgeman and Bigio, 2004) believe that existing culture and systems (for example, Lean, ISO 9000 and continuous improvement) are sufficient to meet their needs, do not understand Six Sigma or have the internal capability to assess its potential value to them, regard the costs of hiring, training and retaining Six Sigma talent as prohibitive in view of what they believe the returns will be, are in services and do not see the applicability of Six Sigma since they don't make things and fear change for any of a variety of reasons, some of which may be valid.

Six Sigma supports report on high returns on investment, defect reduction or elimination, cycle time reduction, waste reduction, market share gain, significant product or process improvement or innovation, and increased customer satisfaction (Edgeman and Bigio, 2004). However at the root of Six Sigma failures one commonly finds poorly scoped projects, poor project management or use of Six Sigma when another method might have proved a better match (Edgeman and Bigio, 2004).

Agile Manufacturing

Agile Manufacturing is presented not as a component of Lean but for completeness as often Lean and Agile are presented in documents and writing together i.e. 'Lean and Agile'. However, it is important to realize that Agile is not the same as Lean as it is often considered to be appropriate for high variety, low volume situations whereas Lean lends itself to high volume and low variety. Agile can be seen as the principles of Lean combined with Flexible Manufacturing Systems (FMS) to provide low-cost manufacturing for all volumes through application of processes, techniques and people. There are comparisons with Lean through considering the elements of agile (Tracey, 1994): The product; agile considers optmising current processes but has flexibility to respond to other developments whereas Lean only responds to the first, the process; agile focuses on the reduction or elimination of variables, the people; important in both and global manufacturing; important for both.

CHAPTER THREE: METHODOLOGY

3.1 The Research Design

3.1.1 Overview of the Research Design

A case study was adopted for this research. Within the selected case (KRA), both quantitative and qualitative techniques were used for the study.

Case study research excels at bringing an understanding of complex issues or objects. Case studies also emphasize detailed contextual analysis of a limited number of events or conditions and their relationships. Researcher Robert K. Yin defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used (Yin, 1984, p. 23). Measurement of employee responses on the application of Lean in KRA were captured and the data collected was used to indicate the extent to which Lean management has been applied in KRA and then create a link of Lean managements' probable adoption in the public sector.

Qualitative research using in-depth interviews helps bring an understanding of human behavior and the reasons that govern human behavior (Patton, 2002). Unlike quantitative research, qualitative research relied on reasons behind various aspects of behavior and responses. Simply put, it investigated the why and how of decision making.

Quantitative research unlike qualitative research which relies on reasons behind various aspects of behaviors, exclusively bases itself on the analysis of numerical or quantifiable data (Patton, 2002). Data collected from the employees formed the basis from which measurements of the employee responses were used to determine the following key issues:

- What Lean tools and techniques are applied at KRA?
- How can Lean work?
- What are the challenges of Lean implementation in KRA?

3.2 Respondents

All the 2330 employees in the different departments of Kenya Revenue Authority working at their head offices at Times Towers were targeted.

In the selection of the respondent, quota sampling technique was employed. The quotas were categorized along the four departments that exist at KRA. The sample distribution was proportionate to the population in the various departments. Sampling units were drawn from each department on convenience basis. This was intended to make the sample selection as representative as possible of the overall organization to enable generalization of the findings about the application of Lean at KRA.

Employees at KRA headquarters are distributed in the different departments as indicated below:

Table 3.1: Employee distribution at KRA

Department	Distribution
Support Department	169
Domestic Taxes Department	589
Customs Department	1302
Road Transport Department	270
Total	**2330**

Source: www.kra.go.ke

3.3 Sample Size

3.3.1 Overall Sample Size Determination

The overall sample size (SS) was determined at 95% confidence level giving a Z value of (Z = 1.96). The value for p used was 0.5, providing for 50% chance of picking a choice and the confidence interval (C) at 0.04 providing the ranges of` actual findings at ±4 of the results obtained.

$$SS = \frac{Z^2 \times (P) \times (1-P)}{C^2}$$

3.3.2 Correction for Finite Population

Because the population at KRA is finite, the sample size (SS) obtained above was corrected with pop equaling the overall population at KRA to obtain the new sample (New. SS)

$$New \cdot SS = \frac{SS}{1 + \frac{SS - 1}{pop}}$$

Source: www.surveysystem.com

The sample size for the study at 95% degree of confidence was computed as:

$$SS = \frac{1.96^2 \times 0.5 \times 0.5}{\pm 0.04^2}$$

$$= 600$$

The sample size for the study was corrected given that employees at KRA are finite i.e. 2330 in number;

$$New \cdot SS = \frac{600}{1 + \frac{600 - 1}{2330}}$$

$$= 477$$

Table 3.2: Sample distribution

Department	Distribution	Adjustment for the study	
		Quantitative	Qualitative
Support Department	35	4	1
Domestic Taxes Department	121	13	1
Customs Department	266	28	1
Road Transport Department	55	6	1
Total	**477**	**50**	**4**

The required number for the study was four hundred and seventy seven but because of the constraints on time and resources, this number was adjusted as indicated in the table above. This is effective to represent the application of Lean tools, techniques and equipments as the

variability on views regarding the usage of these tools, techniques and equipment is expected to be very low among the employees.

3.4 Data Collection

Qualitative component of the research was conducted using in-depth interviews. In-depth interviews were held with heads of departments to ensure representations of the departments as they were the ones involved in policy making at KRA. The quantitative component used self-administered questionnaires. The questionnaire designed was able to capture information on the type of Lean projects that had been implemented, how they were implemented and whether they had been successful in achieving their original aims. The questionnaire also comprised of a mix of open-ended and closed questions.

3.5 Data Analysis

The data obtained was quantified to indicate the frequency and proportion of employees who responded in various ways to different questions regarding the issues that were raised in the application of Lean. The results were analyzed and summarized using the statistical products services and solutions (SPSS) software.

3.5.1 Summary measures

Frequencies and percentages were used to indicate the extent to which Lean has been applied overall and in different departments of KRA.

3.5.2 Cross tabulations

Cross tabulations were done to indicate the extent to which KRA has realized the objectives and aims of applying Lean in their operations. The analysis sought to establish the areas for which Lean was successful and also establish the reasons underlying the success in the application of Lean.

CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND DISCUSSIONS

4.1 Introduction

This section provides the data analysis and findings of the survey. The data has been analysed using descriptive statistics. In the subsequent tables, descriptive statistics using frequencies and percentages have been used to present the findings. Verbatim statements from the in depth interviews have also been recorded in italics.

4.2 Response rate

A total of fifty questionnaires were sent to KRA and 42 were returned. This survey therefore achieved a response rate of 84% while all the targeted in depth interviews were successful.

Table 4.1: Response rate by department

Department	Targeted sample		Achieved sample	
	Quantitative	**Qualitative**	**Quantitative**	**Qualitative**
Support Department	4	1	6	1
Domestic Taxes Department	13	1	12	1
Customs Department	28	1	18	1
Road Transport Department	6	1	6	1
Total	**50**	**4**	**42**	**4**

Source: Research Data

4.3 Lean Practices at KRA

This section presents the respondents understanding of Lean management, the Lean practices applied at KRA and the objectives of implementing the tools, techniques and equipments. It further provides information on those objectives that have been successful and statistics on timing of implementation of these tools, techniques and equipments, resource implication of their implementation and factors contributing to the success in the implementation process.

4.3.1 Application and Understanding of Lean at KRA

Respondents were asked if in their view Lean was being applied at KRA. Results indicated that 60% of the respondents felt that Lean was being applied at KRA. They were also asked

what they understood by the term Lean management. The following table summarize the results.

Table 4.2: Understanding of Lean

Efficiency and effectiveness	19	45%
Transformation/ Improvement/ Change	8	19%
Decentralization/ Quick decision making	7	17%
Using technology	3	7%
Creativity	2	5%
Don't know	3	7%

Source: Research Data (N = 42)

In their view, close to half (45%) of the respondents understood Lean to mean efficiency and effectiveness while another 19% understood Lean to mean transformation/ improvement or change. Others (17%) understood Lean as decentralization or quick decision making. A small number of the respondents (7%) associated Lean with use of technology while 5% had the opinion that Lean meant creativity however, 21% did not know what Lean was all about. These results indicate above average agreement that Lean is applied at KRA and is also consistent with Lean description with other scholars. Thus, there is clear indication of Lean implementation at KRA as employees' hold the understanding that Lean is being applied.

Respondents who agreed Lean was being applied at KRA were asked to identify some of the practices, tools and equipments they considered part of application of Lean management. The following results were obtained and are summarized in table 4.3 below. Electronic Tax registers (ETRs') scored highest (60%) followed with Simba System (36%). Electronic collection of documents, training of staff and staff improvement schemes scored third at 20%. Other considerations were encouragement of staff on good use of equipments (16%), team building (8%), project planning or job evaluation (8%), Business Process Re-engineering, aligning functions and improvement, the use of modern equipments, workshops and awareness sessions, organization review, distribution of KRA offices all over Kenya, creation of audit section and partnerships with other organizations were each mentioned by a single respondent.

Table 4.3: Practices, tools and equipments at KRA associated with Lean

Electronic Tax Registers	15	60%
Simba system	9	36%
Electronic collection of documents	5	20%
Training of staff	5	20%
Staff improvement schemes	5	20%
Encouragement of staff on good use of equipments	4	16%
Team building	2	8%
Project planning/ Job evaluation	2	8%
Business Process Re-engineering (BPR)	1	4%
Allignment functions and improvement	1	4%
Use of modern equipment	1	4%
Workshops/ Awareness sessions	1	4%
Organization review	1	4%
KRA offices all over Kenya	1	4%
Creation of audit sessions	1	4%
Partnership with other organizations	1	4%

Source: Research Data (N = 25)

As Syrett and Lamminam (1997) noted about Lean application, KRA has embraced the notion of Leanness by adopting new working practices as identified by the respondents. An in depth interview with one of the heads of departments consistently revealed similar views about Lean management at KRA.

"Lean is simply reducing expenditure and costs by employing the most suitable means of realizing organization's objective. In KRA, the need for efficiency and effectiveness in revenue collection coupled with desire to give quality services to the public at better speed ensured that we had to involve the application of such known technology as ETR, the Simba system and others"

4.3.2 Objectives of adopting Lean at KRA

Syrett and Lamminan (1997) argue that organizations commonly introduce Lean to cut costs, promote efficiency and support growth and innovation. To establish the probable reasons for Lean adoption at KRA, respondents were asked to provide their opinions on what they perceived were the aims of adopting the tools, techniques and equipments associated with Lean management that KRA had implemented.

Table 4.4: Perceived reasons for Lean implementation at KRA

Improve customer satisfaction	22	86%
Improve quality	19	76%
Cost reduction	16	64%
Reduce lead time	16	62%
Flexibility improvements	14	55%
Increase staff decision making	13	50%
Increase staff motivation	8	33%
Workforce reduction	4	17%

Source: Research Data (N = 25)

Among the reasons perceived as the aims of implementing Lean at KRA, customer satisfaction improvement was rated highest (86%) followed with quality improvement (76%), cost reduction (64%), reduction of lead time (62%), flexibility improvement (55%) and increased decision making by staff (50%). Other reasons cited as having been the objective of Lean implementation included need to increase staff motivation (33%) and to reduce workforce (17%). These findings were consistent with Syrett and Lamminan arguments that organizations commonly introduce Lean to cut costs, promote efficiency and support growth and innovation.

4.3.3 Achieved objectives of adopting Lean at KRA

It was essential to establish if the perceived reasons for initiating Lean had been achieved. Respondents were asked to indicate the objectives of adopting the tools, techniques and equipments associated with Lean management at KRA they felt had been achieved.

Table 4.5: Achieved objectives of implementing Lean at KRA

Improved customer satisfaction	20	81%
Improved quality	19	76%
Cost reduction	14	57%
Reduced lead time	13	52%
Flexibility improvements	10	40%
Increased staff decision making	8	33%
Increased staff motivation	3	12%
Workforce reduction	3	12%

Source: Research Data (N = 25)

Results obtained indicated that customer satisfaction improvement scored highest (81%) followed by quality improvement (76%), cost reduction (57%) and reduction of Lead time (52%). Even though the other factors scored below average, other realized objectives of Lean implementation at KRA include; flexibility improvement (40%), increased decision making by staff (33%), increased staff motivation (12%) and reduced workforce (17%). These results do suggest that KRA was aggressive at realizing the objectives for which they implemented Lean tools and equipments.

It is worth noting that, the first four factors perceived as the main aims of Lean implementation at KRA (i.e. improvement of customer satisfaction, improvement of quality, cost reduction and reduction of lead time) also scored highest in their achievement. An interview with the regional tax manager at KRA consistently supported the findings. The findings indicated that the collection of revenue from taxes had increased due to reduced tax evasions.

"KRA since the introduction of computerized systems have greatly improved on tax collection. The government can now trust that a bigger percentage of their expenditures can be financed from the taxes and revenues collected from the domestic market rather than rely on borrowing as in the past"

4.3.4 Resource implication of adopting Lean at KRA

Implementing Lean has resource implication. Time is one major resource requirement in an organization to successfully implement Lean. Respondents were asked to give their opinions regarding the length of time it had taken KRA to implement Lean and the resource implications of the adoption of Lean at KRA.

Table 4.6: Implication of Lean implementation on time

It is an ongoing exercise/ always in development	36	86%
Between 1 and 3 years	2	5%
About 1 year	3	7%
Don't Know	1	2%

Source: Research Data (N = 42)

Majority of the respondents (86%) said Lean implementation at KRA is an ongoing exercise and is always in development. This is consistent with the view that Lean management and continued improvement go hand in hand with one another. Womack and Jones (1990) indicate that among the five principles of Lean is continuous improvement. This therefore means that KRA's findings are consistent as a whooping majority of respondents considered Lean at KRA as an ongoing process. An interview with human resource manager at KRA further endorsed this finding by indicating that enough resources in continuous training of staff had been spent.

"The need to continuously train and equip employees with the knowledge to use these new equipments and technology is fundamental. KRA has sponsored many of its employees to undertake various courses to equip them with adequate knowledge and expertise on various fields. On job training and job rotation has also been of essence in building Leaner management and all these require enormous resources"

Apart from time implication, Lean implementation created other resource implications. Respondents were also asked to state some of the arising resource implications of implementing Lean tools techniques and equipments that had been experienced at KRA.

Table 4.7: Implication of Lean implementing on other resources

A need to invest in Lean training or awareness	31	74%
Time commitment from all involved	30	71%
Additional technology resources	27	64%
Additional funding to implement projects	26	62%
Additional internal staffing required	21	50%
External staffing required	10	24%
Set up of specialized change teams	6	14%

Source: Research Data (N = 42)

The need to invest in training or awareness about Lean scored highest (74%). Other resource implications included time commitment from all those involved (71%), additional technology resources (64%) and additional internal staffing requirement (50%). The need for external staff and setting up a specialized change team were also mentioned even with low scores of 24% and 14% respectively. Forrester (1995) argues that successful Lean practice

implementation implies a pre requisite in having the right employees in the right position which means, human resource practitioners need to review the reliability of their selection and training programmes for every level of the organization. These findings consistently indicate the same with specific implication mentioned as need for staff training and addition of staff and professionals requirements.

4.3.5 Factors contributing to the success of Lean implementation

Successful Lean implementation is pegged on various factors. Sohal (1996) argue that need to change existing attitudes, behaviors and practices, full and ongoing support from top management, need for a champion to drive the change initiatives and maintain momentum are some success factors of Lean implementation. In this study, respondents were asked to provide their views on factors they perceived as having contributed to the success of Lean implementation at KRA. The table below summarizes the results obtained.

Table 4.8: Factors contributing to successful Lean implementation at KRA

Commitment to ongoing improvements by top management	35	83%
Dedication of time	26	62%
Appointing facilitator to drive the project	26	62%
Desire to improve	25	60%
Good communication	22	52%
Learning from experts/ training of staff	19	45%
Good planning	18	43%
Commited/ experienced delivery teams	17	40%
Realistic/ focused approach	15	36%
Involvement and enthusiasm in all stages	13	31%
Ongoing monitoring and evaluation	12	29%
Willingness to be wrong/ taking risks	10	24%
No seniority at meetings	5	12%

Source: Research Data (N = 42)

Commitment to ongoing improvements by top management scored highest (83%) as one of the factors that have contributed to the success of implementing Lean followed with dedication of time (62%), appointment of facilitators to drive the projects (62%), the desire to improve (60%) and good communication (52%). Despite these other factors also being mentioned as having contributed to the success of Lean implementation, they scored below average and included committed or experienced delivery teams (40%), having realistic or

focused approach (36%), involvement and enthusiasm at all stages (31%), ongoing monitoring and evaluation (29%), willingness to be wrong or taking risks (24%) and lack of seniority at meetings (12%).

Furthering Sohal (1996) arguments, Lucey, Bateman and Hines (2004) argued that; realization by everyone that Lean will take a long time, engaging employees as much as possible in the planning, implementation and evaluation of changes and developing an environment of openness and trust through communication and sharing information were some factors that led to the success of Lean implementation. A study of a number of companies concluded that successful redesign would only be achieved if an organization (Hall et al., 1993) set an aggressive performance target, commit 20-50% of CEO time. Hazlett and Hill (2000), highlight several factors that are fundamental in Lean implementation.

These findings, just as the arguments of Sohal, Lucey, Baterman and Hines and Hall et al., indicate that top management commitment, time commitment, appointment of Lean facilitators, good communication among other factors led to successful Lean implementation at KRA. In addition, the findings about top management commitment and support coupled with the desire to increase revenue collection were spelt out by a senior member of KRA staff as having been key success factors of Lean implementation.

"The top management recognizes and supports these initiatives. They approve the purchase of these equipments and allow funds to be used in training employees to be acquainted with the tools and equipments that are being introduced with time to increase revenue collection while minimizing tax evasions"

4.4 Extent of adoption of Lean practices at KRA

This section presents the respondents understanding of the extent by which KRA has adopted Lean management and practices. In specific, the section will evaluate the extent of application of the Lean tools, techniques and equipments, the level of involvement of the departments and employees as well as the reasons underlying any variation on the level of application of these tools, equipments and techniques in the departments.

4.4.1 Lean associated tools, techniques and equipments

Bicheno (2004) indicated that Lean is a philosophy and within it there are some fundamental principles and concepts. He further argued that to make Lean happen there are a number of tools, techniques and approaches often referred to as the 'Lean toolbox' that must be employed. In establishing the tools, techniques and equipments that KRA applies to realize Lean, respondents were asked to indicate the tools, techniques and equipments KRA had employed in its businesses that they associated with Lean.

Table 4.9: Lean associated tools, techniques and equipments applied at KRA

Work standardization	30	71%
Workplace organization	29	69%
Overall equipment effectiveness	26	62%
Information and communication technology	23	55%
Visual management	23	55%
Business process re-engineering	22	52%
Quick changeover/ set up time reduction	17	40%
Total productive maintenance	15	36%
Good housekeeping	15	36%
Process mapping	12	29%
Changeover reduction	8	19%
Error proofing	5	12%
Demand pool in the process	4	10%
Six sigma	2	5%
Value stream mapping	2	5%
Kaizen blitz	1	2%

Source: Research Data (N = 42)

Although most of the tools, techniques and equipments associated with Lean were indicated by the respondents as having been applied, more than half of the respondents indicated these six as the leading; the use of work standardization (71%), work place organization (69%), overall equipment effectiveness (62%), Information and communication technology (55%), visual management (52%) and business process re-engineering (52%). The findings, however, differ with Bicheno's argument that value stream mapping, six sigma and kaizen blitz are the key tools in Lean. This fundamental difference might however have been caused by the technicalities of the terminologies. Respondents agree that tools to enhance work standardization, work place organization, equipment effectiveness, use of information and

communication technology among others are used which are consistent with tools, techniques and equipment identified by Bicheno.

The study also sought to establish the extent to which these tools, techniques and equipments associated with Lean had been applied at KRA. Respondents were asked to rate the extent they perceived each of these tools, techniques and equipments had been applied at KRA. The scale for rating ranged from a great extent, some extent and not applied at all.

Table 4.10: Extent of application of Lean associated tools, techniques and equipments at KRA

Lean Associated Tools, Techniques and Equipments	Great extent		Some extent	
Networked computers	33	79%	9	21%
Labelled offices and serving points	27	64%	14	33%
Job rotation	21	50%	14	33%
Customer feedback points	19	45%	15	36%
Open floor system	16	38%	23	55%
Team work	12	29%	27	64%
Related department in the same floor	11	26%	27	64%
Employee development and training	10	24%	28	67%
Quality checks/ systems	8	19%	26	62%
Adequate remuneration	8	19%	21	50%
Partnership with revenue collectors and other stakeholders	8	19%	29	69%
Flatter organization structure	6	14%	28	67%
Decentralized decision making/ Employee empowerment	5	12%	32	76%

Source: Research Data (N = 42)

Among the tools, techniques and equipments applied to a great extent at KRA include networked computers (79%), labelled offices and serving points (64%), job rotation (50%), customer feedback points (45%) and open floor system (38%). Respondents also agreed that the application of the other tools, techniques and equipments was to some extent. Other techniques applied either to a great extent or some extent include team work, closely locating related departments, employee development and training, quality checks/ systems, adequate remuneration, partnership with revenue collectors and other stakeholders, having a flatter organization structure and decentralizing decision making/ empowering of employees.

These findings actualise the concepts of Lean enterprise (Womack and Jones, 1994) and Lean consumption (Lamming, 1996). Partnership between KRA and other organizations like

supermarkets to collect revenue (taxes), the use of ICT among other aspects clearly indicate active Lean application. These findings are further supported by an in depth interview finding. The software developer admits that there has been increased use of networked computers in KRA headquarters, regional offices as well as collaboration with appointed agents.

"We are working on ensuring that all regional offices and agents are networked to the headquarter so that we can have real time data processing"

Departmental involvement

To gauge departmental involvement in Lean implementation, respondents were asked to state whether they were of the opinion that all the departments were involved in Lean implementation, more than half of the departments were involved or if only less than half of the departments were involved in Lean implementation at KRA. The table below summarises the findings.

Table 4.11: Departmental involvement in Lean implementation at KRA

All departments	28	67%
More than half	12	29%
Less than half	1	2%
Don't know	1	2%

Source: Research Data (N = 42)

More than two thirds (67%) agreed that all departments were involved in Lean implementation and another 29% had the opinion that more than half of the departments were involved. It is apparent that respondents' feel Lean is department driven than employee driven. This is evident in the higher percentage score in departmental involvement (96%) feeling that all/more than half of the departments are involved as opposed to 85% score on employees feeling that all/more than half of the employees are involved.

Variability in Adoption of Lean in the departments

Respondents were asked to state whether there existed variability in adoption of Lean by the various departments at KRA. Majority of the respondents (81%) felt that there was variability in the adoption of Lean thinking among the departments. This indicates a non wholesome

approach to Lean implementation at KRA. In addition, those respondents who felt there was variability in departmental adoption of Lean thinking were subsequently asked to state the department (s) they perceived had adopted Lean tools, equipments and techniques more than others.

Table 4.12: Variability in the implementation of Lean among the departments

Customs department	26	76%
Domestic taxes department	13	38%
Support department	7	21%
Road transport department	6	18%

Source: Research Data (N = 34)

Customs department was believed to apply Lean tools, techniques and equipments more than other departments at KRA. The results indicated the departments' perception score on Lean thinking application at 76% while domestic taxes department ranked second with a score of 38%. Oyugi (2005) explained that KRA needed to fund 90% of the governments' budget. It is believed that, customs department is the main revenue collection arm of KRA while domestic taxes department subsequently follows in revenue. This explains the reason why Lean has been adopted in customs department more than any other department followed by domestic taxes department.

This argument is further held by the regional tax manager of KRA. In an interview, he revealed that the departments involved in tax collection had been mostly considered in the implementation of the tools, techniques and equipments associated with Lean:

"It is clear that KRA is the sustaining arm of the government. The need to be effective and efficient in the mandate of collecting revenue and netting tax evaders requires that customs department and domestic taxes departments are equipped with the latest technology"

Reasons for variability in implementation of Lean in the departments

To explain the underlying reasons for departmental variability in Lean adoption, respondents were asked to list some of the reasons they believed had contributed to variations in the implementation of Lean management in the various departments.

Table 4.13: Reasons for variability in the implementation of Lean

Improve tax/ revenue collection	15	44%
Need to improve service delivery	6	18%
Need for computerised operations	4	12%
Heavy workload	4	12%
Reduce tax collection/ revenue loss	4	12%
Ease in application	1	3%
Enhanced co-ordination	1	3%

Source: Research Data (N = 34)

Respondents appeared to share with the sentiments of the regional tax manager that the departments had to adopt Lean to enhance revenue collection. They mentioned need to increase tax/ revenue collection highest (44%), followed by the need to improve service delivery (18%), the need for computerised operations (12%), the heavy workload in the department (12%). Other individual mentions included ease of application of Lean tools, techniques and equipments in the department and the need to enhance co-ordination.

Employee involvement

Everyone in the organization needs to be trained in the Lean philosophy and concepts as well as the planning, design, implementation and evaluation of the changes so that Lean is driven by all the people. Lean is usually driven through teams, in the organization not just the senior management (Hogg, 1993; Sohal, 1996; Sohal and Egglestone, 1994). In establishing the extent of employee involvement in Lean implementation, respondents were asked to give their opinions regarding the proportion of employees they felt had been involved in implementing Lean at KRA.

Table 4.14: Employee involvement in Lean implementation

All employees	18	42%
More than half of the employees	18	43%
Just half of the employees	1	2%
Less than half of the employees	4	10%
Don't know	2	5%

Source: Research Data (N = 42)

At least two fifth (42%) of the respondents felt that all employees had been involved in Lean management implementation while slightly more than the number (43%) held the view that more than half of the employees had been involved. Just a single respondent felt that just half of the employees were involved and another 10% felt that less than half of the employees were involved. Two of the respondents did not know the extent to which employees had been involved. It is apparent from the findings that, the critical factor of involving all employees (all the people) in Lean implementation as argued by Hogg (1993); Sohal (1996); Sohal and Egglestone (1994) is yet to be completely achieved.

Developing a culture that creates the involvement of everyone in the organization is a critical element of Lean philosophy (Womack and Jones, 1990). This study, sought to establish some of the strategies the management had used to involve the employees. Respondents who felt employees had been involved in Lean implementation were asked to indicate some of the strategies the management had used to involve them in Lean implementation.

Table 4.15: Strategies employed to involve employees in Lean implementation

Consultation/ Communication with staff	31	78%
Training for those involved in the project	29	73%
Involvement and empowerment of those concerned	23	58%
Workshops/ awareness sessions	23	58%
Regular reporting/ inclusion in planning process	21	53%
Dedicated delegation and agreement of necessary tasks	20	50%
Use of the system thinking methodology	16	40%
Meetings to discuss improvement	13	33%

Source: Research Data (N = 40)

Results indicate that, among the strategies used by KRA management to involve employees in the implementation of Lean are Consultation/ communication with staff scoring highest (78%) followed by training of those involved in the Lean projects (73%), involvement and empowerment of those concerned (58%), workshops/ awareness sessions (58%), regular reporting/ inclusion in the planning process (53%) and dedicated delegation and agreement of necessary tasks (50%). The remaining two strategies although used by the management

scored below average and included use of the system thinking methodology (40%) and meetings to discuss improvement (33%).

These findings were also shared with the human resources manager of KRA who acknowledged employee training and involvement at most levels and proper communication and consultations as having participated to a great extent towards the implementation of the new technology, tools, equipments and practices.

"We have always involved our employees in what we do. Before we adopted these equipments and technology, our employees did not know how to use them. Training, participation, consultations have been the greatest drivers towards the success of the new systems being implemented at KRA"

After identifying the strategies used to involve employees in Lean management, respondents were asked to state how successful they perceived the strategies used to involve employees in Lean implementation were.

Table 4.16: Success of the strategies employed to involve employees

Very successful	14	35%
Somewhat successful	25	63%
Don't know	1	3%

Source: Research Data (N = 40)

Only 35% of the respondents felt that these strategies had been very successful while close to two thirds (63%) had the opinion that the strategies employed had been somewhat successful. Only one respondent could not rate the level of success of these strategies.

4.5 Challenges to adoption of Lean Practices at KRA

This section presents what the respondents perceived as the challenges to adoption of Lean management and practices at KRA. Hazlett and Hill (2000) argued that barriers to continuous improvement and increasing business excellence including public sector culture, lack of clear customer focus, too many procedures, people working in silos and too many targets acted as

challenges to Lean adoption. Silvester et al (2004) pointed out that lack of awareness of strategic direction, lack of 'buy-in' by staff, general belief that staff are overworked and underpaid, domination by stakeholders and lack of understanding of the effect of variation, systems thinking and process flow also acted as challenges to Lean implementation. Respondents were asked to indicate the factors they believed were the challenges to adoption of Lean management and practices at KRA.

Table 4.17: Challenges to adoption of Lean management and practices at KRA.

Organizational culture and resistance to change	28	67%
Backlogs and other ongoing work pressures	26	62%
Lack of awareness/ knowledge about Lean	25	60%
IT illiteracy of many people	24	57%
Lack of equipments	23	55%
The scale of the projects/ high volume of data	17	40%
Reliance upon/ engagement with other internal departments	9	21%
Lack of top management commitment	9	21%
Staffing shortages/ getting staff released from duties	9	21%
Short term funding	7	17%
Inability to quantify and realize saving	1	2%

Source: Research Data (N = 42)

Respondents indicated that organizational culture and resistance to change was the major barrier (67%) followed with backlogs and other work pressures (62%), lack of awareness or knowledge about Lean (60%), Information Technology illiteracy (57%) and lack of equipments (55%). Another factor that received about an average mention was the scale of the projects or high volume of data (40%).

Other mentions included reliance upon or engagement with other internal departments, lack of top management commitment, staffing shortages or getting staff released from duties all rated at 14% and short term funding (17%). One respondent had the opinion that inability to quantify and realise savings was also a challenge in adopting Lean management and practices at KRA. These findings, just as argued by Hazlett and Hill (2000) and Silvester et al (2004)

consistently reveal that public sector culture and resistance to change, backlogs and other work pressures, lack of awareness or knowledge about Lean, Information Technology illiteracy and lack of equipments are the major challenges facing KRA while implementing Lean.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary of findings

Two thirds of the respondents agreed that Lean was being applied at KRA. The more the respondents were senior in their job places the more they understood and agreed that Lean was applied at KRA. This indicates disparity of information on Lean initiatives with more communication about Lean to the senior employees than to the junior employees. The definitions given for Lean were consistent with the philosophical understanding of Lean. Respondents tended to define it by what they associated it with. Among definitions respondents associated Lean to were efficiency and effectiveness, transformation, improvement, change, decentralization of decision making and quick decision making. Other associations included the use of technology and creativity.

Some of the major practices, tools and equipments at KRA that the respondents considered part of application of Lean management included the Electronic Tax registers (ETRs'), Simba System, electronic collection of documents, training of staff and staff improvement schemes, encouragement of staff on good use of equipments, team building. These factors had the greatest contribution to the respondents' understanding of Lean management implementation at KRA. Other mentions were project planning and job evaluations, Business Process Re-engineering, aligning functions and improvement, the use of modern equipments, workshops and awareness sessions, organization review, distribution of KRA offices all over Kenya, creation of audit section and partnerships with other organizations.

Respondents had the belief that KRA management implemented Lean tools, techniques and practices to realize six main objectives which included the need to improve customers' satisfaction, the need to improve service quality, the need to reduce costs, the need to reduce lead time, the need to enhance flexibility and the need to increase decision making by staff. Of the six main objectives, KRA has been successful at realizing four including improved customer satisfaction, improved service quality, reduction in costs of operations and reduction in lead times. This therefore implies that the success of implementing Lean

management tools techniques and equipment has to some extent been witnessed as is evident by the respondents' conceptions.

Lean management at KRA is an ongoing process that always continues to develop. Regarding the resource implication, Lean implementation has created a need to invest in training and/ or awareness about Lean tools, techniques and equipments, it involves time commitment from all those involved, it requires additional technological resources and additional internal staffing requirement. Other resource requirements include the need for external staff and setting up of specialized change teams.

Majority of the respondents agree that Lean management implementation has been successful. Five main factors recognized as having led to the success of Lean implementation at KRA are commitment to ongoing improvements by top management, dedication of time for Lean implementation, appointment of facilitators to drive the projects, desire to improve and good communication. All the above factors indicate greater support and resource allocation from the top management to ensure Lean is a success. Other factors also considered to have contributed to the success of Lean implementation include experienced delivery teams, having realistic or focused approach, involvement at all stages, ongoing monitoring and evaluation, willingness to be wrong or taking risks and lack of seniority at meetings.

Although most of the tools, techniques and equipments associated with Lean have been applied at KRA, respondents were of the opinion that six have been adopted greatly. These were the use of work standardization, work place organization, overall equipment effectiveness, information and communication technology, visual management and business process re-engineering. Other tools, techniques and equipments applied at KRA include quick changeover or reduction in time of setting-up processes, total productive maintenance, good housekeeping, process mapping, reduction in changeover, error proofing, demand pool in the process, six sigma, value stream mapping and kaizen blitz.

Most tools, techniques and equipment associated with Lean are applied at KRA. However, six of the tools, equipment and techniques are applied to a great extent and include networked computers, labelled offices and serving points, job rotation, customer feedback points and open floor system. It is also apparent that KRA steers to involve most of the departments in Lean implementation despite customs department and domestic taxes department being cited as being heavily involved respectively than others. Among the reasons given for the disparity in Lean implementation in the two departments include the need to increase tax/revenue collection, the need to improve service delivery, the need for computerised operations, heavy workload, the need to reduce tax evasion/revenue loss and the need to enhance co-ordination in the departments.

Employee involvement in Lean implementation process was also considered successful with majority citing six main ways through which the management has involved them. These included consultation and communication with staff, training of those involved in the Lean projects, involvement and empowerment of those concerned, workshops/ awareness sessions, regular reporting/ inclusion in the planning process and dedicated delegation and agreement of necessary tasks. Overall, employee empowerment and involvement through formal career development path and informal contribution have had contribution into the success of Lean implementation.

Despite the success of Lean implementation at KRA, it was not free of any challenge. Respondents cited four factors as main challenges to adopting Lean management which include organizational culture and resistance to change, backlogs and other work pressures, lack of awareness or knowledge about Lean and illiteracy in Information Technology (IT). To enhance Lean initiatives, a culture of improvement and change, communication of the benefits of continuous improvement and Lean management and increasing IT literacy levels among the staff will be fundamental. Other factors that were also cited include lack of equipments, the scale of project or high volume of data, reliance upon or engagement with other internal departments, lack of top management commitment, staffing shortages or getting staff released from duties, short term funding and inability to quantify and realise savings.

5.2 Conclusion

Lean management and application of related tools, equipments and techniques is a continuous process at KRA highly driven by the need to improve service delivery and tax collection while netting those evading taxes. The definition of Lean is clearer among the senior staff despite general agreement to the use of the tools, techniques and equipments associated with it. Among the cited tools, ETR, simba system and use of technology e.g. networked computerisation were the major mentions to Lean implementation. The extent of application of Lean involves all departments and all employees being targeted through communication, training and reviews among other means which have turned out to be successful.

Despite benefits of Lean management being realized at KRA, organizational culture and resistance to change, backlogs and work pressures, lack of awareness and knowledge about lean and illiteracy in IT have been the major bottle necks towards implementing Lean and the related tools equipments and techniques. To harness complete benefits of Lean will demand an inside look into the organizations culture and communication on Lean and continuous improvement (change) and career development to employees including IT literacy to all staff.

5.3 Recommendations

In order for KRA to realize the full benefits of Lean Thinking to business processes, an increased attempt to involve employees at all levels should be encouraged. This involvement should include the provision of information on Lean Thinking as well as communicating the benefits that accrue due to Lean implementation. KRA should also attempt to implement Lean across all departments without necessarily skewing the implementation to a few departments in the organization. This will ensure speed in inter - departmental transactions as well us an enhanced understanding and acceptance of Lean implementation within the whole organization.

Moreover, KRA should attempt to create a conducive organizational culture that would minimize or alleviate resistance to change. Finally, to harness complete benefits of Lean will demand an inside look into the organizations culture and communication on Lean and

continuous improvement (change) and career development to employees including IT literacy to all staff.

5.4 Limitations of the study

In conducting this study, resource constraints in terms of time and money were the major limitations to this study. These factors therefore only allowed one case, KRA to be considered among all the public sector organizations. Even at KRA, only a small percentage of employees at their head office were considered. A larger sample would have been preferable to enable analysis at department level within KRA and also more public sector organizations would have been considered to enable informed generalization to the application of Lean management in Public sector.

5.5 Suggestions for further research

Future researches should use a larger sample and try to evaluate Lean management approach to business management in the public sector. The attempt to correlate employee involvement and departmental involvement to the success of Lean implementation in the public sector can also be explored in future studies.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

This study is meant to capture the extent to which KRA uses equipments, tools and techniques to improve on its productivity/performance. Kindly provide the most accurate information regarding each item in the questions as it is in your place of work. The study will take approximately 15 minutes of your time. There is no right or wrong answer.

SECTION A: DEMOGRAPHICS

1. Which department are you? **(Tick appropriately, single code)**

Support Department	
Domestic Taxes Department	
Customs Department	
Road Transport Department	
Other (Specify)	

2. What is your job title?
.....

3. What is your job group?
.....

SECTION B: LEAN THINKING AND ADOPTION

4. To what extent are the tools, techniques and equipments specified below applied in KRA? **(tick only one option appropriately)**

	Great extent	Some extent	Not applied at all	Don't Know
Networked computers				
Related departments in the same floor or close by to one another				
Open floor system in place/ Ease in accessing your boss				

Labeled offices and serving points				
Team work				
Decentralized decision making/Employee empowerment				
Employee development and training in their work				
Partnerships with suppliers, revenue collectors and other stakeholders				
Adequate remuneration				
Customer feedback point				
Quality checks/systems				
Flatter organization structure				
Job rotation				

5. Are there some departments that you would say apply these tools, equipment and techniques more than other departments?

Yes		**Go to Q 6**
No		**Go to Q 8**
Don't know		**Go to Q 8**

6. You have said that some departments apply these tools, equipment and techniques more than other departments. Which departments are they? **(tick appropriately, multiple codes allowed)**

Support Department	
Domestic Taxes Department	
Customs Department	
Road Transport Department	
Other (Specify)	

7. Why is the department(s) applying these tools, equipment and techniques than other departments?

……
……
……

8. How long has it taken KRA to implement the tools, techniques and equipments? **(tick appropriately, single code only)**

It is an ongoing exercise /always in development	
About 1 year	

Between 1 and 3 years	
Varying lengths of projects	
Between 3 and 6 months	
Very short - about 3 months	
Not yet been implemented	
3 year projects or greater	

9. What were the aims of adopting the tools, techniques and equipments KRA implemented? **(tick appropriately, multiple codes allowed)**

Workforce reduction	
Cost reduction	
Improve customer satisfaction	
Flexibility improvements	
Increase staff motivation	
Increase staff decision making	
Reduce lead time	
Improve quality	
Other (Specify)	

10. What aims of adopting the tools, techniques and equipments at KRA have been achieved? **(tick appropriately, multiple codes allowed)**

Workforce reduction	
Cost reduction	
Improve customer satisfaction	
Flexibility improvements	
Increase staff motivation	
Increase staff decision making	
Reduce lead time	
Improve quality	
Other (Specify)	
Don’t know	

11. About what proportion of your overall organization departments have been involved in implementing these tools, techniques and equipments? **(tick appropriately, single code only)**

All departments	
More than half of the departments	
Just half of the departments	

Less than half of the departments	
No department at all	

12. About what proportion of your overall organization employees have been involved in implementing these tools, techniques and equipments? **(tick appropriately, single code only)**

All employees		**Go to Q 13**
More than half of the employees		**Go to Q 13**
Just half of the employees		**Go to Q 13**
Less than half of the employees		**Go to Q 13**
No employee at all		**Go to Q 15**

13. What strategies have been used to engage staff in implementing these tools, techniques and equipments? **(tick appropriately, multiple codes allowed)**

Consultation / communication with staff	
Workshops / awareness sessions	
Meetings to discuss improvement	
Use of the system thinking methodology	
Involvement and empowerment of those concerned	
Regular reporting / inclusion in planning process	
Dedicated delegation and agreement of necessary tasks	
Training for those involved in the project	
Other (Specify)	
None	

14. In general how successful have these strategies used to engage staff in implementing these tools, techniques and equipments been? **(tick appropriately, single code only)**

Very successful	
Somewhat successful	
Somewhat unsuccessful	
Not successful at all	
Don't Know	

15. What tools and techniques would you say have been used? **(tick appropriately, multiple codes allowed)**

Process Mapping	
Workplace Organization	
Work Standardization	

Visual Management	
Error Proofing	
Kaizen Blitz	
Overall Equipment Effectiveness	
Total productive maintenance	
Demand pull in the processes	
Value Stream Mapping	
Changeover Reduction	
Good housekeeping	
Quick changeover/set-up time reduction	
Business process reengineering	
IT/ ICT	
Six Sigma	
Total Productive Maintenance	
Other (Specify)	
Don't Know	

16. What have been some of the resource implications of implementing these tools, techniques and equipments? **(tick appropriately, multiple codes allowed)**

Additional internal staffing required	
Time commitments from all involved	
Additional funding to implement project	
External staffing required	
A need to invest in lean training or awareness	
Set up of a specialized change team	
Additional technology resources	
Other (Specify)	

17. What have been the factors contributing to the success of implementing these tools, techniques and equipments? **(tick appropriately, multiple codes allowed)**

Commitment to ongoing improvements by top management	
Committed / experienced delivery team	
Dedication of time	
Involvement and enthusiasm in all stages	
Appointing facilitator to drive the project	
Desire to improve	
Good planning	

Good communication	
Ongoing monitoring and evaluation	
Willingness to be wrong / taking risks	
Learning from experts / training of staff	
No seniority at meetings	
Realistic / focused approach	

18. What have been the barriers to implementing these tools, techniques and equipments? **(tick appropriately, multiple codes allowed)**

Organizational culture and resistance to change	
Lack of awareness / knowledge about Lean	
Staffing shortages / getting staff released from duties	
Lack of top management commitment	
Backlogs and other ongoing work pressures	
Lack of equipment	
Short term funding	
Reliance upon or engagement with other internal departments	
None	
Inability to quantify and realise savings	
The scale of the project / high volume of data	
IT illiteracy of many people	

SECTION C: UNDERSTANDING LEAN THINKING AND PRACTICES

All the tools, techniques and equipments mentioned in the previous questions are elements of Lean management, thinking, application or activities

19. In your view, what do you understand by Lean management/thinking?

……
……
……

20. Do you think lean management/thinking is applied in this organization?

Yes		**Go to Q 21**
No		**Terminate**
Don't know		**Terminate**

21. What are some of the practices, projects, tools, equipments etc. that you would consider part of Lean management/application in your organization?

……
……
……

22. Has there been any evaluation of the impact of the Lean activities?

Yes		**Go to Q 23**
No		**Go to Q 24**
Don't know		**Go to Q 24**

23. If Yes, please provide a brief summary.

Each process improvement is monitored / audited for success	
Quantitative evaluations to measure lead time and performance indicators	
Used to produce conclusions and recommendations	
Still early days in terms of realizing benefits from projects	
Used to demonstrate improvements	
Used to highlight lessons learnt	

24. Is there anything else that has not been covered above that you wish to tell us about Lean management in your organization?

……
……
……

THANK YOU

APPENDIX 2: VALUE STREAM ANALYSIS TOOL

		Tools							
Wastes	**Weight (Section A)**	**Process Activity Mapping**	**Supply Chain Response Matrix**	**Production Variety Funnel**	**Quality Filter Mapping**	**Demand Amplification**	**Decision Point Analysis**	**Physical Structure**	**Competitor Analysis (Section B)**
Overproduction		Low	Medium		Low	Medium	Medium		
Waiting		High	High	Low		Medium	Medium		
Transport		High						Low	
Inappropriate Processing		High		Medium	Low		Low		
Unnecessary Inventory		Medium	High	Medium		High	Medium	Low	
Unnecessary Motion		High	Low						
Defects		Low			High				
Overall Structure		Low	Low	Medium	Low	High	Medium	High	
	Total Weight (Section C)								

Source: The value stream analysis tool (Hines and Rich, 1997)