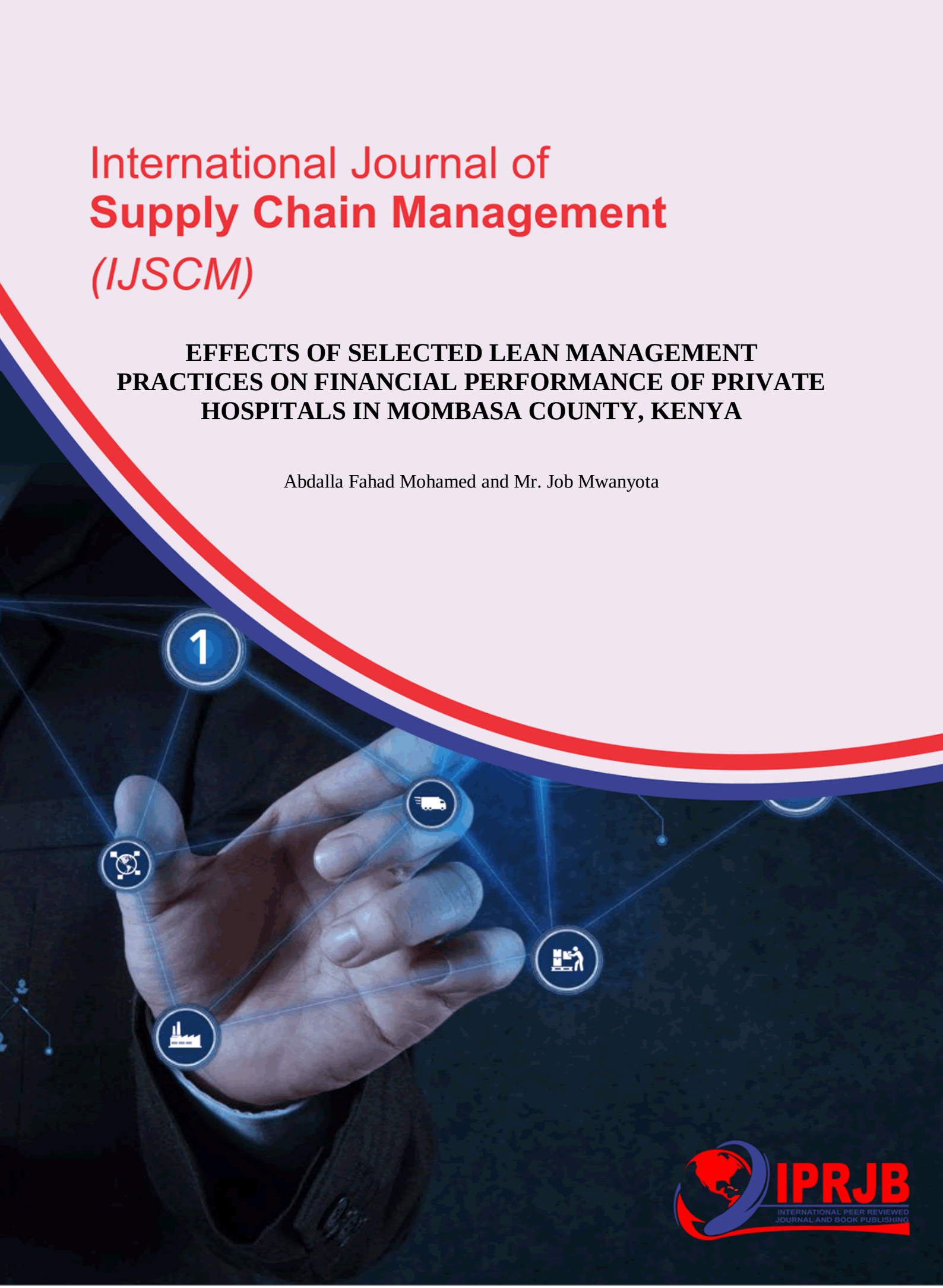
International Journal of
Supply Chain Management
(IJSCM)

EFFECTS OF SELECTED LEAN MANAGEMENT PRACTICES ON FINANCIAL PERFORMANCE OF PRIVATE HOSPITALS IN MOMBASA COUNTY, KENYA

Abdalla Fahad Mohamed and Mr. Job Mwanyota



IPRJB
INTERNATIONAL PEER REVIEWED JOURNAL AND BOOK PUBLISHING

International Journal of Supply Chain Management
ISSN 2518-4709(Online)
Vol.3, Issue 2 No.1, pp 1 - 21, 2018

www.iprjb.org

EFFECTS OF SELECTED LEAN MANAGEMENT PRACTICES ON FINANCIAL PERFORMANCE OF PRIVATE HOSPITALS IN MOMBASA COUNTY, KENYA

[1*] Abdalla Fahad Mohamed
[1]Post Graduate Student: University of Nairobi
[*]Corresponding Author's Email: abdallafahad@gmail.com

[2]Mr. Job Mwanyota
Lecturer: University of Nairobi
Email: jmwanyota@yahoo.com

Abstract

Purpose: Lean management concept is geared towards waste elimination, eliminating time wasting, money or effort. This is achieved thorough identifying every step the process of a business and cutting out the steps that fail to bring about value. The lean thinking has its origin in engineering although it has been applied to other sectors such as healthcare. The main objective of the study was to examine the effect of lean management practices on financial performance.

Methodology: The study adapted a descriptive design with the use of cross-sectional data. The target population was 40 private hospitals in Mombasa County and since the population was small, a census survey was carried out on all the private hospitals in Mombasa County. A questionnaire was used to collect primary data. Out of the 40 research instruments distributed, 37 questionnaires were received and analysed representing 92.5% response rate which was considered adequate. Data analysis was done with the use of SPSS which produced both descriptive and inferential statistics.

Results: The findings revealed that all the lean management practices had a significant relationship with financial performance ($p<0.05$). When individual lean practices were considered, Performance Measurement Systems had a strong positive correlation with financial performance while Total Productive Maintenance had a weak positive correlation with financial performance. Moreover, lean management practices have been employed to a moderate extent and lean management practices affects financial performance to a large degree.

Unique Contribution to Theory, Practice and Policy: The study recommended that the private hospitals should concentrate on all aspects of lean management and not one or two since all practices worked in tandem to bring about superior performance.

Key Words: *Lean Management Practices, Private Hospitals and Financial Performance.*

1.0 INTRODUCTION

1.1 Background to the Study

Lean management concept is geared towards waste elimination, eliminating time wasting, money or effort. This is achieved thorough identifying every step the process of a business and cutting out the steps that fail to bring about value. The idea behind lean has its origin in manufacturing (McKinsey & Company, 2014; Manrodt &Vitasek, 2005; McIntosh, Heppy & Cohen, 2014; Rexhepi & Shrestha, 2011). The benefit and objective of applying lean in health sector is to do away with waste, as well as eradicating travel that is not necessary, waiting time reduction and while at the same time building quality, speed and promoting flexibility into the organization (McIntosh et al., 2014).Corbett (2007:), states that the lean approach percolates into ever wider circles of operations; it ceases to be about best practice and starts to become a part of the fabric of doing business. Shah and Ward (2007) indicated that the most frequently mentioned benefits of lean practices are enhancement in quality, productivity of labour along with customer cycle time reduction, reduction in lead time and minimization of manufacturing costs.

1.1.1 Lean Management Practices

According to Smith and Hawkins (2004), lean management practices involve waste elimination in all aspects of production. This includes designing products, customer relations, supplier networks, engineering, sales distribution and quality assurance. Lean management is a continuous process intended to find its way into the final products and services in terms of low prices that improves firm's productivity. Ondiek, Kisombe and Magutu (2013) explain that lean includes the formation of enhanced value for customers by doing away with wasteful activities. This implies that any activity that makes use of resources, adds costs or time without creating customer value should be eliminated. Thus, the central role of lean manufacturing is elimination of waste.

Lean brings about a fresh dimension of effort in a firm which includes relationships build on trust with suppliers, employees and clients; eliminating wastes, cost reduction, and enhanced quality of products (Womack, Jones & Roos, 1990; Krafcik, 1998). These include TPM, JIT, TQM, cellular manufacturing, extensive cross-functional training and quality circles (Shah, 2007). Despite eagerness for 'lean', research analyzing the connection between its adoption in manufacturing and successive performance has yielded varying findings. Although there are various lean management practices that can bring about improvement in a firm's bottom-line, this study considers the following: 5S, Kaizen (Continuous Improvement), Performance Measurement Systems or KPIs (Key Performance Indicators)**,** Standardization of work, Total Productive Maintenance (TPM) and Lean synchronization (Slack et al., 2010; Otsima, 2015; Shazali et al., 2013; Poksinska, 2010; Dahlgaard, Pettersen & Dahlgaard-Park, 2011).

1.1.2 Financial Performance

The main aim of stakeholders or investors in investing in a business is to enhance their wealth or value (Borad, 2009). Thus, performance measurement of a business must provide a hint of how wealthier a shareholder has become as a result of the investment over a specific time period. Performance in financial terms is a subjective measure of how healthy a firm is and how assets are used to create revenues (Erasmus, 2008; Halsey, 2001). An organization's performance entails the appraisal of indicators prescribed or standards of efficiency and effectiveness (Leontiades, 2009). This also extends to accountability of the environment in

relation to productivity, time cycle, compliance to regulations and reducing wastes or pollution.

According to Baffoe and Tettey (2008) and Leontiades (2009), organizations use various financial indicators to estimate if their investments are performing well and these are ratios like Return on Assets (ROA), Return on Investments (ROI), Return on Equity (ROE), profitability ratios and liquidity ratios. ROA for example helps companies to check if the assets are being used in the right way or maximized in order to enhance business performance. It would be detrimental to a business if some assets are idle, yet they can be used to increase profits. Liquidity ratios on the other hand help to show if a business is able to meet its obligations when they fall due (Baffoe & Tettey, 2008; Qian et al, 2007). On the overall, the key measures of financial performance are sales revenue and profitability, and these determine if an investment is worthwhile or not (Leontiades, 2009).

1.1.3Lean Management Practices and Financial Performance

The principle of lean is somewhat direct, it implies a path towards eliminating wastes in order to create an operations that are highly dependable, quicker, producing products of high quality and offering higher quality services and more importantly minimizing costs (Slack et al., 2013). This shows that elimination of wastes from operations leads to minimization of operational costs which in turn enhances profitability. Lean implementation has a huge influence on financial performance an operational efficiency such as reduction of work-in-process inventory, lead time reduction, productivity increase, improving on quality and reducing space utilization (Kilpatrick, 2003). According to Susilawati, Tan, Bell and Sarwar (2013), lean manufacturing tasks impact on financial performance, customer satisfaction, procedures and processes, individuals and the future. Innovative manufacturing practices examined by Ketokivi and Schreoder (2003), many of which are related with the idea of lean TQM and JIT are, connected to economical operational performance, if they are applied for the right reason. Integrating tactical intent into the analysis offers a good understanding of relationships in practice performance.

1.1.4 Private Hospitals in Mombasa County

Given that the available public health sector resources are scarce, it is important to guarantee that they are used optimally for health services provision to a maximum number of people possible delivering value for money. Unfortunately, the Ministry of Health has limited information on the operational efficiency of the health system at different levels of care (Kioko, 2013). Furthermore, the government of Kenya reports that there are more than 5,000 health facilities in Kenya. The government oversees 41% of health centers, NGOs run 15%, and the private sector operates 43% (Center for Strategic & International Studies, 2016). The government operates most hospitals, health centers, and dispensaries, while the private sector operates nursing homes and maternity facilities catering to higher income clientele. The health sector in Kenya faces various problems mostly shortage of doctors. For example, according to World Health Organization (WHO), whereas the United States counts on 26 physicians per 10,000 people, Kenya has just one doctor per 10,000 residents, a ratio that is below average for the Africa region. Other problems are poor funding, constant strikes by medical staff, shortage of medicine and others (Center for Strategic & International Studies, 2016).

Hospitals are different from other types of healthcare facilities because of their ability to admit and care for inpatients. The Free Dictionary.com defines a private hospital as a hospital owned by a for-profit or a not-for-profit organization and is privately funded through

payment for medical or healthcare services by patients themselves, by insurers, or by foreign embassies. The private hospitals have been grouped according to the number of beds. The highest percentages are represented by group (11 to 20 beds) and group (31 to 40 beds). The least percentage is depicted by group (21 to 30 beds). In addition, most of them 63.6% have doctors numbering to below ten (10) (Kalume, 2012). There are about forty (40) private hospitals in Mombasa County (see appendix II) which forms the basis of this study.

1.2 Research Problem

Professionals in the hospital sector are starting to discover innovative methods that decrease medical errors that are preventable, increase care for patients and safety and reducing costs of healthcare. Increasingly, hospitals are applying principles of lean operations. In the application of lean practices to current structures and procedures, major organizations in the healthcare sector are attaining substantial developments in safety of patients while also decreasing costs (UL LLC 2013; Rexhepi & Shrestha, 2011; Leslie et al., 2006).But as a result of the triple pressures of rapidly improving and more costly technology, ageing populations and severe recessionary pressures on government finances, healthcare systems of the developed and developing worlds need to make long-term cost savings, whilst maintaining and enhancing the quality of essential services such as health (McIntosh et al., 2014).

The philosophy of lean has been applied in UK hospitals and internationally. Lean has been promoted as an efficiency response in the face of rising public spending (Rexhepi & Shrestha, 2011; Leslie et al., 2006). Several efficiency approaches have attracted particular interest, encompassing a number of Operations Management (OM) and Human Resource Management (HRM) practices, such as Just-in-Time (JIT), Total Quality Management (TQM), employee empowerment and extensive training (Rexhepi & Shrestha, 2011; Leslie *et al*., 2006; McIntosh et al., 2014) and it is their modification and adaption to health systems that is of particular interest to health managers. There are various examples of lean application in private hospitals in UKand USA. For example, a Florida dental practice applied lean principles as part of its effort to reduce patient and clinician wait times. As a result of its lean initiative, the practice reports a reduction in the number of visits and also a decrease in the time required to make a patient go back to full health. These changes have allowed the practice to increase the number of patients seen while also reducing treatment rooms and staff requirements (achieved without loss of jobs). Clinicians have seen their available time increase on a weekly basis, allowing them to spend time with new patients (UL LLC 2013; Value Capture, 2013).

Lean production in manufacturing in Kenya has been investigated by Wanjihia (2011) who examined innovation management and found that more investment needs to put in innovation. Ondiek*et al*. (2013) did a study on lean operation tools and techniques used in the sugar industries in Kenya and the conclusion was that sugar processing industries in Kenya did not fully understand lean operation concepts and have therefore not reaped the full benefits of lean implementation. Kimani (2013) examined lean supply chain management practices in the industrial sector in Kenya and finds that the most predominant practices adopted are preventive preservation and decrease in the initial finishing time. Maina (2013) investigated lean management practices in the Kenyan industrial sector and concluded that firms used lean principle to a large extent and in doing so they were able to secure the benefits of improved performance in operations.

This study therefore seeks to answer research questions as: To what extent are lean practices employed by private hospitals in Mombasa County, Kenya? What is the influence of lean practices, tools and techniques on the performance of operations, efficiency of the private hospitals in Mombasa County, Kenya? Are there any challenges faced by private hospitals in implementing lean practices in their operations?

2.0 LITERATURE REVIEW

2.1 Theoretical Review

2.2.1 Transaction Cost Theory

Transaction cost theory (TCT) is broadly used in various disciplines in management. It has been linked to two Nobel laureates (Oliver Williamson and Ronald Coase) (Martins *et al*., 2010). Transaction cost theory makes an effort to clarify why firms exist and why firms expand or undertake in strategic sourcing. This theory believes that firms try to cut on costs and that firms try to reduce the red tape costs of exchanging resources (Martins *et al*., 2010; Madhok, 2002). Corporations are considering the costs incurred in a business, against the red tape costs of performing activities internally. Hagg, Suskovich, Workman, Scachitti and Hudson (2007) observe that lean is an important instrument for recognizing and eradicating waste from process.

Transaction cost theory is anchored in various assumptions about behavior of humans and characteristics in the environment. The assumptions that a company will select the governance form from the many substitutes among the firm's menu, that brings down costs of transacting business and manufacturing products clarify why firms may face greater costs for transactions in the market and why companies may be relatively more effective than markets at organizing trades (Martins *et al*., 2010; Madhok, 2002; Tadelis & Williamson, 2010).The model views organizations and market as dissimilar possible forms of harmonizing and organizing economic transactions. When peripheral transaction costs are more than the company's interior bread tape costs, the company will develop, because a firm is able to achieve its activities more cheaply, than if the actions were accomplished in the market. Nevertheless, if the red tape costs for organizing the activity are more than the external cost of transaction the company will be rationalized.

As per Ronald Coase, a firm expands as long as its activities can be performed inexpensively within the company than by example outsourcing the tasks to external agents in the market in order to reduce costs or promote efficiency. Transaction cost occurs "when a product or a service is moved across a technologically distinguishable interface". Thus, contract costs arise each time a product or service is being moved from one phase to another, where new sets of technological competences are required to make the product or service. So, if businesses view the environmental uncertainty as high, they might make a choice not to outsource or exchange resources with the environment (Martins *et al*., 2010; Madhok, 2002).

2.2.2 Theory of Constraints (TOC)

This theory and lean management are two prevalent business beliefs that supplement each other (Moore & Scheinkopf, 1998; CIMA, 2007). Theory of Constraints was recommended by Eliyahu Goldratt in 1990 and one of the strong points of this method is that it gives focus in an environment full of unnecessary information. It offers guidance to specialists to enhance their firms by concentrating on little subjects that restraint continuing profitability. This theory sees firms as systems made up of assets that are connected by the practices they

undertake. Within the organization, a limitation is looked at as whatever brings about restrictions to the system from attaining greater performance in relation to what it was intended to achieve. The ubiquity of inter-connections in a firm makes the equivalence of a chain, or system of links, very descriptive of a system's procedures. Synonymous to the power of a chain being determined by its solitary fragile link, the TOC viewpoint shows that the capability of any firm to attain its aim is ruled by one or very few restrictions (Alan, 2010; Moore & Scheinkopf, 1998; CIMA, 2007).

In principle, each manager, and especially owners of firms, wants to make sure that their firms are ever-flourishing implying an organization that is unceasingly improving performance and stability, while enhancing value to all shareholders, without ever wearing out resources and without taking major risks (Alan, 2010; Moore & Scheinkopf, 1998). Nevertheless, although it is almost always likely with the correct resources and funding to enhance every part of a firm, even the biggest and most flourishing firms have scarce resources and time available to invest in creating changes needed to advance their organizations. Managers require a dependable method/mechanism to differentiate between all the many portions that can be bettered from the few that must be upgraded in order to attain more goal units for the organization, present and in the future. The issue is that not every change in a firm will result in an enhancement in performance and value. In fact, investigation shows that the most changes (characteristically sixty-eighty percent) started by management and owners to enhance their firms, do not result in improvements that are measurable in performance and a substantial percentage of these alterations worsen organizational performance (Alan, 2010).

Overall, companies must recognize the system's limitation and the question to be answered is "what is materially limiting the ability to generate high throughput?" The limitation will be situated in one of three places: the market (less sales); in the vendors/suppliers (less materials) or in an internal resource (less capacity resources or a set of skills) (Moore & Scheinkopf, 1998).

2.2 Empirical Review

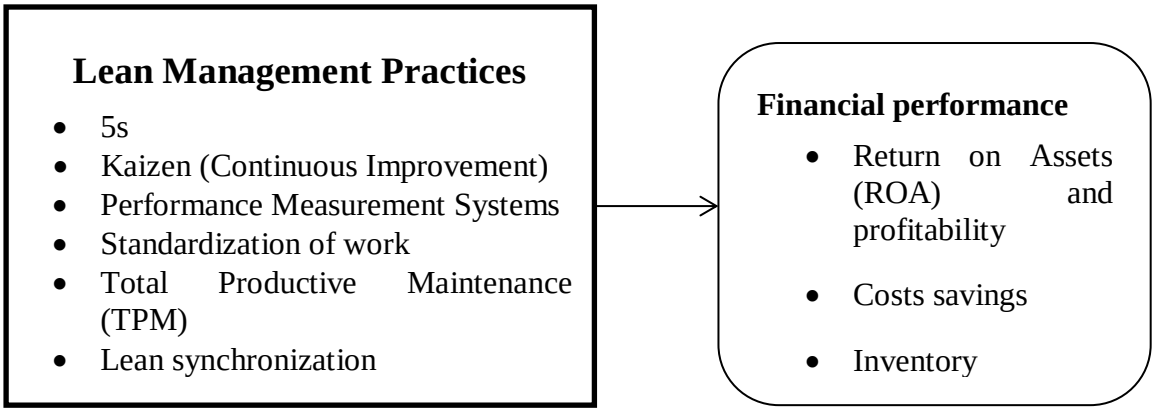
As per Mader (2008), lean six sigma makes use of tools from two or more toolboxes, so that the better of the two practices can be obtained, enhancing promptness while also increasing precision. The results of lean six sigma entail: Meeting needs of customers through services and products (listening to customer voice); activities of little value are removed from the process (minimized wastage); reducing defectives in products/transactions; making cycle time shorter and making sure that the right product/service are delivered at the correct time and in the correct place.

Study findings by UL LLC (2013) and Value Capture (2013). Revealed that a breast cancer screening center used lean practices to implement a multi-disciplinary method to screening, diagnosis, biopsy and treatment processes. The changes reduced from 10% to 5% the patient call back rate for unnecessary biopsies, and 35% decrease on breast biopsy-related costs; employees in emergency room at nine northern Virginia hospitals made use of lean methods to decrease time wasted. Also, a hospital in Midwestern deployed a lean implementation team to redesign the hospital laboratory process, amalgamate redundant equipment and reconfigure personnel roles. The changes resulted in a 53% improvement in turnaround time for patient blood test results and nearly $500,000 in annual savings (UL LLC, 2013; Value Capture, 2013).

Papadopoulos (2011) in in a study showed that lean management practices resulted in enhanced turnaround times for all examples inpatients, outpatients and doctors, staff self-esteem, lowered costs, helped in faster treatment decisions and increased competence in caring for patients. Rexhepi and Shrestha (2011) also did a study in the subject area and found that the benefits of lean were: decreased time for waiting time, reduction in stress for staff, enhanced client satisfaction and greater income for firms. Ondiek et al. (2013) did a study on lean operation tools and techniques used in the sugar industries in Kenya and the conclusion was that sugar processing industries in Kenya did not fully understand lean operation concepts and have therefore not reaped the full benefits of lean implementation.

Maina (2013) examined lean methods in the Kenyan industrial sector and concluded that firms made use of lean management practices to a large extent and this brought about the ability to benefit from enhanced performance in operations. The continuous process industry where cement manufacturing falls in was explored by Rono (2013) in a case study of Bamburi Cement. The study sought to determine the degree to which lean manufacturing practices have been embraced at Bamburi Cement Limited, the drivers and barriers to effective implementation of lean manufacturing and finally the benefits of implementing lean manufacturing practices. The research findings revealed that Bamburi Cement Limited have systems and structures of lean manufacturing practices well in place. However, they are not practically or well implemented thus hindering the organization from reaping full benefits of lean manufacturing.

2.3 Conceptual Framework



Independent variables **Dependent Variable**

Figure1: Conceptual Framework

3.0 RESEARCH METHODOLOGY

The study adapted a descriptive design with the use of cross-sectional data. The target population was 40 private hospitals in Mombasa County and since the population was small, a census survey was carried out on all the private hospitals in Mombasa County. A questionnaire was used to collect primary data. Out of the 40 research instruments distributed, 37 questionnaires were received and analyzed representing 92.5% response rate which was considered adequate. Data analysis was done with the use of SPSS which produced both descriptive and inferential statistics.

4.0 FINDINGS

4.1 Demographics

Table 1 shows the respondents demographics in terms of number of years the organization has been in existence, number of employees, average number of patients per month and bed capacity.

Table 1: Demographic information

Years organization been in existence	Frequency	Percentage (%)
Less than 5 years	7	19%
6-10 years	7	19%
11-15 years	20	57%
Over 16 years	3	5%
Total	**37**	**100%**
Number of employees		
0-49 people	15	41%
50-99 people	17	46%
100-149 people	5	13%
Over 150 people	0	0%
Total	**37**	**100%**
Patients received per month		
Less than 50 patients	8	22%
51-99 patients	13	35%
100-150 patients	7	19%
Over 150 patients	9	24%
Total	**37**	**100%**
Bed capacity		
Less than 20 beds	10	27%
21-40 beds	11	30%
41-60 beds	3	8%
61-80 beds	4	11%
81-100 beds	6	16%
More than 100 beds	3	8%
Total	**37**	**100%**

As shown in table 1, majority of the respondents 57% stated that their organizations had been existence for 11-15 years then 19% who said less than 5 years and 6-10 years each and lastly 5% who said over 16 years. This shows that private hospitals in Mombasa County have been in existence for relatively long periods of time allowing them room to implement lean management practices. In addition, the results show that most private hospitals 46% have employed 50-99 people followed by 41% who said 0-49 people. Furthermore, majority of the respondents 35% said that their hospitals receive 51-99 patients per month followed by those who said over 150 patients at 24% then less than 50 patients at 22% and finally 100-150 patients at 19%. Lastly, most respondents 30% stated that their hospitals have a bed capacity of 21-40 beds followed by less than 20 beds at 27% responses then 81-100 beds at 16% followed by 61-80 beds at 11% and finally 8% who said 41-60 beds and more than 100 beds each.

4.2 Lean Management Practices

This section carries out an analysis of the questions addressed to operations, marketing, supply chain or human resource manager in each hospital. The questions relate to lean management practices and performance arranged as per the three research objectives. The responses were measured on a scale of 1-5.

4.2.1 If Lean Practices are employed in Private Hospitals

The study sought to establish the extent to which 5S has been implemented in the private hospitals and how it affects performance. Outcomes are shown in table 2

Table 2: Implementation of 5S

5s (Sort, set in order, Shine, Standardize and Sustain)	1	2	3	4	5	Mean	Std.Dev.	Rank
The hospital sorts out and separates that which is needed from that not needed in the area	0%	0%	30%	68%	2%	4.45	.4549	2
The hospital arranges items that are needed so that they are ready and easy to use	0%	0%	73%	27%	0%	3.67	.5630	3
The hospital cleans, keeps to rules and identify defects in equipment on a regular basis	0%	0%	0%	81%	19%	4.77	.4715	1
Overall mean						**4.30**	**0.50**	

Table 2 shows the results for implementation of 5S in private hospitals. Majority of the respondents stated that the hospital cleans, keeps to rules and identify defects in equipment on a regular basis at 81% great extent responses followed by 68% great extent responses for the hospital sorts out and separates that which is needed from that not needed in the area. On the statement of the hospital arranges items that are needed so that they are ready and easy to use, 73% said moderate extent. The results reveal that cleaning, keeping to rules and identifying defects in equipment on a regular basis is the most important aspect under 5S. Additionally, overall mean of 4.30 implies that private hospitals in Mombasa County have implemented 5S practices to a great extent either knowingly or unknowingly.

The study also sought to establish the extent to which Kaizen (Continuous Improvement) has been implemented in the private hospitals and how it affects performance. Outcome is shown in table 3

Table 3: Implementation of Kaizen (Continuous Improvement)

Kaizen (Continuous Improvement)	1	2	3	4	5	Mean	Std.Dev.	Rank
The hospital speaks with data and makes decisions based on facts	0%	13%	54%	33%	0%	3.52	.3467	3
Employees work together proactively to achieve regular and incremental improvements (team work)	0%	0%	0%	73%	27%	4.71	.3424	2
Collective talents of the hospital are combined to create an engine for continually eliminating waste and enhancing personal efficiency	0%	0%	0%	81%	19%	4.77	.3648	1
Overall mean						**4.33**	**0.35**	

As shown in table 3, 81% of the respondents stated that collective talents of the hospital are combined to create an engine for continually eliminating waste and enhancing personal efficiency has been implemented to a large great extent than 73% great extent responses who said that employees work together proactively to achieve regular and incremental

improvements (team work). When asked whether or not the hospital speak with data and makes decisions based on facts, majority 54% said moderate extent while 33% said great extent. Thus, the results show that private hospital in Mombasa County use collective talents to continually eliminate waste and enhance personal efficiency followed by team work. When the mean is considered, the results indicate a score of 4.33 implying that private hospitals in Mombasa County have implemented Kaizen (continuous improvement) to a great extent.

The study also sought to establish the extent to which Performance Measurement Systems has been implemented in the private hospitals and how it affects performance. Outcome are shown in table 4

Table 4: Implementation of Performance Measurement Systems

Performance Measurement Systems	1	2	3	4	5	Mean	Std.Dev.	Rank
KPIs (Key Performance Indicators) have been established in the hospital	0%	0%	0%	89%	11%	4.87	.5466	1
KPIs are aligned with hospitals' top-level strategic goals	0%	0%	73%	27%	0%	3.77	.4454	3
Performance measurement systems effectively expose and quantify wastes at the hospital	0%	0%	0%	81%	19%	4.73	.5668	2
Overall mean						**4.46**	**0.52**	

Table 4 shows results for implementation of performance measurement systems. Majority of the respondents 89% stated that KPIs (Key Performance Indicators) have been established in the hospital to a great extent followed by those who said performance measurement systems effectively expose and quantify wastes at the hospital at 81% great extent responses and finally 73% moderate extent responses on whether or not KPIs are aligned with hospitals' top-level strategic goals. None of the respondents said very low extent to the factors under performance measurement systems. Overall mean for the indicators was 4.46 which show that performance measurement systems have been implemented in Mombasa County's private hospitals to a great extent.

The study also sought to establish the extent to which standardization of work has been implemented in the private hospitals and how it affects performance. Results are shown in table 5.

Table 5: Implementation of Standardization of work

Standardization of work	1	2	3	4	5	Mean	Std.Dev.	Rank
Hospital processes are not ambiguous	6%	62%	32%	0%	0%	2.77	.6 476	3
The hospital is able to answer the who, what, when, where, why and how of operational activities	0%	0%	62%	38%	0%	3.67	.7554	2
The hospital consistently applies best practices	0%	0%	81%	19%	0%	3.87	.6478	1
Overall mean						**3.44**	**0.70**	

As shown in table 5, 81% said that their hospitals consistently apply best practices to a great extent followed by those who said that the hospital is able to answer the who, what, when, where, why and how of operational activities at 62% moderate extent and 38% great extent

responses. It appears that majority of the hospitals process are ambiguous as shown by 62% who said hospital processes are not ambiguous has been implemented to a low extent. Thus, the results reveal that even though the hospitals consistently apply best practices, their processes are ambiguous. Overall mean of 3.44 reveals that private hospitals in Mombasa County have implemented standardization of work to a moderate extent.

The study also sought to establish the extent to which Total Productive Maintenance (TPM) has been implemented in the private hospitals and how it affects performance. Results are presented in table 6.

Table 6: Implementation of Total Productive Maintenance (TPM)

Total Productive Maintenance (TPM)	1	2	3	4	5	Mean	Std.Dev.	Rank
The hospital encourages shared responsibility for equipment (total employee involvement from top to bottom)	0%	76%	24%	0%	0%	2.87	.6 577	3
The hospital optimizes the use of existing equipment before adding new ones	0%	0%	62%	38%	0%	3.56	.3754	1
The hospital has a system which ensures no equipment breakdowns, no small stops or slow running, no defects and no accidents	0%	19%	81%	0%	0%	3.48	.4468	2
Overall mean						**3.30**	**0.41**	

As the results in table 6 reveal, hospital has a system which ensures no equipment breakdowns, no small stops or slow running, no defects and no accidents received 81% great extent responses followed by 62% great extent responses that the hospital optimizes the use of existing equipment before adding new ones and finally 76% low extent responses that the hospital encourages shared responsibility for equipment (total employee involvement from top to bottom). Thus, private hospitals tend to ensure less machine breakdowns but lack shared responsibility for equipment. Overall mean of 3.30 imply that Total Productive Maintenance (TPM) has been implemented in Mombasa's private hospitals to a moderate extent.

Lastly, the study also sought to establish the extent to which lean synchronization has been implemented in the private hospitals and how it affects performance. Results are presented in table 7

Table 7: Implementation of lean synchronization

Lean synchronization	1	2	3	4	5	Mean	Std. Dev.	Rank
The hospital ensures wastes in operations are eliminated	0%	0%	46%	19%	35%	3.85	.4456	2
Quality and value is delivered to customers at the lowest possible cost	0%	0%	86%	14%	0%	3.57	.3755	3
The hospital challenges existing order leading to continuous innovation and improvement	0%	0%	30%	62%	8%	4.15	.4374	1
Overall mean						**3.86**	**0.42**	

As shown in table 7, most respondents 86% indicated that their organizations quality and value is delivered to customers at the lowest possible cost to a moderate extent followed by those who said that the hospital challenges existing order leading to continuous innovation

and improvement at 62% great extent responses then the hospital ensures wastes in operations are eliminated at 46% moderate extent responses. The overall mean for lean synchronization implementation was 3.86 which show that it has been implemented to a moderate extent.

4.2.2 Impact of Lean Management Practices on Financial Performance

The respondents were given the measures of financial performance employed by a firm to test the influence of lean practices implementation.

Table 8: Lean management practices and Financial Performance

	Mean	Std. Dev.	Rank
Kaizen (Continuous Improvement) improves throughput/ profits and ROA, reduces the level of customer complaints, save on costs in your hospital and reduces the number of defective units and inventory in your hospital	4.33	.4 376	2
Standardization of work improves throughput/ profits and ROA, reduces the level of customer complaints, save on costs in your hospital and reduces the number of defective units and inventory in your hospital	3.44	.3454	5
5s improves throughput/ profits and ROA, reduces the level of customer complaints, save on costs in your hospital and reduces the number of defective units and inventory in your hospital	4.30	.6379	3
Performance Measurement Systems (KPIs) improves throughput/ profits and ROA, reduces the level of customer complaints, save on costs in your hospital and reduces the number of defective units and inventory in your hospital	4.46	.4 336	1
Total Productive Maintenance (TPM) improves throughput/ profits and ROA, reduces the level of customer complaints, save on costs in your hospital and reduces the number of defective units and inventory in your hospital	3.30	.7337	6
Lean synchronization improves throughput/ profits and ROA, reduces the level of customer complaints, save on costs in your hospital and reduces the number of defective units and inventory in your hospital	3.86	.5478	4
Overall mean	**3.95**	**0.64**	

Table 8 shows the relationship between lean management practices and financial performance. Most respondents 77% agree that Kaizen (continuous improvement) and Performance Measurement Systems (KPIs) improves throughput/ profits and ROA, reduces the level of customer complaints, save on costs in your hospital and reduces the number of defective units and inventory in your hospital followed by 5S with 65% agree responses. The responses show that 57% were not sure if standardization of work enhances financial performance followed by 60% not sure responses on lean synchronization then 55% on Total Productive Maintenance (TPM).

The mean scores also show that Performance Measurement Systems (KPIs) ranks high with a core of 4.46 in terms of influencing affecting financial performance followed closely by Kaizen (continuous improvement) at 4.33. Total Productive Maintenance (TPM) ranked low with a mean score of 3.30 in terms of its effect on financial performance followed by standardization of work at 3.44. None of the respondents disagreed that lean management practices have helped the private hospitals in Mombasa County improve their financial performance and efficiency.

Furthermore, the respondents were asked to indicate the tangible benefits achieved or hope to achieve through implementation of lean management practices. Increased revenues/profitability, operational efficiency, increased sales/profits, increased efficient

operations and costs minimization/savings received 100% responses. This was followed by improved customer and supplier experience at 87%, then reduced inventory and better, fact-based decision making at 76% each followed by higher quality products and services at 73%, then increased customer numbers/accounts, offering a specialized service in a niche market, creating uniquely desirable products and services and new product innovations at 57%. Overall, the consistency in the results show that private hospitals in Mombasa County have experienced, experienced and will continue to experience tangible benefits when lean management practices are applied continuously.

4.3.3 Lean Management Practices Implementation Challenges

The respondents were asked to indicate the possible challenges or constraints their hospitals encounter or a likely to encounter in the implementation of lean management practices. The responses were measured on a scale of 1-5 and outcomes are displayed in table 9

Table 9: Lean management practices implementation challenges

	1	2	3	4	5
Lack of top management commitment to lean implementation	0%	0%	0%	13%	87%
Lack of resources	0%	0%	0%	90%	10%
Resistance to change	0%	0%	0%	100%	0%
Lack of all stakeholder engagement	0%	0%	33%	57%	10%
Lack of effective measurement of quality improvement	0%	76%	24%	0%	0%
Lack of proper training/inadequate Human Resource Development	0%	0%	0%	10%	90%
Inadequate managerial skills	0%	0%	15%	50%	35%
Organization culture	0%	15%	8%	77%	0%
Compatibility with existing systems	20%	68%	12%	0%	0%
Poor infrastructure	0%	7%	77%	16%	0%
Shortage of medical staff	0%	0%	67%	23%	10%
Others (please specify): Lack of experts,					

As shown in table 9, all respondents 100% stated that resistance to change as a challenge affects implementation of lean management practices to a great extent followed by 90% who said that lack of proper training/inadequate Human Resource Development affects implementation of lean management practices to a very great extent the 90% who said lack of resources affects implementation of lean management practices to a great extent. Additionally, lack of top management commitment to lean implementation also affects implementation of lean management practices with 87% very great extent responses. On the contrary, lack of effective measurement of quality improvement affects lean management practices implementation to a low extent with 76% responses then compatibility with existing systems at 68% low extent responses. Poor infrastructure and shortage of medical staff affects lean management practices implementation to a moderate extent with 77% and 67% responses respectively.

Overall, the results indicate that the greatest challenge to implementing lean management practices in Mombasa County's private hospitals is resistance to change followed by lack of proper training/inadequate Human Resource Development and lack of resources then lack of top management commitment to lean implementation. Lack of effective measurement of quality improvement and compatibility with existing systems is of less concern to the respondents.

4.3 Pearson's Correlation

This study was interested in establishing if there is a relationship between lean management practices and financial performance i.e. to see if they are correlated. The previous descriptive analysis showed a linear relationship between lean management practices and financial performance. Pearson's correlation was therefore used to categorize the type of correlation (positive or negative) by considering the predictor variables (5s, Kaizen/ continuous improvement, Performance Measurement Systems, Standardization of work, Total Productive Maintenance (TPM) and Lean synchronization) that were strongly or weakly correlated with the dependent variable (financial performance).

In order to develop the Pearson's correlation matrix, the means of the variables were calculated and grouped into six dimensions; 5s, Kaizen/ continuous improvement, Performance Measurement Systems, Standardization of work, Total Productive Maintenance (TPM) and Lean synchronization. The Pearson's correlation coefficient is denoted by r and is by design constrained as follows: $-1 \leq r \leq 1$. The decision rule is such that if $p \leq 0.5$, the test is significant and if $p \geq 0.5$, the test is not significant. Furthermore, positive values denote positive linear correlation; negative values denote negative linear correlation; and a value of 0 denotes no linear correlation. The closer the value is to 1 or –1, the stronger the linear correlation. Table 10 shows the Pearson's correlation coefficient matrix.

Table 10: Pearson's Correlation Coefficient Matrix

		FP	5S	Kaizen	PMS	STD	TPM	LS
FP	Pearson Correlation	1						
	Significance							
5S	Pearson Correlation	.241	1					
	Significance	.003						
Kaizen	Pearson Correlation	.305	.734	1				
	Significance	.026	.003					
PMS	Pearson Correlation	.419	.596	.120	1			
	Significance	.035	.026	.379				
STD	Pearson Correlation	.427	.361	.390	.025	1		
	Significance	.016	.026	.003	.853	.026		
TPM	Pearson Correlation	.365	.461	.390	.025	.361	1	
	Significance	.017	.026	.003	.853	.026		
LS	Pearson Correlation	.270	.461	.390	.025	.361		1
	Significance	.017	.026	.003	.853	.026		

Note: Correlation is Significant at 0.05

Key: FP is financial performance, PMS is Performance Measurement Systems, STD is Standardization of work, TPM is Total Productive Maintenance and LS is Lean synchronization

As shown in table 10, all the independent variables (the lean management practices) had a positive correlation with financial performance. This relationship shows that as the lean management practices change, financial performance changes in the same direction but at varying degrees. In addition, the positive relationship between financial performance and performance measurement systems, standardization of work, total productive maintenance, 5S and lean synchronization was weak. Although all the independent variables had a weak relationship with financial performance, Standardization of work ranked high at r=.427 and lean synchronization as ranked low at r=.270

4.4Tests

4.4.1 Test for Multicollinearity

In statistics, multicollinearity (also collinearity) is a situation in which two or more independent variables in a multiple regression model are extremely correlated, implying that one can be linearly predicted from the others with a considerable degree of accurateness (Hair et al., 2010; Martz, 2013). The results of multicollinearity for the variables under study are documented in table 11.

Table 11: Test for Multicollinearity

	Consumer Protection	
Variables	**Tol.**	**VIF**
5S	.832	1.027
Kaizen	.561	1.066
Performance Measurement Systems	.638	1.062
Standardization of work	.445	0.962
Total Productive Maintenance	.846	1.112
Lean synchronization	.944	1.322

Note: Tol. = tolerance, VIF = variance inflation factor

The values of tolerance and VIF for each independent variable were within the threshold of .10 with VIF of slightly more than one showing that multicollinearity was not a problem in the study.

4.4.2 Reliability test

A reliability test was done using Cronbach's alpha test. The Cronbach's alpha values for this research are displayed in table 12.

Table 4.12: Reliability

Lean management practices	Coefficient Alpha Reliability
5S	0.638
Kaizen	0.712
Performance Measurement Systems	0.724
Standardization of work	0.825
Total Productive Maintenance	0.726
Lean synchronization	0.664

The findings suggest that most of the components had relatively high internal consistency. Cronbach (1951) argued that a reliability coefficient of 0.70 is considered “acceptable" in most social science research situations.

4.4.3 Test of Autocorrelation

Autocorrelation was tested using Durbin-Watson statistic which ranges in value from 0to 4. A value near 2 indicates non-autocorrelation; a value toward 0 indicates positive autocorrelation; a value toward 4 indicates negative autocorrelation (Montgomery, Peck & Vining, 2001). Durbin-Watson is a test that the residuals from a linear regression or multiple regression are independent. This study intended to test the null hypothesis of no autocorrelation in the residuals against the alternative that the residuals are positively autocorrelated at the 5% level of significance. The printed bounds were dL=1.131and dU=1.870. Since the the Durbin-Watson value in this study was 2.026 as per table 4.13and

was more than dU, the null hypothesis will not be rejected. Thus, there was no autocorrelation.

4.5 Model fit

Table 13 shows the results for variations between the dependent and independent variables. Although R^2 value does not guarantee that the model fits the data well, this study asssumed that R^2 was the best indicator for how well the indepenedent variables explain variations in dependent variable. R^2 is the coefficient of determination and shows how financial performance is influenced by lean management practices combined.

Table 13 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.249[a]	.062	-.125	.63560994	2.026

a. Predictors: (Constant), Lean synchronization, 5S, Performance Measurement Systems, Total Productive Maintenance, Standardization of work, Kaizen
b. Dependent Variable: Financial Performance

As shown in table 13, Pearson r $(.249)^2$= .062. The overall p value for the null hypothesis (tests of significance of the model) that there is a significant relationship between lean management practices (Lean synchronization, 5S, Performance Measurement Systems, Total Productive Maintenance, Standardization of work and Kaizen) and financial performance was .915 as shown in table 13. This shows that the relationship between lean management practices identified in this study and organizational efficiency was not significant i.e. p>0.05. Thus, although there is a relationship between lean management practices and financial performance, it was not significant.

As shown in table 13 with R^2 of .062 for the model, this means that the independent variables in the model (5S, Kaizen, performance measurement systems, standardization of work, total productive maintenance and lean synchronization) could offer about 6.2% explanation of the variance in the dependent variable financial performance. This means that variations in independent variables causes 6.2% change in dependent variable financial performance with 93.8% explained by other factors captured under the error term. Thus, the result shows that the predictors identified in this study are influencers of financial performance but to a small extent. It also demonstrates that there was a weak relationship between the variables.

Table 14 Model fit (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.804	6	.134	.332	.915[b]
	Residual	12.131	30	.404		
	Total	12.935	36			

a. Dependent Variable: Financial Performance
b. Predictors: (Constant), Lean synchronization, 5S, Performance Measurement Systems, Total Productive Maintenance, Standardization of work, Kaizen

The outcomes in table 14 show that the F statistic was .332 and was not significant at 5% level of confidence (p = 0.915) i.e. P>0.05. This means that although lean management practices can explain variation in financial performance, this explanation was not significant. This means that there are other factors that determine financial performance in private hospitals in Mombasa County other than lean management practices identified in this study.

4.6 Distribution of Coefficients

The table of coefficients below measures the individual contribution of each independent variable to changes in the dependent variable. This is represented by the coefficient Betas for each of the predictor.

Table 15: Distribution of Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.029	2.291		1.322	.196
	5S	1.161	1.213	.782	.957	.346
	Kaizen	.927	1.208	.626	.768	.449
	Performance Measurement Systems	.064	.342	.034	.187	.853
	Standardization of work	.026	.208	.025	.125	.902
	Total Productive Maintenance	.253	.343	.144	.739	.466
	Lean synchronization	.180	.283	.125	.636	.529

a. Dependent Variable: Financial Performance

The model shows a weak and statistically insignificant positive relationship between Performance Measurement Systems (β = .064, t= .187, p>0.05), Kaizen (β = .927, t=.768 p>0.05); lean synchronization (β = .180, t=.636, p>0.05), Total Productive Maintenance (β = .253, t=.739, p>0.05), standardization of work (β = .026, t=.125, p>0.05) and financial performance and 5S (β =1.161, t=-.957, p<0.05) and financial performance. The coefficients are positive for 5S, kaizen, performance measurement systems, standardization of work, total productive maintenance and lean synchronization which would indicate that as the selected lean management practices become larger or increases, it is related to a higher financial performance which is what we would expect.

Overall, the consistency of regression coefficients on the selected lean management practices suggests that these variables are important factors influencing operational efficiency although at different degrees although the relationship was insignificant. All the independent variables were insignificant predictors of financial performance since their significant value was more than (p>0.05). Additionally, the results show that multicollinearity did not pose a problem in the study since all the variables met the criteria of Tolerance should be >0.1 or VIF (variance inflation factor) <10.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

The study concludes that lean management is not a new concept and has been applied in various industries such as manufacturing; it is relatively new to hospitals especially in developing countries. This study has shown that practicing lean management can bring about various financial benefits such as reduced waiting time, reduced wastages, operational efficiency, cost minimization, increased revenue and customer satisfaction. More importantly, standardization of work and performance measurement had a great influence on financial performance of private hospitals compared to 5S, Kaizen (continuous improvement) and Total Productive Maintenance (TPM).

The effectiveness of lean thinking or lean management on promoting financial performance and efficiency cannot be disputed. This study has established that lean management can be applied in every sector or firm including hospitals which require high levels of quality to be observed. The results showed that lean management practices impact financial performance to a large extent. Additionally, the relationship between all the lean management practices in this study and financial performance was significant at $P<0.05$. In the study, R^2 of .062 showed that all the predictors could offer 6.2% explanation of variation or changes in financial performance of private hospitals in Mombasa County. The consistency of regression coefficients on the lean management practices suggests that these variables are important factors influencing operational efficiency although at different degrees.

Thus, based on the findings of this study, the research question of this study was answered, and the conclusion is that practicing lean management leads to increased financial performance for private hospitals. Virtually all the private hospitals studied are practicing lean management albeit with or without their knowledge.

5.2 Recommendations

The study recommends for practice is that lean management practices have a positive impact on financial performance. Hence, there is need for leadership and top management commitment towards the process of lean management. Commitment to lean management practices means leading by example, providing mentorship, employee training, education and teamwork.

Thus, lean offers significant advantages over other quality improvement models by increasing efficiency and reducing waste while simultaneously improving quality of patient care. With its focus on increasing value, lean has the potential to help balance the cost associated with healthcare, increase the job satisfaction of healthcare professionals, and fundamentally improve the health of our communities. Senior management in private hospitals should be committed to lean management practices.

References

Alan, B. (2010). *"What is Theory of Constraints (TOC)?"* http://www.goldrattresearchlabs.com/documents/What%20is%20Theory%20of%20Constraints%20by%20Dr%20Alan%20Barnard.pdf

Bahensky, J.A., Roe, J., & Bolton, R. (2005). "Lean Sigma-will It Work for Healthcare?" *Journal Healthcare Information Management*, 19(1), 39-44.

Ben, N., J., Naim, M. M., & Berry, D. (1999). 'Legality: Integrating the lean and agile manufacturing paradigms in the total supply chain - Strategies for enriching', International Journal of Production Economics, 62(1-2), 107-118.

Bigelow, B., & Arndt, M. (1995). The implementation of total quality management in hospitals: How good is the fit? *Health Care Management Review*, 20, 47-14.

Burgess, N., Radnor, Z., & Davies, R. (2009). Taxonomy of Lean in healthcare: a framework for evaluating activity and impact. *In 16th International Annual EurOMA Conference*, JunGöteborg, Sweden, 14-17

Byrne, G., Lubowe, D., Blitz, A. (2007). "Using a Lean six sigma approach to drive innovation", *Strategy & Leadership*, 35(2), 5-10.

CIMA (2007). Theory of constraints and throughput accounting. *Topic Gateway Series No.26.*Availableathttp://www.cimaglobal.com/Documents/ImportedDocuments/26_Theory_of_Constraints_and_Throughput_Accounting.pdf. Accessed on 09.09.2016

Corbett, S. (2007). Beyond manufacturing: The evolution of lean production. *The McKinsey Quarterly*. 3, 95-105.

Cox, A., & Chicksand, D. (2005). 'The Limits of Lean Management Thinking', European Management Journal, vol. 23, no. 6, pp. 648-662.

Dahlgaard, J.J., Pettersen, J., & Dahlgaard-Park, S.M. (2011). "Quality and lean health care: a system for assessing and improving the health of organizations," *Total Quality Management*, 22(6), 673-689

Doss, R., & Orr, C., (2007). "*Lean Leadership in Healthcare*," White Paper

Emiliani, B. (2011). "Lean management failure at HMRC", *Management Services*, 55(4), 13-15.

Folinas, D., and T. Faruna, T., (2011). "Implementing Lean Thinking Paradigm Practices in Medical Set Up," *Business Management Dynamics*, 1(2), 61-78

Gabcanova, I. (2012). Human resources key performance indicators. *Journal of competitiveness*, 4(1).

Gati-Wechsler, A. M., & Torres, A. S. (2008). 'The influence of lean concepts on the product innovation process of a Brazilian shoe manufacturer', PICMET '08 - 2008 Portland International Conference on Management of Engineering & Technology, 1137-1144.

Goldratt, E. M. (1990). *What is this thing called Theory of Constraints and how should it be implemented, Great Barrington,* North River Press Publishing Corporation.

Hagg, H., Suskovich, D., Workman, J., Scachitti, S., & Hudson, B. (2007). Adaption of Lean Methodologies for Healthcare Applications.*RCHE Publications*, 24

Kaizen Institute (2016). *About 5S*. Available at https://www.kaizen.com/knowledge-center/what-is-5s.html. Accessed on 20.09.2016

Ketokivi, M.A. & Schreoder, R.G. (2003). Manufacturing practices, strategic fit and performance: A resource-based view, *International journal of operations and production management.*

Kimilu, J. (2005). Materials Management Practices in the Building Industry: The Case of Large Construction Firms in Kenya, *Unpublished MBA project*, University of Nairobi.

Kioko, U. M., (2013). *Health sector efficiency in Kenya: implications for fiscal space*. Nairobi, Kenya:UniversityofNairobi.http://documents.worldbank.org/curated/en/2013/10/20330673/health-sector-efficiency-kenya-implications-fiscal-space

Leslie, M., Hagood, C., Royer, A., Reece, C.P., & Maloney, S. (2006). Using Lean methods to Improve OR Turnover Times," Aron *Journal*, 84(5), 849-855

Madhok, A. (2002). Reassessing the fundamentals and beyond: Ronald Coase, the transaction cost and resource-based theories of the firm and the institutional structure of production. *Strategic Management Journal*, 23(6), 535-550

Manrodt, K., & Vitasek, K., (2008). Lean Practices in the Supply Chain, *Jones Lang LaSalle.*

Martins, R., Serra, F., Leite, A., Ferreira, M. P., & Li, D. (2010). Transactions Cost Theory influence in strategy research: A review through a bibliometric study in leading journals. *Center of Research in International Business & Strategy, workingpaperNo.61/2010*.http://globadvantage.ipleiria.pt/files/2010/03/working_paper61_globadvantage.pdf

Monden, Y. (1983). The Toyota Production System, Productivity Press. Lewis, M. A. (2000), 'Lean production and sustainable competitive advantage', International Journal of Operations & Production Management, 20(8), 959-978.

Montgomery, D. C., Peck, E. A. & Vining, G. G. (2001). *Introduction to Linear Regression Analysis.*3rd Edition, New York, New York: John Wiley & Sons.

Moore, R., & Scheinkopf, L. (1998). Theory of constraints and lean manufacturing: friends or foes. *Chesapeake Consulting Inc*.

Motwani, J. (2003). A business process change framework for examining lean manufacturing: a case study. *Industrial Management & Data Systems*, 103(5), 339-346.

Ondiek G.O., Kisombe S.M. &Magutu P.O. (2013). Lean Operations Tools and Techniques used in the Sugar Sector in Kenya.*African Journal of Business and Management*, 3, ISSN 2079-410X, ISBN 978-9966-1570-3-4

Otsima, M. (2015). Implementing lean synchronization in a medium sized manufacturing organization.*Researchgate*.Availableathttps://www.researchgate.net/publication/279756213_IMPLEMENTING_LEAN_SYNCHRONIZATION_IN_A_MEDIUM SIZED_MANUFACTURING_ORGANIZATION. Accessed on 09.09.2016

Papadopoulas, T. (2011). "Continuous Improvement and Dynamic Actor Associations," *Leadership in Healthcare Service*, 24(3), 207-227

Poksinska, B. (2010). "The Current State of Lean Implementation in Health care: Literature Review, "*Manage Health Care*, 19(4), 319-329

Rexhepi, L., &Shrestha, p., (2011) "Lean Service Implementation in Hospital: A Case study conducted in University Clinical Centre of Kosovo, Rheumatology department", *Master Thesis*, Umea School of Business, Umea University, Sweden

Rono, F.C. (2013). Lean manufacturing practices in a continuous process industry: A case study of Bamburi Cement Limited, *Unpublished MBA project*, University of Nairobi.

Shah R, W.P. (2007). Defining and developing measures of lean production. *Journal of Operations Management*, 25, 4785-805

Susilawati, A, Tan J, Bell D and Sarwar M. (2013). Development a framework of performance measurement and improvement system for a lean manufacturing activity, *3rdInternational Conference on Trends in Mechanical and Industrial Engineering*, 282 – 286

Van den Heuvel, J., Does, R.J., de Koning, H. (2006), "Lean six sigma in a hospital", *International Journal of Six Sigma and Competitive Advantage*, 2(4), 377-88.

Waring, J. J. & Bishop, S. (2010) Lean Healthcare: Rhetoric, Ritual and Resistance.*Social Science & Medicine.*71, 1332-1340.

Waters, D. (2002). *Operations Management* 2nd Edition, Prentice Hall, England.

Womack, J., Jones, D., &Roos, D., (1990). *The machine that changed the world: based on the Massachusetts Institute of Technology 5-million-dollar 5-year study of the future of the automobile*, New York: Rawson Associates

Womack, J.P., & Jones, D.T. (1996). *Lean Thinking: Banish Waste and Create Wealth in Your Organization*, Rawson Associates, New York, NY

Womack,J.P., & Jones , D.J., (2009). From lean production to the lean enterprise, *Havard Business Review*, 93-103.