

**JUST-IN-TIME ADOPTION AND OPERATIONAL PERFORMANCE OF
CEMENT COMPANIES IN KENYA**

BY

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REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF
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DECLARATION

I hereby declare that this project is my original work and has not been presented to any other university for examination purposes.

Signed-----

Date-----

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D61/83835/2016

This research project has been submitted for examination with my approval as a university of Nairobi supervisor.

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DEDICATION

I dedicate this work to my family for the continuous support that they have given me throughout the entire process. It is my prayer that this work will motivate my children to work hard in school.

ACKNOWLEDGEMENTS

I thank the Almighty God for good health and for bringing me this far; His grace has been sufficient. I would also like to acknowledge the sacrifice and prayer of my family. My wife, Catherine and my daughter, Michelle for their understanding, patience and encouragement when it was most needed.

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ABSTRACT

This study aimed at establishing effects of Just-In-Time (JIT) adoption on operational performance of cement companies in Kenya. Specifically, this study aimed at establishing how much Just-In-Time (JIT) is applied in cement firms in Kenya, to determine the factors that enhances JIT adoption in cement firms in Kenya and to establish the relationship between JIT adoption and operational performance of cement firms in Kenya. This study was founded on Henri Fayol Principle of Operation Management, and Theory of Constraints (TOC). The research design adopted in this study is the descriptive research design, the study targeted operations managers, quality control managers and procurement managers of these companies. Therefore, the study population consisted 18 managers in the major cement companies in Kenya. Purposive sampling method was used to select the 18 operations managers, quality control managers and procurement managers. The study collected both primary and secondary data. The study used a questionnaire for primary data collection purposes. The study generated both qualitative and quantitative data. Quantitative data collected through the questionnaires were checked for completeness and accuracy and usability. Descriptive statistics was used to quantitatively describe the imperative structures of the variables using SD, frequency and the mean. The researcher employed a multivariate regression model to study the relationship between employee training, information communication technology, top management support and level of payroll and operational performance of major cement companies in Kenya. In the first objective, the study established that JIT in cement manufacturing companies has been implemented to a great extent. The second objective established among the factors that enhanced JIT implementation includes; top management support, Information Communication and Technology (ICT), training and level of payroll. JIT lead to reduction in waste, lead time, stock out, cost of production and production time. Further, the study established that there was a positive direct relationship between JIT adoption and operational performance of cement firms in Kenya. This study concludes that JIT inventory management technique presented high operational advantages to cement manufacturing firms in Kenya. Employee training, ICT utilization and top management commitment are paramount in ensuring successful implementation of JIT inventory management technique. Cement manufacturing companies should uphold continuous implementation of JIT inventory management technique. Cement should firms should continually ensure continuous employee training and development. However, quality and consistency measures must be embraced to ensure that skills acquired are relevant and can bring about the anticipated changes toward efficient implementation. JIT inventory management cement manufacturing companies should lay adequate IT infrastructure. For JIT implementation to take place in an effective manner, top management of cement manufacturing companies should remain fully commitment. The top management ought to closely monitor the process in order to incorporate the necessary changes in timely manner.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In today's dynamic, rapidly changing workplace and globalized economy, operational performance is associated with the growth of personal performance, skills, knowledge and experience (Covey, 2014). Organizations have tried several approaches to improve operational performance; Just-In-Time (JIT) has been one of them. JIT has been hailed to help organization to improve their operational performances while reducing wastes. In the United States of America, JIT has been both praised and criticized for its effectiveness in improving production efficiency and relatively conservative adoption rate (Bowman, 2011).

Kinney and Wempe (2017) indicated that JIT emerged as a means of obtaining the highest levels of usage out of limited resources available in India. Furthermore, Fullerton and McWatters (2011), notes that JIT helps organizations in United Kingdom to realize several benefits that includes; Similarly, in China JIT is hailed by researchers (Chen & Tan, 2013; Lee & Paek, 2015) as a tool that assists organizations to reducing inventory level because the average level of inventory is a function of quantity produced in a batch. The adoption of JIT by the United of States firms is low, growing awareness of its alleged benefits notwithstanding (Goyal & Deshmukh, 2012). Resistance to change has been blamed as the main culprit for the slow uptake. However, other factors blamed for the slow uptake includes, low JIT understanding methods, workforce and workplace environment that is incompatible and suppliers who are not supportive (Snell & Dean, 2012).

Procurement procedure has traditionally included moderate manual methods and considerably slower efficient procedures for taking care of procurement exchanges (Hawking, 2004). E-procurement has had an inexorably essential part in business to business (B2B) acquirement.

Most firms have made it key to ensure that their procurement functions are getting better over the last ten years. This is because the function has proven to be a strategic unit for many organizations because huge costs can be cut down through prudent procurement

hence increase in profitability, (Pearcy & Giunipero, 2010). Since a number of costs can be cut down through procurement procedures, the association of low costs with procurement has induces the many institutions to embrace procurement technology.

Actualizing Web-based acquisition frameworks exclusively could make operational procedures of purchaser association more powerful yet in addition could influence request satisfaction to procedure of provider association more proficient and enhance accomplice relationship administration. The fundamental target of request fulfillment process that buyer expected is supplier can pass on qualified things to fulfill its solicitations at culminate time and right place (Lin and Shaw, 2014). Demand fulfillment execution can be improved if supplier can see ask for, with objective that demand plans are more direct to supplier. With objective for supplier to overhaul mastermind fulfillment execution, buyer and supplier need to share information. For example, Toyota shares its stock and deals data to its providers. Approaching such data enables Toyota's providers to design and deal with their tasks better and Toyota can facilitate the stock requests successfully; subsequently, execution of in the nick of time (JIT) conveyance procedure can be accomplished (Chopra and Meindl, 2011). Electronic acquirement empowers data to be shared among exchanging accomplices, for example, deals gauges, creation plans, stock levels, and item details.

1.1.1 Cement Industry in Kenya

Cement industry in Kenya between 2000-2015 highlighted that, Kenya cement industry has six cement manufacturers, the largest of which are Bamburi Cement, a subsidiary of the Lafarge Group, with an annual installed capacity of 2.1 million metric tonnes annually contributing 22.3% of total production. Bamburi Cement has plants in Nairobi and in Mombasa. National Cement, a subsidiary of Devki Group, is second one with a capacity of 2 million metric tonnes per year contributing up to 21.2% of total production. At number three with contributing 13.8% to total production of cement in the country is the East Africa Portland Cement Company with 1.3 million tonnes per year. Muiru (2016) indicated that Mombasa Cement and Savannah Cement, each produces 1.5 million tonnes annually and thus contributes 15.95% of total production. Finally, Muiru (2016) highlights that ARM Cement, formerly Athi River Mining, has an installed capacity of 1million tonnes, 10.6% of total cement production in Kenya.

The history of the cement industry in Kenya dates back to 1930s when in 1933, East Africa Portland Cement (EAPC) started importing cement. The plant initial production was 60,000 tonnes per annum. By 2015, the capacity had grown by approximately 1066.67% to producing 700,000 tonnes per annum (East African Portland Cement - EAPC, 2015). Athi River Mining has a market capitalization of 8.7 billion (Athi River Mining Limited, 2015). Currently Kenya's cement factories are owned by six manufacturing firms located in Mombasa, Nairobi's Athi River branch and in Lukenya in Machakos County (Dyer & Blair Investment Bank, 2012).

However, Olingo (2018) highlighted that in the recent past, cement manufacturing companies have been facing a bleak future owing to stiff competition from cheap imports, high power costs and low demand in the housing and construction sector. For instance, Athi River mining reported a decline in net profits by \$39 million to \$19.9 million in 2017. The company made a loss of \$28 million in 2016 and \$28.9 million in 2015. Due to these challenges, the firm has been suspended from trading in the Nairobi Bourse in 2018. Other companies like East African Portland Cement Company have also faced challenges as well reporting huge losses that are associated debt financing, overproduction (Kisero, 2018). It is important to note that for the companies that are operating on the red they blame the elections in 2017 highlighting their level of production in 2017 was met by antagonizing election which made the companies' sales to drop and thus make losses (Mutegi, 2018). This together with the challenge of cheap imports destabilizing their market points towards lack of planning to anticipate these kinds of challenges. A Proper inventory management ought to have anticipated drop in sales in an electioneering period and therefore adjust production accordingly. Similarly, cheap import can mean that the company procurement process is expensive or they procure for material long before they are required and that raises holding cost. This therefore leads to losses and therefore the need to implement Just-In-Time to ensure reduced cost in holding as well as ensuring that production level matches the market needs.

1.1.2 Procurement Technology

Procurement technology has varying definitions, but its general one is that it's the application of technology in the undertaking of, majorly purchasing of goods and services, (Wu et al., 2010). This system is IT based which comes at the completion of the supply transaction. Therefore, procurement technology is a form of trading that utilizes

the Internet platform such ERP and electronic data interchange. The advantages brought by this system have earned it popularity as it is associated with a reduction in transaction turn-around time and cost cutting (Bof & Previtali, 2010).

Parida and Parida (2015) characterize it as an innovation arrangement that encourages corporate purchasing utilizing Internet. Basically an Internet/Intranet based obtaining application or facilitated benefit that streamlines purchasing, exchanging accomplices, amplifies exchange productivity over the whole inventory network, and gives vital web based business abilities in Internet time; Process which bolsters acquirement and sourcing exercises by means of Internet advances and empowers a proficient arrangement amongst purchasers and providers (Gimenez and Lourenço 2014); Electronic securing of merchandise and ventures in a firm; The mechanization of acquisition forms with goal that sourcing, seller choice, obtainment forms, shipment status following and installments can be made in an online domain (Bhaskar, 2015).

Driven by expanding pattern toward obtaining inputs and other rough materials from outside affiliation, completing securing development has transformed into a basic technique in numerous associations' e-business frameworks. Today measure obtaining capacities are rapidly transforming into a cost of cooperating. A regularly expanding number of associations know about prerequisites to display Internet-based headways in their demand technique, in view of points of interest of saving trade cost, growing forceful sourcing openings, and enhancing between various leveled coordination.

It was Kenya's 1st capital city and now a county. It has eight (8) constituencies and machakos town is the main. Dr. Alfred Mutua is the leader of the county and has 40 wards within the constituencies. The county governments have eleven offices which are agriculture, trade, water, ICT, culture and tourism, housing and public works, industrialization and economic planning, social welfare, education and youth, revenue allocation and county treasury. (Machakos County Government, 2013).

Locally Kingori (2013) researched on effect of e-procurement on supply chain performance at Teachers Service Commission. The researcher established that, e-procurement helps in improving auditing process and also enables staff and inspectors to check and track development of requests through framework as well as that e-procurement can be used any time of the day. Using the KRA e-platform application

background, Abala (2014) sought to establish factors impacting the usage of in KRAs activities. The study established that it was a difficult task creating acceptance of this concept among the staff, senior management staff and stakeholders because they developed lack of confidence in it, feared making errors with it and there was general inadequacy of pioneers who would take the lead in implementing it. From the above studies, it is evident that while an attempt has been made to look at effect of technology in procurement such as e-procurement on various facets of the organization including performance, little attention has been paid on the effects that procurement technology has on operational performance.

Effect of online innovation has included esteem/speed to every one of the exercises and business avenues in present dynamic worldwide rivalry. The capacity to give clients practical aggregate arrangement and life cycle costs for feasible esteem has turned out to be indispensable. Business associations are currently under colossal strain to enhance their responsiveness and proficiency as far as item advancement, tasks and asset usage with straightforwardness. With the developing use of web and (ICT) the organizations are compelled to move their tasks from conventional path to a virtual e-acquisition and production network reasoning to exchange the organization's action to computerized one (Carabello, 2016).

1.1.3 Operational Performance

The sum total of an entity's routine processes and activities, and the undertaking of these activities can range from financial to being non-financial. Kalpan and Norton, (2009) came up with a performance measure framework which gives organizations, a balanced view of performance; under four perspectives; financial, customer, growth, and internal processes. By shifting towards innovation in technology and application of electronic procurement, benefits in an entities performance alongside making the organization more competitive and profitable (Koh, et al, 2006). Going by Ogot et al, (2009), it is essential to have a strong procurement system that is automated, interlinked and seamless in operation, as this will realize increase in aggressiveness and cut on costs for the enterprise. Additionally, the ease of following up services and goods, their bids and ensure sufficient information is acquire for better pricing procedures. E-procurement is also advantageous because it reduces product development turn-around time and this is because it tremendously improves information sharing.

According to Weele (2016) how effective and efficient the procurement process is determining the performance of the purchasing process. An organization is inclined to assess its performance based on its set goals, the areas it needs to improve on before it decides to put in processes that improve its performance. Relying on a set of indicators of five impact dimensions, Gardenal (2013) identified an e-procurement evaluation framework for an organizations' performance. This dimensions that e-procurement realizes the most benefits to the organization including transparency, dematerialization, efficiency, competitiveness and effectiveness.

The operational performance is the degree at which the different departments of the organization achieve their goals and objective. Operational performance in procurement has received a lot of attention due to increasing competition in the world of business. To measure operational performance, organization should establish a system measurement performance. This is done due to increasing diversity in organization variety in production of goods and service and for organization to gain competitive advantage in market (Gunasekaran, 2014). The SCOR model is the mostly used in assessing the operational performance in procurement performance (Gunasekaran & Kobu, 2010). The SCOR model groups the procurement process in to sages; plan, source, make, deliver and return.

1.2 Research Statement

A good JIT procurement system ensures that all the equipment and services required by the customers are always available for them and hence a superior service and products from the organization (Bowell, 1987). Poor management of inventory leads to high operational cost; when the inventory is high there is a high handling cost associated with it and when the inventory is insufficient, the organization has to commit other resources to ensure it is stocked or it may lose business thereby hurting operational performance. Further, lack of proper inventory systems will lead to low operational performance hence making the organization to be inefficient in serving its customers and also it gives bad image to its customers (Mukovi & Iravo, 2015).

Major cement companies in Kenya would not be spared either. For instance, failure to plan for delivery of raw materials such as limestone would cost these companies time and huge amounts of money in idle capacity of both machines and human resource (Kisero,

2018). Similarly, if they fail to anticipate orders from their customers, it would lead to low customer delight and hence loss of business, which translates to low profits and hence low operational performance (Mutegi, 2018). This study seeks to establish the influence of JIT adoption on operational performance of these firms.

Technology has become an integral practice of life for many enterprises in the world today as many of them practice at least one form of it, such as e-sourcing. The significance of it is to ensure efficiency in operations by replacing or improving trading activities with e-business (Essig, et al. 2014). Review by Chan and Lu (2014) discovered associations which received procurement innovation techniques have diminished expenses through value-based and process efficiencies and consequently advancing their acquisition execution. In any case, in Singapore, past survey by Lai and Li (2015) depict internet utilization is high by world organizations on role of procurement innovation adoption strategy, while in Kenya, past research by Kim et al, (2014) 33% of corporations have adopted the strategy and utilize it.

Locally Kingori (2013) researched on effect of e-procurement on supply chain performance at Teachers Service Commission. The researcher established that, e-procurement helps in improving auditing process and also enables staff and inspectors to check and track development of requests through framework as well as that e-procurement can be used any time of the day. Using the KRA e-platform application background, Abala (2014) sought to establish factors impacting the usage of in KRAs activities. The study established that it was a difficult task creating acceptance of this concept among the staff, senior management staff and stakeholders because they developed lack of confidence in it, feared making errors with it and there was general inadequacy of pioneers who would take the lead in implementing it. From the above studies, it is evident that while an attempt has been made to look at effect of technology in procurement such as e-procurement on various facets of the organization including performance, little attention has been paid on the effects that procurement technology has on operational performance. This study therefore sought to fill this research gap by answering the following research question, what are the effects of JIT adoption on operational performance of major cement companies in Kenya?

1.3 Objectives of the Study

This study sought to establish the effect of just-in-time (JIT) on operational performance of major cement companies in Kenya

1.3.1 Specific Objectives

The specific objectives were: -

- i). To establish the extent to which just-in-time (JIT) is applied in cement firms in Kenya.
- ii). To determine the factors that enhances JIT adoption in cement firms in Kenya.
- iii). To establish the relationship between JIT adoption and operational performance of cement firms in Kenya.

1.4 Value of the Study

This study will be important to the management of the cement manufacturing companies. This is because; the research findings will highlight the benefits of proper procurement procedures that ensure that the firm remains operational at all times. Furthermore, the findings also will highlight on the challenges and therefore make recommendations to counter the challenges and hence assist the organizations in meeting and surpassing operational performance expectations.

To other stakeholders and policy makers, the research findings will be important to them and it will assist them to make procurement policies that are aimed at ensuring efficient procurement procedures. Efficient procurement procedures will ensure that goods and services are procured in time and therefore operational performance in such firms is enhanced.

Similarly, to other manufacturing firms, procurements of goods and services are the backbone of all operations. It will be important to such firms in that it will assist them to align their procurement procedures to the ones recommended here and therefore realize enhanced operational performance.

The study and its outcomes will add to knowledge in the field of procurement, Just in Time (JIT), and operational performance of organization. This study therefore will form an important reference material in the aforementioned field. Lastly, the study will also identify gaps in knowledge that future researcher will seek to fill.

By understanding impact of procurement technology practices and operational performance, the study results will enable policy makers, Government, Regulatory bodies and other users to model policies and programs that significantly enhance sustainability and growth of counties while at the same time support, encourage, and promote the establishment of appropriate policies to guide the various institutions and counties in their procurement programs. The outcome of this research and recommendations there-upon will assist stakeholders to fully understand how they can effectively manage their procurement function as a source of competitiveness.

The managers will benefit with source of material in developing and harnessing their procurement function as a source of competitiveness in the present day evolving and dynamic business environment. The research provides background information to other researchers and scholars who may want to carry out further research in this area and will add value in understanding the nexus between technology–organization–environment and the institutional theories. Further, the study is expected to better inform other researchers on the effects of procurement technology on operations of counties.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter discusses the literature that has been established about influence of just-in-time (JIT) adoption on operational performance. The chapter as well looks at the theoretical framework used as a basis for linking the just-in-time (JIT) adoption and its effects on the operational performance. The chapter is thus structured into theoretical, conceptual and empirical review.

2.2 Theoretical Review

This section presents the theoretical review. It indicates the theories that will underpin the study. This study will therefore be founded on Henri Fayol Principle of Operation Management, and Theory of Constraints (TOC)

2.2.1 Henri Fayol Principle of Operation Management

This principle if implemented by operational managers, a phenomenon of success will be witnessed. Organizations can improve their operations performance if they can use their existing resources to sustain competitive advantage by employing Fayol's principle to exploit opportunities in the market or neutralizing threats from competitors' strategic resources. The theory is therefore imperative in understanding how effective management of the organization can lead to higher operational performance. In that regard, in an organization, JIT system would help to manage the inventory by forecasting future need to ensure that the cement firms just procure what is adequate to meet the foreseen production demands. This helps to cut the holding cost. The system further helps to plan, organize command, coordinate and control the use the inventory in the cement company thereby ensuring that there are no instances of stock out or overproduction.

2.2.2 Scientific Management Theory

In relation to the study, JIT implementation in cement manufacturing firms can be seen as way to ensure reduction of waste in organization which will eventually lead to improvement in organizational performance. It helps in maintaining manufacturing activities uninterrupted, which leads to better utilization of men and machines besides

economy JIT implementation reduces non-value adding activities like getting more raw materials from the warehouse than what is actually needed for production. Further, it reduces other wastes like holding cost that would be incurred when the firm procures more than it needs for immediate production needs. This leads to operational efficiency and therefore enhanced overall firm performance.

2.2.3 Theory of Constraints

It is an instinctive framework used in identifying the most important limiting factor that stands in the way of achieving a set objective and then systematically improving that constraint until it is no longer the limiting (Goldratt, 2014). Umble and Spoede (2011) argue that if any other factor other than the weakest link is strengthened, the strength of the whole chain is not increased. Improvements in the processes should focus on the weakest areas in the organization. The main constraints include the policies or the procedures put in place. Lack of clear goals to be followed often leads to conflicts among the different functions on the organization slowing improvement (Weston, 2017).

In the context of this study, theory of constraints is relevant in that, it helps to assess the constraints that lead to organisational underperformance that can be ironed out by the implementation of JIT. From its numerous benefits, adoption of JIT would help to enhance operational performance through reduction of operational cost emanating from holding cost, spoilage and spillage. Through the constraints, the cement manufacturing company should see an opportunity that will assist in reduction of these costs. When the limitation/constraint is removed, to enhance the output, new systems like JIT can be put in place to increase the output since it helps to further eliminate of constraints.

This theory is relevant to this study in cement manufacturing firms as it highlights the different and interdependent nature of the processes of the organization as an interconnection of different departments, processes and functions where the materials are transformed into the final product. TOC enumerates the processes used in operations into a simple structure of throughput, inventory, and operating expenses (Fawcett & Pearson, 2011). TOC relates to lean thinking in that both emphasize on operational performance with the aim of attaining high results and returns.

2.3 Adoption of Just-In-Time (JIT)

The origin of JIT is universally linked to the Toyota Motor Company where it was identified as a way of optimizing the processes and procedures by ensuring that only the products that are needed are produced. This eliminates work in progress and ensures that all wastes are reduced to a bare minimum (Krajewski & Ritzman, 2015).

Service companies must ensure clear-cut communication is maintained with the customers. Organizations need to simplify their procedures in order that their customers and employees understand the requirements. The processing time for order is reduced. JIT system can be effective in operations management by providing effective maintenance programs, reducing lead time and minimizing employee turnover through consensus management.

2.4 Factors that Enhance JIT Adoption

2.4.1 Information Communication Technology

Moreover, an ERP framework can be utilized as an apparatus to help enhance execution level of a production network organize by diminishing process durations (Garcia-Dastugue and Lambert, 2013). Be that as it may, it has customarily been connected in capital-concentrated ventures, for example, producing, development, aviation and protection. As of late, ERP frameworks have been extended past assembling and acquainted with the fund, medicinal services, inn networks, and instruction, protection, retail and broadcast communications areas.

ERP is presently thought to be cost of entry for sustaining a business, and at any rate at show, for being related with various ventures in a framework economy to make "business to business" electronic exchange (Bouwman, 2015). Moreover, various multinationals limit their business to only those from multinational firm. ERP is for gigantic firms and more diminutive firms need to change their arrangement of activity and approach as showed by the practices and programming got by enormous firms. With opening up of the economy, little to medium estimated endeavors (SMEs) have found the going to a great degree troublesome. Since they don't have quality related with broad associations, SMEs need to tap its vitality and an organized information structure to remain focused and client situated.

ERP is frequently seen as answer for their survival (Rao, 2010). Thusly, ERP programming market has ended up being one of the present greatest IT hypotheses around the globe. ERP has facilitated the troublesome movement of supporting unfaltering systems that a great part of the time result in cost manufactures, data overabundance and slip-up, or all the more all, unique inefficient viewpoints (Osmonbekov et al, 2012). In a perfect world, ERP is a PC framework that keeps supervisors educated about what is going on continuously all through an organization and its worldwide associations.

In present aggressive business condition, organizations endeavor to meet expanded rivalry by extending all around and living up to clients' developing desires. Organizations mean to accomplish higher benefit by creating more yield with bring down aggregate cost in the whole business chain. In this specific circumstance, (ERP) turns into a vital apparatus for the organization to fabricate solid abilities, enhance execution, embrace better basic leadership and accomplish upper hand (Agarwal & Prasad, 2014).

2.4.2 Top Management Support

In a customary forward (or English) sell off, an item is offered to intrigued purchasers who offer contending, upward costs until the point that a last deal cost is come to. In principle there is no upper value confine as purchasers will pay whatever they think about a fitting cost. Officially across the board in the web world since the 1990s through destinations, for example, eBay, such sales are additionally utilized as a part of B2B markets for liquidation of overabundance stock or undesirable resources. In the online invert sell off (ORA), the procedure adequately works from the other way, where the offer is made by a purchaser who welcomes providers to delicate for a deal or contract utilizing particular parameters. Such occasions occur on the web, continuously, where providers (the bidders) can take an interest remotely through a protected web interface.

In most likely the main distributed scholastic investigation, Emiliani (2000) set up that turn around barterers contribute benefits through time pressure and process change, by diminishing process duration for undertaking aggressive offers with providers: the customary procedure can be lessened from months to weeks. This article additionally recommended there were advantages to purchasers through distinguishing market cost, giving minimal effort access to providers and in picking up investment funds in advance. Other essential favorable circumstances of closeouts have been distinguished, for

example, making genuine rivalry between providers prompting lower costs, and the procedure being anything but difficult to imitate once settled. So also, providers can be incorporated from worldwide sources at no additional cost (Hartley *et al*, 2014).

Suppliers can gain from auction reverse mechanism as per literature. ORAs give perceivability of contenders' costs not generally accessible in customary delicate strategies, access can be picked up to new clients and may diminish cost of offers (Caniels and van Raaij, 2009). Providers may pick up advantage from streamlined the 'level playing field' of the ORA, where all providers are dealt with similarly. Alternately there have been a few hindrances referred to for providers, for example, real value diminishments and the powerlessness to underscore factors which can separate items, prompting potential commoditization (Jap, 2013). Existing or occupant providers are typically the most opposing to ORAs.

The issue of connections amongst purchasers and providers has been inspected in various investigations of ORAs and here again confirmation is blended. Specifically, Giampietro and Emiliani (2015) have given confirmation where providers supposedly were dealt with unreasonably, which harmed notoriety of purchaser. In another investigation providers communicated worry that purchasers may embed ghost offers from non-existent providers, or that a few merchants could be welcomed essentially to drive down costs, when the purchaser had no goal of utilizing them (Jap, 2012). Griffiths (2013) traces how sell-offs can make ruin with provider trust through variables, for example, welcoming unacceptable providers to the occasion, utilizing 'sham' providers or not giving full data to all members. Such feelings of dread reflect bona fide moral situations looked in ORAs, where the purchaser could be blamed for dishonest conduct. In any case it ought to be perceived that it isn't simply the sale system which is untrustworthy, as recommended by Giampietro and Emiliani (2015). Truth be told Griffiths (2013) proposes that rebuking a sale occasion for a harming result resembles reprimanding a vehicle for a street mishap, as opposed to the driver. Curiously, Carter et al (2014) found that a few providers kept on speculating exploitative conduct by purchasers.

2.4.3 Employee Training

Training can have considerable influence in the right position which means, human resource practitioners need to review their reliability of their selection programmes for every level of the organization (Forrester, 2015). E-Collaboration is a partnership

between two or more individuals or organization using electronic technologies to achieve a common goal or objective (Kock & D'Arcy, 2012). The e-collaboration concept has captured basic element which involve: e-collaboration technology, the collaboration task, the individual involved in the collaboration task, the expertise of individual and social environment (Kock & Nosek, 2015). The e-collaboration system in an organization involves the use of computer software which are created to assist the users to undertake technical operations effectively and efficiently. E-Collaboration assist in collection and updating of information of the buying organization in terms of tenders, requests for bids and bonds, auctions provided to the supplier through the company's intranet or extranet. It also involves the use of e-collaboration tools such as virtual meetings, shared management systems among others (Dyer, 2011). E-Collaboration system allow for electronic meetings enabling managers and suppliers to make critical decision on procurement issues while in different place all over the world. The electronic meetings can take different types: Video teleconferencing; this is close to face to face whereby the buyer and supplier can negotiate using live camera feed: Real-time conferencing; it allows buyers and suppliers to interact at their workstation via a centralized portal. The e-collaboration system also provides a groupware where a member of a group working together on a task can communicate, coordinate and collaborate in their decision-making process. Groupware allows sharing of information through groupware tools such as e-mails, video conferencing, chat applications and database sharing. The team working together to accomplish task and make crucial decision need e-collaboration technologies which has the following capabilities: which can give audio, video and computer conferencing services, be able to allow access to database, members to use online chat, allow members to brainstorming among others capabilities.

A virtual organization can be able to undertake their operations from different regions thus no need to emphasis on having a centralized office. It can serve their partners effectively through use of e-collaboration system. The advantages of e-collaboration in a virtual organization are: (Klein, & Singh 2014): each company involved can focus on their core mandate improving customer satisfaction; due to sharing skills among participating firms, the labour cost is reduced; due to specialization of participants organization, the response to customers quick; the time cycle of new product development is reduced.

2.4.4 Level of Payroll

It is the process of identifying new supplier to deliver goods or services in a specified category through electronic means. It is an internet based application which enables a collaborative technology in the full life-cycle of the procurement process between buyer and supplier. The e-sourcing is one of the best e-purchasing practices that organizations are employing to reduce costs (Kock & Nosek, 2015). Presently, e-sourcing applications offers two main functions which are; online request for quotations (RFQ), this whereby of identifying the needs, the buyer ask possible suppliers to send their quotation of the product or service which is then evaluated through the application. The second one is online auctions; this is whereby buyers are invited to bid for the contracts being offered. The lowest bidder is usually the one given the contract to supply needed goods or services.

The use of e-sourcing benefits in the following ways: Cost saving; sourcing enhances visibility on expenditures and economies of scale through bulk buying (Boer, Harink, J. & Heijboer, 2012). The organization can save money through the implementation of e-sourcing practices in the procurement department. Rink and Fox (2009) argued that supplier contact is part of the sourcing process thus it needs to be established. Reduce sourcing cycle time; e- sourcing tremendously reduces the time take from identifying the supplier, negotiation and contract signing. As survey by SAP found out that organization that has adopted use of e-sourcing applications their cycle time reduced between 30% and 75%. The e-sourcing creates a collaborative environment for buyers and suppliers by providing a centralized portal where they can share information effectively.

With today business environment which focus mostly on efficiency and customer satisfaction, e-sourcing has played a major role in business achieving its objective. The use of e-sourcing benefits in the following ways: Cost saving; sourcing enhances visibility on expenditures and economies of scale through bulk buying (Boer, Harink, & Heijboer, 2012). The organization can save money through the implementation of e-sourcing practices in the procurement department. Reduce sourcing cycle time; e-sourcing tremendously reduces the time take from identifying the supplier, negotiation and contract signing. As survey by SAP found out that organization that has adopted use of e-sourcing applications their cycle time reduced between 30% and 75%. The e-sourcing creates a collaborative environment for buyers and suppliers by providing a

centralized portal where they can share information effectively. Rink and Fox (2009) argued that supplier contact is part of the sourcing process thus it needs to be established.

2.5 Just in Time Adoption and Operational Performance

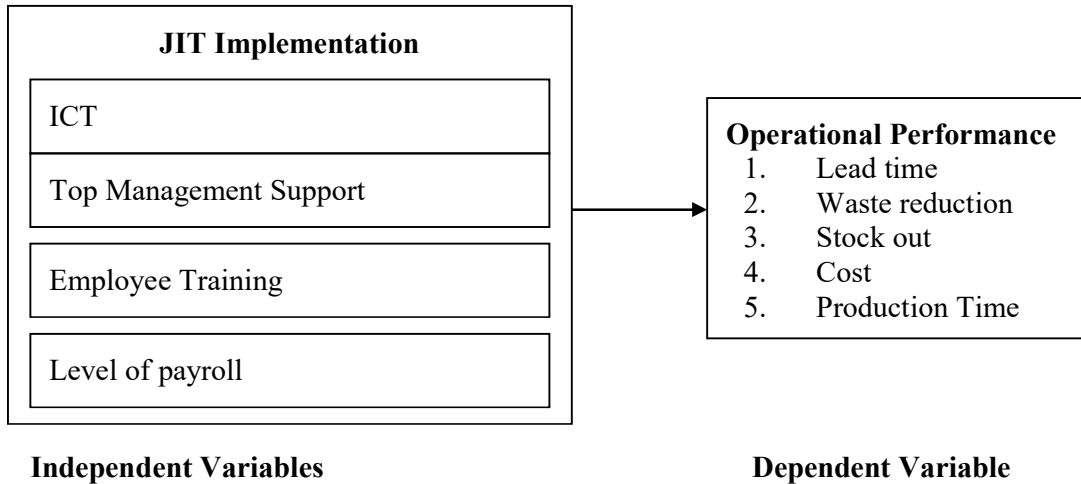
According to weele (2016) how effective and efficient the procurement process is determining the performance of the purchasing process. An organization is inclined to assess its performance based on its set goals, the areas it needs to improve on before it decides to put in processes that improves its performance. Relying on a set of indicators of five impact dimensions, Gardenal (2013) identified an e-procurement evaluation framework for an organizations' performance. This dimensions that e-procurement realizes the most benefits to the organization including transparency, dematerialization, efficiency, competitiveness and effectiveness.

The operational performance is the degree at which the different departments of the organization achieve their goals and objective. Operational performance in procurement has received a lot of attention due to increasing competition in the world of business. To measure operational performance, organization should establish a system measurement performance. This is done due to increasing diversity in organization variety in production of goods and service and for organization to gain competitive advantage in market (Gunasekaran, 2014). The SCOR model is the mostly used in assessing the operational performance in procurement performance (Gunasekaran & Kobu, 2010). The SCOR model groups the procurement process in to sages; plan, source, make, deliver and return.

2.6 Conceptual Framework

It explains relation between study variables and diagram utilization. It is a speculated demonstrate recognizing ideas under examination and their relation (Mugenda and Mugenda, 2009). The Occurrence or change of free factors will bring about change in reliant variable.

Figure 2.1: Conceptual Framework



CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Part shows methodology that will conduct study. Included here is design research, target populace, sample size, sampling procedure and techniques. Data collection, processing, procedures, analysis and presentation are also here.

3.2 Research Design

Descriptive research design shall be utilized. Descriptive research is a logical technique for examination which includes accumulation and dissecting of both quantitative and subjective information. Mugenda and Mugenda, (2009) express that unmistakable plan is a technique, which empowers analyst to outline and arrange information in a powerful and important way. As indicated by Cooper and Schindler (2008), an enlightening report is worried about discovering the what, where and how of a marvel. This examination subsequently will have the capacity to sum up the discoveries to every one of the areas in the country.

Review main focus shall be quantitative. However different approach shall be utilized to better understanding and give detailed results interpretation from quantitative review. The underlining thought is to pick a couple of concentrated on circumstances where a heightened examination perceives possible choices for comprehending investigation request in view of current course of action associated in the picked relevant investigation. Subject is defined by analyst regularly by coming up with profile that harbors problem (Cooper and Schindler, 2008). This study sought to establish the relationship between just-in-time (JIT) adoption and operational performance of major cement companies in Kenya.

3.3 Population of the Study

Wambugu and Nyonje (2015) characterize populace as the whole gathering of individuals, occasions or things of premium that scientist wishes to explore and is truncated as N. Cohen, Manion, and Morrison (2007) characterize an objective populace

as a particular extent of whole populace that can be limited to accomplish inquire about destinations. Therefore, the population of the study comprised of 18 managers in the major cement companies in Kenya.

Table 3. 1: List of Major Cement Companies in Kenya

Name of the Company	Management
Bamburi Cement Company	3
East African Portland Cement Company	3
ARM Africa Limited Company	3
National Cement	3
Mombasa Cement	3
Savannah Cement	3
Total	18

3.4 Sample

Sampling plan shows reviews sampling frame, unit, procedures and size. The examining shows all populace units from sample chosen (Cooper & Schindker, 2008). Census sampling was utilized. The objective of stratified irregular examining was to accomplish the coveted portrayal from different sub-bunches in the populace.

3.5 Data Collection Procedure

As per Ngechu (2014) gathering information is done utilizing many methods. Apparatus decision relies on goals, design, review topic and information. Donald (2016) notes primary and secondary data are the major data sources utilized by respondents. Primary shall be utilized here. As per Mugenda and Mugenda (2008), primary data is information analyst gathers from the first source and is viewed as more dependable and a la mode.

Questionnaires will be utilized for data collection hence it is faster (Mugenda and Mugenda, 2008). Questionnaire give scientist exhaustive information on an extensive variety of elements. In designing questionnaire, unstructured and structured questions shall be considered. As per Field (2015), structured inquiries are generally joined by a rundown of every conceivable option from which respondents select appropriate response that best depicts their position. Inquiries will be built to address particular targets and give an assortment of conceivable reactions.

Unstructured inquiries give responders opportunity of reaction which causes analyst to check sentiments of responders. These sorts of inquiries uncover respondents' states of mind and perspectives extremely well (Field, 2015). A 5 point Likert scale was utilized where 1 shows to firmly deviate, 2-Disagree, 3-Neutral, 4-Agree and 5-Strongly concur. The Likert - type arrangement will be chosen as organization yields rise to - interim information, a reality that takes into consideration the utilization of all the more intense measurable to be utilized to test theories (Kiess & Bloomquist, 2008).

3.6 Data Analysis and Presentation

The first objective was analyzed through descriptive statistics. The analysis of the second objective was done through factor analysis while the third objective was analyzed through multiple linear regression analysis. The researcher thus employed a multivariate regression model to study the relationship between employee training, information communication technology and top management support on one hand and operational performance of major cement companies in Kenya on the other. The regression model was as follows:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$$

Where:

Y = Operational Performance of cement firms in Kenya; X₁ = employee training; X₂ = Information Communication Technology; X₃= top management support X₄ =level of payroll and; β_0 = Constant; β_1 , β_2 , β_3 and β_4 = coefficients and; ε = error.

CHAPTER FOUR

DATA ANALYSIS, INTERPRETATIONS AND PRESENTATION

4.1 Introduction

The chapter presents an interpretation of outcomes of this research. The objectives of the research were to establish how much just-in-time (JIT) is applied in cement firms in Kenya; determine the factors that enhance JIT adoption in cement firms in Kenya and lastly to establish the relationship between JIT adoption and operational performance of cement firms in Kenya. The outcomes of the research inferential and Descriptive statistics.

4.1.1 Response Rate

The research had a target of 18 respondents as its size if the sample whereby 17 filled up the questionnaires and returned them and hence a 94.4% rate of response.

Table 4.1: Response Rate

	Questionnaires Administered	Questionnaires filled & Returned	Percentage
Respondents	18	17	94.4

4.2 Background Information

The study started by investigating on the background information. Data sought under this section relates on duration in years which the respondents had worked with the company. Moreover, also sought includes the respondent's work department, highest educational qualifications and finally the company particulars.

4.2.2 Respondents' Work Experience

Table 4.2 presents statistical findings on period which the participants had worked with current cement manufacturing firm. This was sought in view of establishing respondent's exposure and knowledge on just-in-time (JIT) in relation to companies' operational performance.

Table 4.2: Period of Service

	Frequency	Percentage	Cum. Frequency
3 years and less	1	5.9	1
4 – 6 years	8	47.1	9
7 – 10 years	2	11.8	11
10 years and above	6	35.3	17
Total	17	100.0	

Results presented in Table 4.2 shows the period of service for the respondents in the cement manufacturing companies. Drawing from these findings, it's evident that, most of the survey participants had worked with firms for a notable duration of time which signifies that based on their experience they were in a position to give valuable opinions on the effect of just-in-time (JIT) on companies' operational performance.

5.2.3 Highest Level of Education

In view of establishing the participants' ability to address study questions as well on their knowledge on subject under investigation, participants were required to indicate their highest academic levels.

Table 4.3: Highest level of Education

	Frequency	Percentage	Cum. Frequency
College level	3	17.6	3
University level	8	47.1	11
Post graduate level	6	35.3	17
Total	17	100.0	

82.4% of the respondents had at least university degree. In that regard they academically qualified to hold the positions they held.

5.2.4 Respondents Work Department

Further, survey participants were required to indicate their work department. This was sought in view of ensuring that respondents were well draw from organizational key departments.

Table 4.4: Work Department

	Frequency	Percentage	Cum. Frequency
Operations Department	6	35.3	6
Quality control Department	5	29.4	11
Procurement Department	6	35.3	17
Total	17	100.0	

Results presented in table 4.4 shows that the three departments targeted by the study were adequately represented. This implies that the study collected reliable data and collected views across the departments concerned. Operations Department, Quality control Department and Procurement Department are the key departments in the implementation of JIT.

4.2 Adoption of JIT in the Firm

The study aimed at determining how much the aspects below applied across the organizations

Table 4.5: Quality measures in Procurement and Logistics

	Extent	Frequency	Percentage
Waste Reduction	Least extent	1	5.9
	Great extent	16	94.1
	Total	17	100.0
Reduction In Lead Time	Great extent	17	100.0
	Total	17	100.0
Reduction In Stock Out	Least extent	4	23.5
	Great extent	13	76.5
	Total	17	100.0
Reduced Cost Of Production	Least extent	3	17.6
	Great extent	14	82.4
	Total	17	100.0
Reduced Production Time	Least extent	2	11.8
	Great extent	15	88.2
	Total	17	100.0

Based on the outcomes of the research a big number of respondents indicated adoption of JIT improved the above aspects to a great extent in cement manufacturing firms. Among these include reduction in lead time (100%), waste reduction, (94.1%), reduction in stock out (76.5%), and reduced cost of production (82.4%) and reduced production time (88.2%).

Respondents were required to rank the following aspects based on importance in adoption of JIT in the firm.

Table 4.6: Factors enhancing successful implementation of JIT

	N	Minimum	Maximum	Mean	Std. Deviation
Employees' trainings	17	1.00	3.00	2.12	0.86
Information communication technology	17	1.00	3.00	2.00	0.61
Top management support	17	1.00	3.00	1.88	0.93

Statistical evidence presented in Table 4.6 shows that top management support (Mean = 1.88), information communication technology (mean = 2.0) and employees' trainings (Mean 2.12) are important factors in JIT implementation. Other factors that are important in implementation of JIT mentioned by the respondents included employee commitment and support, availability of resources.

Respondent were required to indicate their level of agreement with the following benefits of adoption JIT in the firm.

Table 4.7: Benefits linked with JIT adoption in the firm

	N	Min	Max	Mean	Std. Deviation
Improve the competitiveness of the firm	17	3	5	4.47	0.62
Embraces everybody in the organization	17	4	5	4.59	0.51
Covers up quality problems	17	3	5	4.29	0.59
Reduces operational cost	17	4	5	4.47	0.51
Creates a culture of continuous improvement	17	4	5	4.47	0.51
Reduces waste	17	3	5	4.29	0.69
Reduces non-value adding process	17	4	5	4.47	0.51
Optimizes the processes in the firm	17	4	5	4.53	0.51
Provides effective maintenance programs	17	4	5	4.47	0.51
Minimized employee turnover	17	4	5	4.53	0.51

Results presented in Table 4.7 shows that adoption of JIT aided in embracing everybody in the organization (Mean = 4.59), adoption of JIT helps in minimization of employee turnover (Mean = 4.53) and JIT aids in optimizing the processes in the firm (Mean = 4.53). These results concur with the study findings by Kumar and Suresh (2015) that JIT implementation can strategically lead the organization to attain competencies. Further the study revealed that adoption of JIT creates a culture of continuous improvement (mean = 4.47), reduces non-value adding process (mean = 4.47), reduces operational cost (mean = 4.47) leads to improved competitiveness of the firm (mean = 4.47). Also the study indicates that implementation of JIT helped to cover up quality problems (mean = 4.29) and also reduce volume of waste produced (4.29).

4.2.1 Employee Training

The study sought to establish whether the firms conducted employees' trainings on JIT implementation. Results are presented in Table 4.8.

Table 4.8: Trainings on JIT implementation

Opinion	Frequency	Percentage
Yes	15	88.2
No	2	11.8
Total	17	100.0

The results show that the organization conducts employees' trainings on JIT implementation. This signifies that implementation of JIT is supported by the management in the cement manufacturing as they commit resources for the trainings.

Further, the study inquired on frequency at which organizations conducted trainings on JIT implementation.

Table 4.9: Rate at which organizations conducted trainings on JIT implementation

	Frequency	Percentage	Cum. Frequency
Weekly	1	5.9	1
Monthly	2	11.8	3
Quarterly	10	58.8	13
Semi annually	4	23.5	17
Total	17	100.0	

Participants were required to indicate the percentage of the expenditure budget dedicated to training.

Table 4.10: Percentage of the Expenditure Budget Dedicated to Training

	Frequency	Percentage
0 - 25%	6	35.3
25% - 50%	11	64.7
Total	17	100.0

Results presented in Table 4.10 indicate that the cement manufacturing companies in Kenya allocated between quite a huge proportion of the budget to training. This implies that most of the organizations allocated between 25% - 50% of their budget expenditure on employee training activities.

Respondents were required to indicate the number of career development activities conducted in the organization in the last one-year.

Table 4.11: Career development activities conducted in the organization

	Frequency	Percentage	Cum. Frequency
Less than 3	7	41.2	7
3 – 6	9	52.9	16
6 – 9	1	5.9	17
Total	17	100.0	

From the research findings, 52.9% of the respondents indicated the organization conducted between 3 to 6 career development activities in the last one year, 41.2% of the respondents indicated less than 3 whereas 5.9% of the respondent's indicated 6 to 9. This implies that most of the of cement manufacturing firms conducted between 3 to 6 career development activities in the last one year. Respondent's also reported that during the training, the management stressed on expectations that would ensure actualization projected of mission, vision and values other areas covered included need for employees to own their careers personal effectiveness, time management and basic skill development.

Participants were required to indicate the number times that they were involved in teamwork activities in the last one-year.

Table 4.12: Frequency at which firms held teamwork activities in a year

	Frequency	Percentage	Cum. Frequency
Less than 3	6	35.3	6
3 – 6	9	52.9	15
6 – 9	2	11.8	17
Total	17	100.0	

From the research findings, teamwork activities among the employees are held frequently in the firms manufacturing cements in Kenya. This implies that after training, most of the firms held between 3 to 6 teamwork activities in the last one a year. Respondents also reported that teamwork activities provided a framework that helped to increase employee’s ability and willingness to participate in organizational planning exercise. Teamwork activities were organized with a motive of promoting employee ownership of strategic decisions and promoting staff understanding on problem-solving and decision making with a view of enhancing organizational operational efficiency.

Participants were required to indicate whether the organization ensured continuous improvement in work after trainings and career development.

Table 4.13: Continuous improvement in work after trainings and career development

	Frequency	Percentage
Yes	16	94.1
No	1	5.9
Total	17	100.0

From the Table 4.13, the results imply that the organization ensures continuous improvement in work after trainings and career development. This implies that the most of the organization ensured continuous improvement in work after trainings and career development. Respondents also reported that employee training on JIT increased staffs knowledge and skills JIT tasks; it also helped to bridge the gap between job needs and employee skills, knowledge and behaviors and that employee training on JIT enabled employee to be more productive and more useful to the organization.

4.2.2 Information Communication Technology

Participants were required to clarify whether information communication technology enabled successful adoption of JIT technique.

Table 4.14: Information Communication Technology and Successful Adoption of JIT technique

	Frequency	Percentage
Yes	16	94.1
No	1	5.9
Total	17	100.0

From the research findings, it is evident that information communication technology enabled successful adoption of JIT technique. This implies that information communication technology enabled successful adoption. These findings are in line with the findings by Tarokh and Keshtgary (2013) who argue that ICT enhanced accountability through elimination of corruption and hence ensuring efficiency in production process.

Participants were required to indicate the percentage of the expenditure budget dedicated to ICT infrastructure.

Table 4.15: Percentage of budget dedicated to ICT infrastructure

	Frequency	Percentage	Cum. Frequency
0 - 25%	7	41.2	7
25% - 50%	6	35.3	13
51 – 75%	4	23.5	17
Total	17	100.0	

Results presented in Table 4.15 showed that majority of the firm spend more than 25% of their budget expenditure on ICT infrastructure. This ICT infrastructure in the cement manufacturing companies is an important aspect of the daily business in the cement manufacturing companies. Further, it can be depicted that owing to the budget allocation, the ICT infrastructure is very developed in the companies under study.

The research sought to determine the number of computer literate employees in the organization.

Table 4.16: Percentage of computer literate employees in the firm

	Frequency	Percentage	Cum. Frequency
0 - 25%	4	23.5	4
25% - 50%	3	17.6	7
51 – 75%	9	52.9	16
More than 75%	1	5.9	17
Total	17	100.0	

The results presented on the Table 4.16 above indicate that majority of the employees in the cement manufacturing are computer literate. This therefore highlights a good foundation for a successful JIT implementation since the employees are already vast with ICT related knowledge.

Participants were required to indicate the frequency at which ICT trainings were conducted in the organization.

Table 4.17: Rate at Which ICT Trainings Were Conducted

	Frequency	Percentage	Cum. Frequency
Monthly	3	17.6	3
Quarterly	10	58.8	13
Semi annually	3	17.6	16
Annually	1	5.9	17
Total	17	100.0	

Statistical findings presented in Table 4.17 shows that 58.8% of the respondent indicated that their firm conducted ICT trainings on quarterly basis, 17.6% of the respondent indicated that their firm conducted ICT trainings on either semiannually or monthly while 5.9 % of the respondent indicated that their firm conducted ICT trainings on annual. This implies that most of the firms conducted ICT trainings on either Quarterly basis or on semiannual basis.

The study sought to determine the number of the employees working in ICT department in every organization. Results are presented in Table 4.18.

Table 4.18: Number of the employees working in ICT Department

	Frequency	Percentage	Cum. Frequency
Less than 3	2	11.8	2
3 – 6	11	64.7	13
6 – 9	4	23.5	17
Total	17	100	

The results above show that in the cement manufacturing companies, there are a considerable high number of employees in the ICT department. Most organisations had more than three employees.

The study sought to establish whether organizations had adequate ICT equipment in place.

Table 4.19: ICT Resource Adequacy

	Frequency	Percentage
Not Adequate	10	58.8
Adequate	7	41.2
Total	17	100

Despite the high budgetary allocation in the ICT department, the employees still expressed that ICT resources in the firm were not adequate. In that regard, the management of the firm needs to commit more financial resources for the ICT resources to be enhanced.

The study sought to establish the frequency at which activities done through ICT in the organization.

Table 4.20: Extent to which activities in the organization were implemented using ICT

	Frequency	Percentage
Moderately	10	58.8
Always	7	41.2
Total	17	100

From the findings presented above show that organization moderately utilize ICT in their various activities. This implies that most of organization moderately utilized ICT in

implementation of various activities such as supplies order and processing, raw material acquisition, monitoring on the quality of organizational core activities and data archiving

4.2.3 Top Management Support

The study sought to determine whether top management support was paramount in ensuring successful adoption of JIT technique.

Table 4.21: Role of Top Management in JIT Implementation

	Frequency	Percentage
Yes	14	82.4
No	3	17.6
Total	17	100.0

The findings indicate that top management support enables successful adoption of JIT technique. It therefore implies that, for JIT to be successful, top management support is paramount.

The study sought to establish the extent to which respondent's agreed with the following Statements assessing on the role top management support in JIT implementation.

Table 4.22: Role Top Management Support in JIT Implementation

Statements	N	Min	Max	Mean	Std. Deviation
Consultation	17	1.00	2.00	1.35	0.85
Resource provision	17	1.00	2.00	1.82	0.97
Support training	17	1.00	3.00	1.65	0.70
Creating strategy and integrates it with people	17	1.00	2.00	1.53	0.51
Provide feedback to employees on their performance	17	1.00	2.00	1.53	0.51

Results deployed in Table 4.22 shows that top management are involved in the provision of the necessary consultation (mean = 1.35) in implementation of various processes. Also, top management is instrumental in providing feedback to employees on their performance (mean = 1.53) and is involved in creating strategy and integrates people (mean = 1.53). The study also indicates that top management is instrumental in provision of training to the employees (mean = 1.65) and that the top management ensures resource provision (mean = 1.82).

4.2.4 Level of Payroll

Respondents were required to clarify on pay rate difference between the lowest paid to the highest paid.

Table 4.23: Payroll difference between the lowest paid and the highest paid

	Frequency	Percentage	Cum. Frequency
Less than 3 times	1	5.9	1
3 – 6 times	8	47.1	9
7 – 9 times	8	47.1	17
Total	17	100.0	

From the findings, the discrepancy between the highly paid and lowly paid was established to be very high with some employees getting salary more than nine times higher than others. Respondent's also reported that support, commitment and involvement of top management is required for the successful implementation of JIT.

4.3 Operational Performance

The study sought to determine the current trends on organizational waste management after the implementation JIT system.

Table 4.24: Trends on Organizational Waste Management

	Frequency	Percentage	Cum. Frequency
Increase	1	5.9	1
Remained Same	4	23.5	5
Reduced	12	70.6	17
Total	17	100.0	

From the findings, it is evident that organization waste has reduced since the implementation of JIT. This implies that implementation JIT system led to significant decrease in volumes of waste produced reduced significantly.

Respondent were requested to indicate the proportion of stock out instances experienced in the organization in the last 1-year compared to the number of times in which the organization had made purchases.

Table 4.25: JIT Implementation and Stock out Instances

	Frequency	Percentage
Less than 10%	9	52.9
10% to 20%	8	47.1
Total	17	100

The findings presented on Table 4.25 above indicate that the instances of stock out in the organisations has significantly reduced as a result of JIT implementation. This implies that implementation of JIT led to reduction of unexpected instances of stock outs.

The study further sought to establish the impact JIT on cost of production per unit

Table 4.26: Effect of JIT Implementation on Cost of Production per Unit

	Frequency	Percentage	Cum. Frequency
Increase	1	5.9	1
Remained Same	4	23.5	5
Reduced	12	70.6	17
Total	17	100.0	

The findings presented above highlights that cost of production per unit has reduced after implementation on of JIT. This implies that implementation of JIT helps to reduce the cost of production per unit in the cement-manufacturing firms.

Table 4.27: Impact of JIT on Production Time per Unit

	Frequency	Percentage
Remained Same	2	11.8
Reduced	15	88.2
Total	17	100.0

On production time per unit, the results show that it has greatly reduce after JIT implementation. This implies that implementation of JIT helps to cut production time in the cement manufacturing companies.

4.4 Regression Analysis

It was used in determination of the predictive power of the factors affecting operational performances at cement manufacturing firms in Kenya. The researcher carried out a total of six regression analysis, five to determine the association between the independent variables and the individual components of operational performance and finally, another one to determine what relationship existed between independent variables (employee training, information communication technology, top management support and level of pay roll) and the dependent variable (operational performance).

In the research, a multiple regression analysis was carried out to measure how much influence there was amongst predictor variables. The SPSS V 23.0 was employed for coding, entering and computation of multiple regressions. The summary of this model is presented below.

Table 4.28: Model summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.878 ^a	.771	.742	1.04758

a. Predictors: (Constant), Level of Pay Roll, ICT, Employee Training, Top Management Support

The value of adjusted R squared was 0.742 showing a variation of 74.2% operational performance in cement manufacturing firms in Kenya due to changes in employee training, information communication technology, top management support and level of pay roll at 95 percent confidence level.

Table 4.29: ANOVA

ANOVA ^a						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	49.484	4	12.371	3.988	.012 ^b
	Residual	37.224	12	3.102		
	Total	86.708	16			

a. Dependent Variable: Operational Performance of Cement Manufacturing Firms

b. Predictors: (Constant), Level of Pay Roll, ICT, Employee Training, Top Management Support

The model had a p value of 0.012 less than 5% thus the model was significant. The F-calc was greater than F-critical ($3.988 > 2.53$) an indication that employee training, information communication technology, top management support and level of payroll all affect operational performance in cement manufacturing firms in Kenya.

Table 4.30: Coefficients

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.062	.309		3.437	.014
	Employee Training	.856	.149	.424	5.745	.013
	ICT	.753	.144	.204	5.229	.028
	Top Management Support	.647	.107	.552	6.047	.015
	Level of Pay Roll	.603	.085	.652	7.094	.017

a. Dependent Variable: Operational Performance of Cement Manufacturing Firms

Coefficients presented on Table 4.45 revealed that all the factors (employee training, ICT, top management support and level of pay roll) were significant ($p < 0.05$). All the factors (employee training, ICT, top management support and level of pay roll) were all positively related to operational performance. This implies that increase in any of the factor would lead to a decline in operational performance.

4.5 Discussion of the Findings

Results show that employee training is a significant predictor on successful implementation JIT. All the cement manufacturing firms conducted employees' trainings in view of enhancing JIT implementation, most of the firms conducted JIT trainings on either quarterly basis or on semiannual basis. Test regression results show that a unit increase in employee training, would lead to an increase in operational performance of cement firms in Kenya. These finding are in support of the study findings by Kaufman & Hotchkiss (2006) where both content that any organization implementing JIT should consider workers as assets thus should be given more authority and power to make decisions

In-depth analysis on budgetary allocation on employee training revealed that most of the cement manufacturing firms allocated between 25% - 50% of their budget expenditure on training exercise, most of the of cement manufacturing firms conducted between 3 to 6 career development activities in the last one year. The study also uncovered that during the training sessions, the management of cement manufacturing firms stressed on organizational expectations with implementation of JIT system in actualizing organizational mission, vision and values. Other areas covered during the training sessions included the need for employees to own their careers, personal effectiveness, time management and basic skill development.

The study also revealed that after training, many of cement manufacturing firms held between 3 to 6 teamwork activities in the last one a year. Reported further revealed that teamwork activities provided a framework that helped to increase employees' ability and willingness to participate in organizational planning exercise. Teamwork activities were organized with a motive of promoting employee ownership of strategic decisions and promoting staff understanding on problem-solving and decision making with a view of enhancing organizational operational efficiency. These findings are in supports of the study findings by Forrester, (2015) successful adoption JIT practices are dependent on having the right employees in the right position.

Further the study revealed that most of the cement manufacturing firms ensured continuous improvement in work after trainings and career development. Descriptive reports also show that employee training on JIT increased staffs knowledge and skills. JIT also helped to bridges the gap between job needs and employee skills, knowledge and behaviors and that employee training on JIT enabled employee to be more productive and more useful to the organization

Assessment on the relationship between information communication technology and successful adoption of JIT technique showed that ICT aided in successful adoption JIT by cement manufacturing firms. Test regression results affirmed that a unit increase in information communication technology, would lead to an increase in operational performance of cement manufacturing firms in Kenya. These findings are in line with the findings Tarokh and Keshtgary, (2013) that ICT enhanced accountability through elimination of corruption and hence ensuring efficiency in production process.

Further assessment also revealed that most of the cement manufacturing firms allocated between 0 - 25% of their budget expenditure on enhancement of ICT infrastructure. Most of the cement manufacturing firms had between 51 to 75% employees who happened to be computer literate. Considerable number of cement manufacturing firms conducted ICT trainings on either Quarterly basis or on semiannual basis and that many of the organizations had between 3 to 6 employees working in ICT department. These findings are in support of the study findings by Wang (2011) who content ICT is a significant strategic tool for lifting production process, adding that ICT offered greater efficiencies and effectiveness in overall production process

The study also established that most of the organizations lacked adequate ICT equipment and that most of cement manufacturing firms moderately utilized ICT in implementation of various activities such as supplies order and processing, raw material acquisition, monitoring on the quality of organizational core activities and data archiving. These findings are in line support of the findings Tarokh and Keshtgary (2013) that ICT enhances accountability through elimination of corruption and hence ensuring efficiency in production process.

Results obtained on role of top management in implementation of JIT showed that top management support was paramount in ensuring successful adoption of JIT technique. Top management provided necessary consultation in implementation of various processes; top management was instrumental in providing feedback to employees on their performance, top management helped in creating strategy and integrates it with people, top management was instrumental in providing support training and that top management aided to ensuring resource provision.

Further, the findings also revealed that implementation of JIT reduces inventory management cost and implementation of JIT helps in reduction of losses from improper inventory control, reported also re-affirm that top management of cement manufacturing firms played a critical rule in implementation of JIT such as allocation of time for various training programs and appreciation of employees who generate improvement ideas and strategies which would help the organization deliver superior value and ensure smooth implementation of TQM without any obstacle. These findings are in line support of the findings Yasin and Wafa (2012) that Implementation of JIT helps in reduction of losses from improper inventory control.

Assessment on operational; performance revealed that after the implementation JIT system the volume of waste produced in many firms reduced significantly, implementation of JIT led to reduction of unexpected instances of stock outs and that after the implementation of JIT the cost of production per unit reduced in most of the cement manufacturing firms. Survey findings also established that after the implementation of JIT, production time per unit in most of the organizations. The findings concur with the study findings by Marilyn and Paula (2011), that when implementation of JIT is succesanzation and the product variety is enhanced greatly.

CHAPTER FIVE

SUMMARY OF FINDINGS CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter gives a summary, conclusion, recommendation and suggestions for expounding future studies drawn from the findings. The purpose for this research was to determine the effect of just-in-time (JIT) on operational performance of cement companies in Kenya.

5.2 Summary of the Research Findings

5.2.1 Employee Training

This study found out that employee training is a significant predictor on implementation of JIT and thus operational performance of cement manufacturing firms. Most of the cement manufacturing firms conducted employees' trainings in view of enhancing JIT implementation, most of the firms conducted JIT trainings on either quarterly basis or on semiannual basis. In-depth analysis on budgetary allocation on employee training revealed that most of the cement manufacturing firms allocated between 25% - 50% of its budget expenditure on training exercise, most of the of cement manufacturing firms conducted between 3 to 6 career development activities in the last one year. These goes hand in hand with the study findings by Kaufman & Hotchkiss, (2006) workers are supposed to be regarded as assets in an organization which is performing implementation of JIT and therefore during decision making they should be given more power and authority to make their decisions.

Further the study revealed that during the training sessions the management of cement manufacturing firms stressed on organizational expectations with implementation of JIT system in actualizing organizational mission, vision and values. Other areas covered during the training sessions included need for employees to own their careers personal effectiveness, time management and basic skill development. Most of the cement manufacturing firms ensured continuous improvement in work after trainings and career development and that employee training on JIT Increased staffs knowledge and skills JIT tasks; employee training also helped to join ends between the skills which employees have and when what is needed by the job, behaviours of employees and

knowledge and that training on JIT enabled employees to be more productive and more useful to the organization. These outcomes supports of the study findings by Forrester, (2015) that successful adoption JIT practices are dependent on having the right employees in the right position.

5.2.2 Information Communication Technology

Assessment on ICT and implementation of JIT revealed that most of the cement manufacturing firms allocated between 0 to 25% of their budget expenditure on enhancement of ICT infrastructure. Most of the cement manufacturing firms had between 51 to 75% employees who happened to be computer literate. Considerable number of cement manufacturing firms conducted ICT trainings on either Quarterly basis or on semiannual basis and that many of the organizations had between 3 to 6 employees working in ICT department. These findings are in supports of the study findings by Wang (2011) ICT is a significant strategic tool for lifting production process, adding that ICT offered greater efficiencies and effectiveness in overall production process

The findings also showed that cement manufacturing firms moderately utilized ICT in implementation of various activities such as supplies order and processing, raw material acquisition, monitoring on the quality of organizational core activities and data archiving These findings are in line support of the findings Tarokh and Keshtgary, (2013) that ICT enhances accountability through elimination of corruption and hence ensuring efficiency in production process.

5.2.3 Top Management Support

Reports also disclosed that top management played a critical rule in implementation of JIT such as allocation of time for various training programs and appreciation of employees who generate improvement ideas and strategies which would help the organization deliver superior value and ensure smooth implementation of JIT without any obstacle. The findings of this study disclosed that that the pay rate difference between the lowest paid to the highest paid in most of the organization was either 3 to 6 times or 7 to 9 times higher. These findings are in line support of the findings Yasin and Wafa (2012) that Implementation of JIT helps in reduction of losses from improper inventory control.

The findings of this study also revealed that top management was instrumental in providing feedback to employees on their performance, top management helped in creating strategy and integrates it with people, top management was instrumental in providing support training, and that top management aided to ensuring resource provision. These concur with the study findings by Erik and Mats (2010) that Commitment of top management should be required to implement JIT program and they should evolve mechanisms for multi-level communication to all employees and clarify the importance, objectives and benefits of the whole program.

5.2.5 Operational Performance

Survey findings also established that after the implementation of JIT, production time per unit in most of the organizations reduced. In-depth Assessment also revealed that after the implementation JIT system the volume of waste produced in many firms reduced significantly. Moreover, implementation of JIT led to reduction of unexpected instances of stock outs and that after the implementation of JIT the cost of production per unit reduced in most of the cement manufacturing firms. Test regression results show that JIT Implementation changes by single unit in the assessment scale, production lead time will also change by 0.752 units. The overall regression indicate that JIT implementation influences the performance of cement manufacturing companies in Kenya. The overall regression equation becomes $Y = 1.062 + 0.856 X_1 + 0.753 X_2 + 0.647 X_3 + 0.603 X_4$.

5.3 Conclusions

Drawing from the study findings, this study concludes that JIT inventory management technique presented high operational advantages to cement manufacturing firms in Kenya; among the benefits include: reduced work in process increased quality and productivity levels, improved supplier relationships, reduced lead time, better services for customers, downtime reduction, a rise in the inventory turnover and workspace reduction.

This study also concludes that employee training was paramount in ensuring successful implementation of JIT inventory management technique. Most of the cement manufacturing firms had embraced employee training programs in view of ensuring successful adoption of this IT inventory management technique and that cement manufacturing firms had put in place long term competence-based training programs.

This study also concludes that utilization of ICT becomes a critical factor in implementation of JIT inventory management technique, ICT assisted in decision-making for inventory replenishment, ICT assisted in creation of smooth connections amongst the upstream and downstream flow of information therefore, with ICT infrastructure in place JIT implementation in manufacturing can highly help in capacity utilization and minimize the rate of defect in continuous flow processes.

Finally this study concludes that top management played an instrumental role in successful adoption of JIT technique by cement manufacturing companies, top commitment to the strategic direction is critical factor on ensuring successful implementation JIT technique in cement manufacturing firms, top management helped in Alignment JIT objectives to match with organization's strategic objectives and that top management is instrumental in ensuring Effective and efficient utilization of organizational resources

The study concludes that level of pay is significant predictor on successful implementation of JIT system. Well-paid employee feels valued by his organization.

5.4 Recommendations

Cement manufacturing companies should uphold continuous implementation of JIT inventory management technique. This is based on statistical and attributable competitive advantage as revealed in these study findings.

Since employee training was found to key driver in JIT inventory management technique, cement should firms should continually ensure continuous employee training and development. However, quality and consistency measures must be embraced to ensure that skills acquired are relevant and can bring about the anticipated changes toward efficient implementation if JIT inventory management technique.

The outcomes of the research showed that ICT as an important factor in implementation of JIT inventory management technique, therefore this study recommends that cement manufacturing companies should lay adequate IT infrastructure. This will help to promote smooth and effective monitoring of the whole process.

For JIT implementation to take place in an effective manner, top management of cement manufacturing companies should remain fully commitment, top management ought to

closely monitor the process in order to incorporate the necessary changes in timely manner. Implementation of the JIT program requires much commitment by the top most management as well create approaches for enhancing multiple level communications for overall employees and make clear its significance, how it will benefit them and the entire organization. Then that is strategic for the JIT program. In order to implement the JIT program, a master plan is supposed to be prepared.

Cement manufacturing firms requires to put in place some tool which accommodates increase of salaries while still emphasizing on rewards that are non-monetary so as to ensure successful implementation of JIT implementation.

5.5 Limitations of the Study

While the purpose of this research was assessing impacts of Just in Time adoption and operational performance of cement companies in Kenya, the study does not attempt to explain why such just in time adoption might have occurred and why all the companies adopted it. The study area was also limited to the six major cement companies in Kenya only and this could affect the findings. This was attributed to the industry being dominated by only those few companies. These six companies have good structures to provide relevant information concerning the area of study. Also, the study suffered from use from self –reported data from the respondents who may be induced by social desirability bias although this was quite addressed by assuring anonymity to the respondents.

5.6 Areas for further research

This study aimed at determining effects of just-in-time (JIT) on operational performance of major cement companies in Kenya. Future studies may explore effectiveness of FIFO and LIFO on quality production process.

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APPENDICES

Appendix I: Questionnaire

Kindly answer all the questions to the best of your ability. The information provided will be treated with utmost confidence and strictly used for academic purposes only.

Section A: Background Information

1. Please enter the following details of your organisation.

Name of your organisation.....

Year established

Main sector/ industry.....

Location

2. How long have you worked in this firm?

3 years and less [] 4 – 6 years []

7 – 10 years [] 10 years and above []

3. What is your highest level of education?

Primary level [] Secondary level []

College level [] University level []

Post graduate level []

4. In your firm, in which department do you work?

Operations Department [] Quality control Department []

Procurement Department [] Others.....

Section B: Adoption of JIT in the Firm

5. To what extent does the following apply to your organisation? (*Tick appropriately*)

	Least extent	Great extent
Reduction in lead time	[]	[]
Waste reduction	[]	[]
Reduction in stock out	[]	[]
Reduced cost of production	[]	[]
Reduced production time	[]	[]
Others.....		

6. Rank the following factors based on importance in adoption JIT in your firm? Use numbers 1 to 3, with 3 = most important factor; 2 = Important and 3 = least important.

Employees' trainings	[]
Information communication technology	[]
Top management support	[]

7. What other factors has led to successful adoption of JIT in your firm?

.....

8. Kindly indicate your level of agreement with the following benefits of adoption JIT in your firm. Use a scale of 1-5, where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree.

	1	2	3	4	5
Improve the competitiveness of the firm	[]	[]	[]	[]	[]
Embraces everybody in the organization	[]	[]	[]	[]	[]
Covers up quality problems	[]	[]	[]	[]	[]
Reduces operational cost	[]	[]	[]	[]	[]
Creates a culture of continuous improvement	[]	[]	[]	[]	[]
Reduces waste	[]	[]	[]	[]	[]
Reduces non-value adding process	[]	[]	[]	[]	[]
Optimizes the processes in the firm	[]	[]	[]	[]	[]
Provides effective maintenance programs	[]	[]	[]	[]	[]
Minimized employee turnover	[]	[]	[]	[]	[]

Section C: Employee Training

9. Does your organisation conduct employees' trainings on JIT implementation?
 Yes [] No []
10. What is the frequency of training in your organisation?
 Weekly [] Monthly [] Quarterly []
 Semi annually [] Annually [] Bi-annually []
11. What is the percentage of the expenditure budget dedicated to training?
 0 - 25% [] 25% - 50% []
 51 – 75% [] More than 75% []
12. How many career development activities were conducted in your organisation in the last one year?
 Less than 3 [] 3 – 6 []
 6 – 9 [] more than 9 times []
13. During the training, what courses did you cover?

14. After training, how many times have you engaged in teamwork in the last one year?

- | | | | |
|-------------|--------------------------|-------------------|--------------------------|
| Less than 3 | <input type="checkbox"/> | 3 – 6 | <input type="checkbox"/> |
| 6 – 9 | <input type="checkbox"/> | more than 9 times | <input type="checkbox"/> |

15. What was done during teamwork?

.....
.....

16. Has there been continuous improvement in work after trainings and career development?

- Yes No

17. In your own view, how else does employee training enable JIT adoption?

.....
.....

Section D: Information Communication Technology

18. Has Information Communication Technology enabled successful adoption of JIT technique?

- Yes No

19. What is the percentage of the expenditure budget dedicated to ICT?

- | | | | |
|----------|--------------------------|---------------|--------------------------|
| 0 - 25% | <input type="checkbox"/> | 25% - 50% | <input type="checkbox"/> |
| 51 – 75% | <input type="checkbox"/> | More than 75% | <input type="checkbox"/> |

20. What percentage of the employees is computer literate?

- | | | | |
|----------|--------------------------|---------------|--------------------------|
| 0 - 25% | <input type="checkbox"/> | 25% - 50% | <input type="checkbox"/> |
| 51 – 75% | <input type="checkbox"/> | More than 75% | <input type="checkbox"/> |

21. How frequent are training in ICT conducted in your organisation?

- | | | | | | |
|---------------|--------------------------|----------|--------------------------|-------------|--------------------------|
| Weekly | <input type="checkbox"/> | Monthly | <input type="checkbox"/> | Quarterly | <input type="checkbox"/> |
| Semi annually | <input type="checkbox"/> | Annually | <input type="checkbox"/> | Bi-annually | <input type="checkbox"/> |

22. What is the number of the employees working in ICT department?

- | | | | |
|-------------|--------------------------|-------------|--------------------------|
| Less than 3 | <input type="checkbox"/> | 3 – 6 | <input type="checkbox"/> |
| 6 – 9 | <input type="checkbox"/> | more than 9 | <input type="checkbox"/> |

23. In your own assessment, how adequate are ICT equipment available in your organisation?

Not Adequate [] Adequate [] Surplus []

24. In your own view, how frequent are activities done through ICT in your organisation?

Never [] Moderately [] Always []

25. What are the main neutral activities that are done through ICT?

.....

Section E: Top Management Support

26. Do you think top management support enables successful adoption of JIT technique?

Yes [] No []

27. How frequent do you think to top management support JIT implementation in the following aspects? Use the following scale; 1 = Very Frequent; 2 = Frequently; 3 = Rarely, and; 4 = Never.

Statements	1	2	3	4
Consultation				
Resource provision				
Support training				
Creating strategy and integrates it with people				
Provide feedback to employees on their performance				

28. In your own view, how else does top management support enable JIT adoption?

.....

Section F: Level of Payroll

In your organisation, what is the rate between the lowest paid to the highest paid?

Less than 3 times [] 3 – 6 times []

7 – 9 times [] more than 10 times []

29. In your own view, how else does top management support enable JIT adoption?

.....

Section G: Operational Performance

30. What is the average lead-time in your organization?

.....

31. In your own assessment, how has organizational waste in your organisation changed after JIT implementation in the last 1 year?

Increase [] Remained Same [] Reduced []

32. What is the proportion of stock out instances experienced in your organization in the last 1-year compared to the number of times you have made purchases?

Less than 10% [] 10% to 20% []

21% to 30% [] More than 30% []

33. After implementation of JIT, how has the cost of production per unit changed?

Increase [] Remained Same [] Reduced []

34. After implementation of JIT, how has the production time per unit changed?

Increase [] Remained Same [] Reduced []

35. In your own view, how else does JIT adoption influence operational performance?

.....

Thanks for your Participation!

Appendix II: List of Major Cement Companies in Kenya

1. Bamburi Cement Company
2. East African Portland Cement Company
3. ARM Africa Limited Company
4. National Cement
5. Mombasa Cement
6. Savannah Cement

Source: Kenya National Bureau of Statistics (KNBS) (2017)

Appendix III: Sample Size Determination Table

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: “N” is population size “S” is sample size.

Source: Saunders, Lewis, and Thornhill (2012)