Influence of Inventory Management Systems on Performance of Gas Manufacturing Firms in Nairobi City County, Kenya

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ABSTRACT
Kenya manufacturing firms face problems of fluctuating inventories, inaccurate forecast, poor responsiveness to customer’s needs and lack of proper ICT application systems resulting to poor performance. This paper examined the influence of inventory management systems on the performance of gas manufacturing firms in Kenya, by analyzing the extent to which Vendor Managed Inventory, Radio Frequency Identification, Enterprise Resource Planning and E-procurement systems are being applied in these firms. The study was conducted in all the 100 procurement staff in the operating gas manufacturing firms from the period December, 2016. The study used a structured questionnaire to collect data from the key informants (senior and middle level procurement staff) in the organizations. On the other hand, secondary data was obtained from published documents such as journals, periodicals, magazines and reports to supplement the primary data. The data analyzed also shows that taking all other independent variables at zero, a unit increase in VMI would lead to a 0.743 increase in performance of gas manufacturing firms.; a unit increase in ERP would lead to a 0.721 increase in performance of gas manufacturing firms, a unit increase in RFID will lead to 0.633 increase in performance of gas manufacturing firms and a unit increase in E-Procurement systems would lead to 0.621 increase in performance of gas manufacturing firms. This infers that VMI contributed most to performance of gas manufacturing firms. The study has contributed to knowledge by establishing that VMI, RFID, ERP and E-procurement systems influence performance of gas manufacturing firms in the Kenyan context.

Keywords: inventory management, E-Procurement systems, gas manufacturing firms

INTRODUCTION
In the world today, every organization wants not only to mitigate the system wide cost, but also to maintain minimum inventories along the supply chain while maximizing the service level requirements of the customer (Sexton, 2007). This has led to reduced costs, increased efficiency and thus boosted performance of firms. In some organizations it has led to demand variability and thus strengthened the need to maintain proper inventory for improved supply chain performance. Dobler (2016) posit excess inventory in the supply chain blocks the cash flow and this might negatively affect organizational performance.

According to Lwein (2012), organizations have dramatically changed their views of stock in the recent years. Historically, they saw stock as a benefit, with high stocks ensuring maximum service and even giving a measure of wealth. This thinking encouraged organizations to maximize their stocks and is still the reason why countries keep reserves of gold and why individuals keep food in the freezer. But with the advent of the twentieth century, it became clear that these stocks had costs that could be surprisingly high. Then organizations began to view stocks not as unreserved benefits but as a resource that needs careful control and thus the need to device ways of minimizing overall costs. More recently, organizations have
gone further in reducing stocks, and they try to work with very low levels. There has been a trend towards operations that move materials quickly and efficiently through supply chains matching supply to demand so that stocks are not accumulated. When this works, it gives considerable savings, but it is not a realistic option for all operations. Most organizations cannot work properly without stock and therefore they have to consider its management.

Inventories are the stocks of raw materials, work in progress, finished goods and supplies held by a business organization to facilitate operations in the production process (Lwiki, Ojer, Mugend, & Wachira, 2013). Inventories can either be assets as well as items held in the ordinary course of business or they can be goods that will be consumed or used in the production of goods to be sold. Inventory is considered to have originated from the military’s need to supply themselves with arms, ammunition, and rations as they moved from their base to a forward position. Inventory as a business concept evolved only in the 1950’s mainly due to the increasing complexity of supplying one’s business with materials and slipping out products in an increasing globalized supply chain and inventory management systems (Cecil & Robert, 2006).

Historically, inventory management systems have often been associated with either too much inventory and too little management or too little inventory and too much management. There can be severe penalties for excesses in either direction. In traditional settings, inventories of raw material spare parts work in progress, components and finished goods were kept as a buffer of a possibility of running out of needed items. However, large buffer inventories consumed valuable resources and generated inventory costs. Consequently, many companies have changed their approach to production and inventory management systems. Since early 1980s, inventory management systems which leads to inventory reduction has become the primary target, as is often the case in just-in-time (JIT) systems where raw materials and parts are purchased or produced just-in-time to be used at each although evidence of improved firm performance is mixed (Nabwanga & Ojera, 2012).

**Global Perspective of Inventory management Systems in Manufacturing Firms**

According to the available studies, most of them focus on the American firms in the manufacturing sector because of the many revolutions in inventory policies in 1970s and 1980s. Lewin (2012) observed that the extent of emphasis on inventories among American firms reached the financial markets where there were rules that would reward firm that controlled inventories and punish those that did not do so. This is because, during the 1970s, Japanese manufacturing Companies made substantial market share gains in the US markets in a range of industries including most notably the automobile industry. In recent years, a number of firms have faced numerous challenges especially in Inventory management systems or material control, thus affecting the performance of manufacturing companies. There have been cases of materials overstocking which eventually get expired or out dated, under stocking, lack of stock-taking, theft of materials by workers and delays in deliveries of materials into the organizations among others.

As with many other western countries, there have being a relative decline in performance of the manufacturing industry in Australia and as a result, its contribution to the total Australian GDP is less than half what it was four decades ago. This was attributed to poor strategic inventory management systems leading to increased cost of production resulting to the gross operating profit margin for the manufacturing firms to fall from 9.5% in the year 2013 to 7.8% in the year 2014 (Omonge,2012). Similarly, in most of Africa, performance in the manufacturing industry has been poor over the last decades.

**Kenyan Perspective of Inventory Management Systems in Gas Manufacturing Firms**

Manufacturing organizations in Kenya have ignored the potential savings from strategic inventory management systems, treating inventory as necessary evil and not as an asset requiring management (Ondiek & Odera, 2012). Omonge (2012) posit that in the 1980’s inventories of raw materials, work-in-progress components and finished goods were kept as a buffer against the possibility of running out of needed items. However, large buffer inventories consume valuable resources and generate hidden costs (Ondiek & Odera, 2012).
Nyabwanga and Ojera (2012) also observed that too much inventory consumes physical space, creates a financial burden, and increases the possibility of damage, spoilage and loss. On the other hand, too little inventory often disrupts business operations leading to poor performance among manufacturing firms (Dimitrios, 2008). Kenya manufacturing firms face problems of fluctuating inventories, inaccurate forecast, poor responsiveness to customer’s needs and lack of proper ICT application systems resulting to poor performance (Ondiek & Odera, 2012). This was confirmed by Ondiek & Odera (2012) who observed that New Kenya Cooperative Creameries (KCC) faced problems of erratic deliveries, reduced consumer effective demand and high cost of production due to poor strategic inventory management systems techniques leading to declined performance. Kagira (2012) also noted that Kenya Tea Development Agency managed factories faced problems of fluctuating inventory levels, poor demand management and lack of proper inventory control systems due to poor strategic inventory management systems. It is therefore important for gas manufacturing firms in Nairobi County to have sound, effective and well-coordinated inventory management systems because the business environment is rapidly changing, highly competitive and this drastically affects the performance of the organization. With the application of proper inventory management systems techniques, the right materials will be available at the right time, with the minimum storage costs and investment.

Gas manufacturing companies in Kenya can gain competitive advantage from lean production practices. Such practices enable the organizations to get superior performance through reduction of wastes and other related costs (Lewin, 2012). Gas manufacturing companies are experiencing a problem of broad inventory management systems this resulting to lots of wastage like what is experienced in oil spillage and gas flaring. This has seen many of the companies experience problems of waste along the supply chain and the liability to make the right products for customer satisfaction. Managers are bound to embrace the essence of adopting inventory management system which is a business initiative to reduce waste.

**Statement of the Problem**

Inventory management systems contribute 50% to the profitability and performance of any manufacturing firms (Lewin 2012). The performance of the gas manufacturing firms in Nairobi have been affected by use of obsolete inventory management systems and technologies (ROK, 2012). Decline in performance of the manufacturing industry resulted to a decline in the global Gross Domestic Product (GDP) from 5.00 percent in the year 2010 to 3.08 percent in the year 2011 as a result of poor inventory control and reduced consumer effective demand due to poor strategies in managing inventories, Kenya National Bureau of Statistics (KNBS, 2012).

KNBS (2012) also observed that, poor performance of the manufacturing firms in Kenya contributed to a decline in GDP to 1.5 percent in the year 2008 from 7.0 percent achieved in the year 2007. The GDP rose to 2.7 percent in the year 2009 and a further increase of 5.8 percent in the year 2010. However, this growth declined to 4.4 percent in the year 2011. This was attributed to poor inventory control, reduced consumer effective demand, delays in fulfilling customer’s orders and inappropriate technology application due to lack of proper strategic inventory management systems in the firms.

Manufacturing firms in Kenya face problems of fluctuating inventories, inaccurate forecast, poor responsiveness to customer’s needs and lack of proper ICT application systems resulting to poor performance (Ondiek & Odera, 2012)). Similarly, Omonge (2012) observed that New KCC faced problems of erratic deliveries, reduced consumer effective demand and high cost of production due to poor strategic inventory management systems techniques leading to poor performance. Kagira (2012) also noted that Kenya Tea Development Agency managed factories faced problems of fluctuating inventory levels, poor forecasting and lack of proper inventory control systems due to poor strategic inventory management systems techniques leading to declined performance. The situation in many gas manufacturing firms as per KAM (2013) affirms this by indicating multiple problems such inadequate implementation of inventory management systems leading to declined performance. It is on this premise that this study seeks to establish the influence of inventory management systems on performance of gas manufacturing firms in Nairobi, Kenya. Could lack of vendor managed inventory (VMI), Radio
Frequency Identification (RFID), inadequate Enterprise Resource Planning (ERP) and E-Procurement systems affect performance of gas manufacturing firms in Nairobi County, Kenya?

**Objectives of the Study**

The purpose of the study was to establish the influence of inventory management systems on performance of gas manufacturing firms in Nairobi County, Kenya.

The specific objectives of the study included the following:

i. To determine how Vendor Managed Inventory systems influence performance of gas manufacturing firms in Nairobi County, Kenya.


iv. To examine how E-Procurement systems influence performance of gas manufacturing firms in Nairobi County, Kenya.

**Research Questions**

The study was guided by the following research questions:

i. How does Vendor Managed Inventory systems influence performance of gas manufacturing firms in Nairobi County, Kenya?

ii. To what extent does an Enterprise Resource Planning system influence performance of gas manufacturing firms in Nairobi County, Kenya?

iii. How does a Radio Frequency Identification system influence performance of gas manufacturing firms in Nairobi County, Kenya?

iv. What is the influence of E-Procurement on performance of gas manufacturing firms in Nairobi County, Kenya?

**LITERATURE REVIEW**

**Theoretical Review**

This study has adopted the following theories that are: Economic Order Quantity (EOQ) model, Just-In-Time (JIT), Stochastic Inventory Theory.

**Economic Order Quantity (EOQ) Model**

This model relates to the role of Vendor managed Inventory systems on performance of the gas manufacturing firms in Kenya. In inventory management, economic order quantity (EOQ) is the order quantity that minimizes the total holding costs and ordering costs. It is one of the oldest classical production scheduling models. The model was developed by Ford W. Harris in 1913, but R. H. Wilson, a consultant who applied it extensively, and K. Andler are given credit for their in-depth analysis. The economic order quantity also known as the Wilson EQQ model is a model that defines the optimal quantity to order that minimizes total variable costs required to order and hold inventory (Lewin, 2012). EOQ refers to the optimal ordering quantity for an item of stock that aids in the minimization of costs. The relevance of this model is that a smaller order-quantity reduces average inventory but requires more frequent ordering and higher ordering cost per month. This is most applicable to small firms that deal with perishable goods and services seeking to mitigate inventory management systems costs. Patton et al. (2001) explain that the cost of minimizing order-quantity is called the Economic Order Quantity (EOQ). Noe et al (2006) posit that one of the advantages often explored to cushion the burden of net inventory cost and to enjoy substantial savings is the benefit from procuring large enough quantity that reduces the unit price of the item. Muckstadt et al., (2010) also said that the first component of this equation represented the inventory management systems costs and the second component represents the ordering cost. EOQ minimizes the sum of holding and setup costs.
Just In Time (JIT) Model
This model relates to the role of Enterprise Resource Planning systems on performance of the gas manufacturing firms in Kenya. JIT is a Japanese management philosophy which has been applied in practice since the early 1970s in many Japanese manufacturing organizations. It was first developed and perfected within the Toyota manufacturing plants by Taiichi Ohno as a means of meeting consumer demands with minimum delays. Taiichi Ohno is frequently referred to as the father of JIT. Toyota was able to meet the increasing challenges for survival through an approach that focused on people, plants and systems. Toyota realized that JIT would only be successful if every individual within the organization was involved and committed to it, if the plant and processes were arranged for maximum output and efficiency, and if quality and production programs were scheduled to meet demands exactly (Yin, 2014).

This is an inventory management systems method whose goal is to maintain just enough material in just the right place at just the right time to make first the right amount of the product (Lewin, 2012). Just in time inventory management systems system helps in reducing inventory costs by avoiding carriages of excess inventories and mishandling of raw materials. According to Lewin (2012), Just in time purchasing recognizes high costs associated with holding high inventory level and as such it has become important in most organizations to order inventory just in time for production so as to cut costs of holding inventory like storage, lighting, heating, security, insurance and staffing (Lewin, 2012)).

Stochastic Inventory Theory
This theory relates to the role of Radio Frequency Identification (RFID) systems on performance of the gas manufacturing firms in Kenya. In 1958, Stanford University Press published Studies in the Mathematical Theory of Inventory and Production (edited by Kenneth J. Arrow, Samuel Karlin, and Herbert Scarf), which became the pioneering road map for the next forty years of research in this area. One of the outgrowths of this research was development of the field of supply-chain management, which deals with the ways organizations can achieve competitive advantage by coordinating the activities involved in creating products — including designing, procuring, transforming, moving, storing, selling, providing after-sales service, and recycling.

The main results include the following: in contrast to the deterministic EOQ model, the controllable costs of the stochastic model due to selection of the order quantity (assuming the reorder point is chosen optimally for every order quantity) are actually smaller, while the total costs are clearly larger; the optimal order quantity is larger, but the difference is relatively small when the quantity is large; the cost performance is even less sensitive to choices of the order quantity; the relative increase of the costs incurred by using the quantity determined by the EOQ instead of the optimal from the stochastic model is no more than 1/8, and vanishes when the ordering costs are significant relative to other costs (Padget, 2016).

Disruptive Innovation Theory
This theory relates to the role of E-Procurement systems on performance of the gas manufacturing firms in Kenya Disruptive innovation, a term of art coined by Clayton Christensen (1995), describes a process by which a product or service takes root initially in simple applications at the bottom of a market and then relentlessly moves up market, eventually displacing established competitors (Lewin, 2012). As companies tend to innovate faster than their customers’ needs evolve, most organizations eventually end up producing products or services that are actually too sophisticated, too expensive, and too complicated for many customers in their market.

These limitations contrast with the growing number of manufacturing firms pursuing some form of e-procurement to develop and deliver high quality, seamless and integrated public services, to redefine and improve their government-constituency relationships, and to provide a better support for local, national or international development (Griant & Costen, 2017). In this quest, e-procurement is among the first national wide projects that are undertaken by manufacturing firms in search for quick economic gains, as manufacturing firms spend approximately 10 to 15 percent of their GDP in purchases (UN, 2011). However, from the e-procurement perspective, e-procurement has a strategic importance, since its
implementation necessarily crosses many manufacturing firms’ barriers and the silo mentality of many firm managers and practitioners (Oliver & Mangati, 2009)

Conceptual Framework
A conceptual framework also called a research framework gives the research an overview of how various issues in the research work are conceived, and their relationships (Yin, 2013). In this study, previous models of inventory management systems and performance of manufacturing firms are used as the basis for proposing the conceptual framework to be used. The conceptual framework shown in figure 1 describes the relationship between the variables in the study. The independent variables are Vendor Managed Inventory, Radio Frequency Identification, Enterprise Resource Planning and E-Procurement. Performance of gas manufacturing firms is the dependent variable.

Figure 1: Conceptual Framework

RESEARCH METHODOLOGY
Research Design
This study used descriptive research design which involved gathering data that describe events and then organizes, tabulates, depicts, and describes the data. According to Blumberg, Cooper and Schindler (2011), it explores the existing status of two or more variables at a given position in time and whether a relationship exists between them. The study was therefore able to assess how inventory management systems influence performance of the gas manufacturing firms.

Target Population
Target population as defined by Silverman (2016), is a universal set of the study of all members of real or hypothetical set of people, events or objects to which an investigator wishes to generalize the result. The
target population for this study was the 100 supply chain staff from the eight manufacturing firms based in Nairobi Kenya. They were selected to participate in the study since they were arguably in a better position to answer the question in order to address the research problem. This is shown in Table 2.

Table 2. Target population of supply chain staff

<table>
<thead>
<tr>
<th>Firm</th>
<th>Category</th>
<th>Population</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOC Kenya Ltd</td>
<td>Senior Management</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Middle management</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Carbacid Ltd</td>
<td>Senior Management</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Middle management</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Gas Africa Ltd</td>
<td>Senior Management</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Middle management</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Crown Gases Ltd</td>
<td>Senior Management</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Noble Gases Ltd</td>
<td>Senior Management</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Middle management</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Welrods Ltd</td>
<td>Senior Management</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Chemigas Ltd</td>
<td>Senior Management</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Synergy Ltd</td>
<td>Senior Management</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Middle management</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>100</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: ERC (2016)

Sampling Frame, Sample and Sampling Technique

The respondents were randomly selected from the following 8 gas manufacturing firms purposively identified and visited. The researcher was interested with the following; BOC Kenya Ltd, Carbacid Ltd, Gas Africa Ltd, Crown Gases Ltd, Noble Gases Ltd, Welrods Ltd, Chemigas Ltd and Synergy Ltd. The study adopted census survey to collect primary data from 100 respondents. Census survey can be used when the population is small and manageable (Padget, 2016).

Data Collection Instruments

A questionnaire is an instrument that is used to gather data and allows measurement for or against a particular viewpoint. It is meant to provide a standardized tool for data collection and attain objectivity in a survey (Patton, Renn & Quaye, 2016). Structured and open questions were used to collect primary data from the field. 100 questionnaires were distributed out of which 70 copies were returned and qualified to be processed making a response rate of 70%. The same questionnaires were pilot tested to ascertain the extent to which the instrument was correct to collect the intended data and eliminate ambiguous questions, and improve on validity and reliability.

Data Collection Procedure

The study obtained research permit from relevant authorities required for data collection. The study personally administered the instruments to the targeted respondents. For the gas manufacturing firms within Nairobi, the questionnaires were delivered either through emails and parcels. The study established link persons within the firms to whom the parcels were sent and who helped in the collection of the data in the depots where the researcher was not able to reach physically.
Pilot Study
Pre-testing enables the researcher to modify and remove ambiguous items on instruments (Benard, 2016). This enabled the content validity and reliability of the questionnaire and interview schedule to be used in the study established. Reliability is the stability or consistency of scores over time while validity is refers to the extent to which an instrument truly measures what it is intended to measure or how truthful the research instruments are. In order to check and improve reliability and validity, a pilot study was carried out on 10 supply chain officers. It may also help to ensure that research instruments are stated clearly and 10% of the population should constitute the pilot test size (Glesne, 2015).

Validity of Research Instrument
The study adopted a content validity which refers to the extent to which a measuring instrument provides adequate coverage of the topic under study. The content validity was achieved by subjecting the data collection instruments to an evaluation group of experts who provided their comments and relevance of each item of the instruments and the experts indicate whether the item is relevant or not. The content validity formula by Amin (2005) was used in this study. The formula is; Content Validity Index = (No. of judges declaring item valid) / (Total no. of items). It is recommended that instruments used in study should have CVI of about 0.78 or higher and three or more experts could be considered evidence of good content validity. This study adopted a CVI threshold of 0.78. The CVI for the respective items were Vendor Managed Inventory (.889), Radio Frequency Identification (.989), Enterprise Resource Planning (.868), E-Procurement (.848), Performance of Gas Manufacturing firms (.778).

Reliability of Research Instrument
Reliability is the extent to which a research instrument yields findings that are consistent each time it is administered to same subjects (Mugenda & Mugenda, 2012). The measurement of reliability provides consistency in the measurement. Split-half method was used to test on the reliability of the study instruments. The method involves scoring two halves usually odd and even items of a test separately for category of the instruments and then calculating the correlation coefficient for the two sets of scores. The study adopted a threshold of 0.7. The pilot study involved the sample respondents. Reliability analysis was subsequently done using Cronbach’s Alpha which measured the internal consistency. The reliability coefficients for the respective items were Vendor Managed Inventory (.853), Radio Frequency Identification (.808), Enterprise Resource Planning (.789), E-Procurement (.776), Performance of Gas Manufacturing firms (.776).

Data Analysis and Presentation
The qualitative data was analyzed by the use of content analysis. Quantitative data was coded and analyzed using Statistical Package for Social Sciences (SPSS) computer software version 22. SPSS software was used because of its ability to appropriately create graphical presentations of questions, data for reporting, presentation and publishing. Measures of dispersion were used to provide information about the spread of the scores in the distribution. The study also adopted multiple regression analysis to test relationships between the variables. In the study, the statistical model was developed from the conceptual framework and was as follows: the dependent variable (DV) which in the present study is performance of gas manufacturing firms took the variable [Y], and the coefficients of the independent variables (IV) denoted by X1, X2, X3, X4 were used to show the relationship of the independent variables. Statistically, analysis was carried out using the models Yi = β0 + β1X1 + β2X2 + β3X3 + β4X4 + ε
Where:
Yi is the dependent variable (Performance of Gas Manufacturing Firms);
X is the set of the four independent variables, that it is;
X1 – Vendor Managed Inventory (VMI); X2 – Radio Frequency Identification (RFID);
X3 – Enterprise Resource Planning; X4 – E-Procurement; βi (i=1,2,3,4) are the parameters associated with the corresponding independent variable that are to be estimated (partial regression coefficients);
β0 is the intercept; ε is the error variability (error term).
DISCUSSIONS
Demographic Information

Gender Distribution
The research went further to establish the gender of the respondents, the findings as indicated in Figure 1, a simple majority (58%) were male respondents with (42%) being female respondents. The results indicate that the two genders were adequately represented in the study since there is none which was more than the two-thirds. However, the statistics show that the male gender could be dominating workforce in the firms in Kenya. The above results may be attributed to the strong male domineering culture in Kenya where until recently women were relegated to domestic chores. This culture is dying off and a large population of women population is now strongly competing with their male counterparts in most jobs (Amondi, 2011). Hence, the percentages may raise the issue of gender disparity in this country; but that is outside the scope of the present study.

![Figure 1: Respondents on Gender Distribution](image)

Age Distribution
The study went further to establish the distribution of the respondents’ age. The findings were as indicated in Figure 2. From the findings, majority (45%) indicated that they ranged between 41-50 years, followed by those who indicated that they are 51 and above years at 35% with few (15%) and (5%) and indicating that they were 31-40 years and 20-30 years respectively. This implies that respondents were well distributed in terms of their age during the study. It also infers that majority of the respondents were at their maturity stage and therefore able to handle their roles responsibly. The findings are in agreement with those of Salthouse, (2012) who established that there are two natural age peaks of the late 40s and mid 50s which are correlated to employee performance in the organization. The two peaks fall in both the two age brackets used in this study.

Smith, Smith, & Selby Smith (2010) observed that age brings along experiences, responsibilities and skills. Their long experience often allowed them to succeed in training and learning situations better than younger peers. It also shows that the respondents are mature and therefore beneficial to the study as they would give reliable information as sought by the study. Further, the results indicate that any policy biased towards addressing the issues affecting performance of gas manufacturing firms in the country must be age-inclusive and should go beyond the old affirmative action which can only target youth who are in the age bracket of 18-35 years and cover those above 35 years since they contribute significantly on performance of gas manufacturing firms in the country.
The respondents were asked to indicate the period they had been in the respective gas manufacturing firms in the country. This was to ascertain to what extent their responses could be relied upon to make conclusions for the study based on experience. The findings as indicated in Figure 3, a simple majority (40%) of the respondents indicated that they had been in the performance of gas manufacturing firms in the country for a period ranging from 1-10 years followed by those who indicated that they had been in the performance of gas manufacturing firms in the country for a period of 10-20 years at 30%, (20%) indicating that they had less than one year and with only few (10%) indicating that they had been in performance of gas manufacturing firms in the country for a period more than 20 years. An organization set up is reasoned that more than 10 years is ideal because management of it below 10 years the members or staff are mostly engaged in training (Al-kwari & Flamiezi, 2010).

**Figure 3. Work experience**

**Vendor Managed Inventory (VMI) Systems**

The first objective of the study was to establish the influence of vendor managed inventory (VMI) systems on performance of gas manufacturing firms in Nairobi City County, Kenya. Respondents were thus asked to indicate the extent to which they agreed with various statements relating to vendor managed inventory (VMI) systems on performance of gas manufacturing firms. Responses were given on a five-point scale where: 1= Very small extent; 2= Small extent 3= Moderate extent; 4 = Great extent; 5= Very great extent. The scores of ‘Very small extent’ and ‘Small extent’ have been taken to represent a
statement not agreed upon, equivalent to mean score of 0 to 2.5. The score of ‘Moderate extent’ has been taken to represent a statement agreed upon moderately, equivalent to a mean score of 2.6 to 3.4. The score of ‘Great extent’ and ‘Very great extent’ have been taken to represent a statement great extent upon equivalent to a mean score of 3.5 to 5.0.

Table 4.4 below presents the findings. With a grand mean of 3.331, a majority of respondents can be said to have highly agreed to great extent with most statements posed as regards influence of inventory management systems on the performance of gas manufacturing firms in the study area. Majority particularly highly agreed that the stock management system in the firm minimizes the total holding and ordering costs annually thus leading reduction of stock out costs (3.147); the firm ensures that there is optimal stock levels to reduce stock out costs (3.213); the employees get involved in the quality planning and labour requirements planning (3.001); The firm ensures that the replenishment of inventory minimizes the lead time for the timely delivery of goods (3.751); the firm ensures that there is a working stock management system to reduce lead cycle time for effective reduction of wastes (3.807); the firm ensures that there is adequate optimal stock levels for the reduction of wastes (3.573); the stock management system in the firm minimizes the total holding and ordering costs annually thus leading reduction of stock out costs (3.252).

The study findings are in agreement with literature review by Lysons & Farrington(2016) who established that in VMI, the manufacturer is given the responsibility for monitoring and controlling inventory at the retailer’s distribution centre and in some instances at the retail store level as well. Specific inventory targets are agreed and it is the responsibility of the manufacturer to ensure that suitable inventory is always available. Such arrangements enhance accurate and timely information, and suitable computerized systems have only become available leading to the reduction of the operating costs and timely delivery for the products hence improved performance of the manufacturing firm.

**Table 3: Vendor Managed Inventory (VMI) Systems**

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>The stock management system in the firm minimizes the total holding and ordering costs annually thus leading reduction of stock out costs</td>
<td>3.147</td>
<td>.432</td>
</tr>
<tr>
<td>The firm ensures that there is optimal stock levels to reduce stock out costs</td>
<td>3.213</td>
<td>.022</td>
</tr>
<tr>
<td>The firm ensures that the replenishment of inventory minimizes the lead time for the timely delivery of goods</td>
<td>3.001</td>
<td>.123</td>
</tr>
<tr>
<td>The firm ensures that there is a working stock management system to reduce lead cycle time for effective reduction of wastes</td>
<td>3.751</td>
<td>.675</td>
</tr>
<tr>
<td>The firm ensures that there is adequate optimal stock levels for the reduction of wastes</td>
<td>3.807</td>
<td>.341</td>
</tr>
<tr>
<td>The stock management system in the firm minimizes the total holding and ordering costs annually thus leading to reduction of stock out costs</td>
<td>3.573</td>
<td>.093</td>
</tr>
</tbody>
</table>

**Composite mean** 3.331

**Enterprise Resource Planning (ERP) Systems**

The second objective of the study was to establish the influence of Enterprise Resource Planning (ERP) systems on performance of gas manufacturing firms in Nairobi City County, Kenya. Respondents were thus asked to indicate the extent to which they agreed with various statements relating to Enterprise Resource Planning (ERP) on performance of gas manufacturing firms. Responses were given on a five-point scale where: 1= Very small extent; 2= Small extent 3= Moderate extent; 4 = Great extent; 5= Very great extent. The scores of ‘Very small extent’ and ‘Small extent’ have been taken to represent a statement not agreed upon, equivalent to mean score of 0 to 2.5. The score of ‘Moderate extent’ has been taken to represent a statement agreed upon moderately, equivalent to a mean score of 2.6 to 3.4. The score of ‘Great extent’ and ‘Very great extent’ have been taken to represent a statement great extent upon equivalent to a mean score of 3.5 to 5.0.

31
Table 4 below presents the findings. With a grand mean of 3.017, a majority of respondents can be said to agree to great extent with most statements posed as regards influence of Enterprise Resource Planning (ERP) on the performance of gas manufacturing firms in the study area. Majority particularly highly agreed that the firm ensures that there is planning for inventory to improve decision making for the timely delivery of goods (3.215); the connectivity with the suppliers of the firms enhances reduction of stock out costs (3.071); Inventory accuracy facilitates flow of information for timely delivery of goods (3.330); the firm ensures that there is planning of inventory that coordinates all resources and activities for the reduction of wastes (3.011); the ERP systems assists in managing the connections with the outside stakeholders as well as enhancing reduction of stock out costs (3.521). The study findings corroborates with literature review by Panda, Sahu & Gupta (2010) who found that Enterprise Resource Planning System and adoption and organizational performance of manufacturing firms in Kenya enhance firm’s competition from other companies; cost saving and other financial reasons, business innovations, business strategic positioning. This leads to better return on investment, improved data security, improved decision making process and reduced cost of production.

Table 4. Enterprise Resource Planning (ERP) Systems

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>The firm ensures that there is planning for inventory to improve decision making for the timely delivery of goods</td>
<td>3.215</td>
<td>.062</td>
</tr>
<tr>
<td>The connectivity with the suppliers of the firms enhances reduction of stock out costs</td>
<td>3.071</td>
<td>.176</td>
</tr>
<tr>
<td>Inventory accuracy facilitates flow of information for timely delivery of goods</td>
<td>3.330</td>
<td>.122</td>
</tr>
<tr>
<td>The firm ensures that there is planning of inventory that coordinates all resources and activities for the reduction of wastes</td>
<td>3.011</td>
<td>.175</td>
</tr>
<tr>
<td>The ERP systems assists in managing the connections with the outside stakeholders as well as enhancing reduction of stock out costs</td>
<td>3.521</td>
<td>.223</td>
</tr>
<tr>
<td><strong>Composite mean</strong></td>
<td><strong>3.017</strong></td>
<td></td>
</tr>
</tbody>
</table>

Radio Frequency Identification (RFID) Systems

The third objective of the study was to establish the influence of Radio Frequency Identification (RFID) Systems on performance of gas manufacturing firms in Nairobi City County, Kenya. Respondents were thus asked to indicate the extent to which they agreed with various statements relating to Radio Frequency Identification (RFID) Systems on performance of gas manufacturing firms. Responses were given on a five-point scale where: 1= Very small extent; 2= Small extent 3= Moderate extent; 4 = Great extent; 5= Very great extent. The scores of ‘Very small extent’ and ‘Small extent’ have been taken to represent a statement not agreed upon, equivalent to mean score of 0 to 2.5. The score of ‘Moderate extent’ has been taken to represent a statement agreed upon moderately, equivalent to a mean score of 2.6 to 3.4. The score of ‘Great extent’ and ‘Very great extent’ have been taken to represent a statement great extent upon equivalent to a mean score of 3.5 to 5.0.

Table 5 below presents the findings. With a grand mean of 2.998, a majority of respondents can be said to agree to great extent with most statements posed as regards influence of Radio Frequency Identification (RFID) Systems on the performance of gas manufacturing firms in the study area. Majority particularly highly agreed that the firm ensures that there is shared product design with the suppliers and customers to enhance timely delivery of goods (3.109); the firm ensures that there is movement towards single sourcing proximate suppliers to enhance timely delivery of goods (3.246); the organization has ensured that there is reduced machine setup times for the reduction of stock out costs (3.104); the RFID system has led to dramatic improvements in the firms return on investments, quality and efficiency (3.008); the firm has ensured that there is total preventive maintenance that emphasizes that production create items that arrive when needed to reduce wastes (3.211). The implementation of RFID system has yielded minimum inventories (2.987); the implementation of RFID system has led to improved quality, least
amount of resources and provided maximum motivation to solve problems as soon as they occur (2.995). The study findings are in tandem with literature review by Thomson (2009) who established that deployment of RFID leads toward enhanced manufacturing effectiveness and efficiency, enhancement in effectiveness leads the organization toward better supply chain. Findings suggest that firms can adopt RFID technology to boost up their performance in terms of manufacturing effectiveness and efficiency and supply.

Table 5: Radio Frequency Identification (RFID) Systems

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>The firm ensures that there is shared product design with the suppliers and customers to enhance timely delivery of goods</td>
<td>3.109</td>
<td>.098</td>
</tr>
<tr>
<td>The firm ensures that there is movement towards single sourcing proximate suppliers to enhance timely delivery of goods</td>
<td>3.246</td>
<td>.312</td>
</tr>
<tr>
<td>The organization has ensured that there is reduced machine setup times for the reduction of stock out costs</td>
<td>3.104</td>
<td>.412</td>
</tr>
<tr>
<td>The RFID system has led to dramatic improvements in the firms return on investments, quality and efficiency</td>
<td>3.008</td>
<td>.218</td>
</tr>
<tr>
<td>The firm has ensured that there is total preventive maintenance that emphasizes that production create items that arrive when needed to reduce wastes</td>
<td>3.211</td>
<td>.431</td>
</tr>
<tr>
<td>The implementation of RFID system has yielded minimum inventories</td>
<td>2.987</td>
<td>.111</td>
</tr>
<tr>
<td>The implementation of RFID system has led to improved quality, least amount of resources and provided maximum motivation to supply chain solve problems as soon as they occur</td>
<td>2.995</td>
<td>.239</td>
</tr>
<tr>
<td><strong>Composite mean</strong></td>
<td><strong>2.998</strong></td>
<td></td>
</tr>
</tbody>
</table>

E-Procurement Systems

The fourth objective of the study was to establish the influence of E-procurement Systems on performance of gas manufacturing firms in Nairobi City County, Kenya. Respondents were thus asked to indicate the extent to which they agreed with various statements relating to E-procurement Systems on performance of gas manufacturing firms. Responses were given on a five-point scale where: 1= Very small extent; 2= Small extent 3= Moderate extent; 4 = Great extent; 5= Very great extent. The scores of ‘Very small extent’ and ‘Small extent’ have been taken to represent a statement not agreed upon, equivalent to mean score of 0 to 2.5. The score of ‘Moderate extent’ has been taken to represent a statement agreed upon moderately, equivalent to a mean score of 2.6 to 3.4. The score of ‘Great extent’ and ‘Very great extent’ have been taken to represent a statement great extent upon equivalent to a mean score of 3.5 to 5.0.

Table 6 below presents the findings. With a grand mean of 3.003, a majority of respondents can be said to agree to great extent with most statements posed as regards influence of E-procurement Systems on the performance of gas manufacturing firms in the study area. Majority particularly highly agreed that the firm has adopted E-procurement as an important element in its supply chain (3.654); the firm incorporates ‘ICT’ as a key factor in its operations (2.908); the firm takes into account the use of emergence of internet technologies (2.991); the E-procurement systems has led to dramatic improvements in the firms return on investments, quality and efficiency (3.121); there is digitalization of information and data, rationalization and improved efficiency in administration process (2.983). The traditional paper documents disappear and are replaced by digital information that easily can be stolen(copied), changed, deleted among others (2.764). For procurement officers, development will mean the need for further training, amended procurement methods & IT based in procurement tools (2.995). The success of E-procurement systems mostly depends on the increase of bidders (suppliers) that participate to procurement auctions (3.101).
The study findings are in agreement with literature review by Smith (2009) who established that E-Procurement enhance performance in the manufacturing firm.

**Table 6: E-procurement Systems**

<table>
<thead>
<tr>
<th>Statements</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>The firm has adopted E-procurement as an important element in its supply chain</td>
<td>3.654</td>
<td>.213</td>
</tr>
<tr>
<td>The firm incorporates ‘ICT’ as a key factor in its operations</td>
<td>2.908</td>
<td>.221</td>
</tr>
<tr>
<td>The firm takes into account the use of emergence of internet technologies</td>
<td>2.991</td>
<td>.110</td>
</tr>
<tr>
<td>There is digitalization of information and data, rationalization and improved efficiency in administration process</td>
<td>3.121</td>
<td>.421</td>
</tr>
<tr>
<td>The traditional paper documents disappear and are replaced by digital information that easily can be stolen(copied), changed, deleted among others</td>
<td>2.983</td>
<td>.312</td>
</tr>
<tr>
<td>For procurement officers, development will mean the need for further training, amended procurement methods &amp; IT based in procurement tools</td>
<td>2.764</td>
<td>.006</td>
</tr>
<tr>
<td>The success of E-procurement systems mostly depends on the increase of bidders (suppliers) that participate on procurement auctions</td>
<td>3.101</td>
<td>.106</td>
</tr>
<tr>
<td>Composite mean</td>
<td>3.003</td>
<td></td>
</tr>
</tbody>
</table>

**Performance of Gas Manufacturing Firms**

The study sought to determine performance of gas manufacturing firms, attributed to the influence of VMI, ERP, RFID and E-Procurement systems. The study was particularly interested in three key indicators, namely increase of profits, Cost reduction and Timely Purchases-stock out reduction, with all the three studied over a 5 year period, running from 2012 to 2016. Table 4.8 below presents the findings. Findings in Table 4.8 above reveal improved increase of profits across the 5 year period running from the year 2012 to 2017. Cost of reduction recorded positive growth with a majority affirming to less than 10% in 2012 (42.3%) and 2013 (37.7%), to 10% in 2014 (36.1%) then more than 10% in 2015 (41.1%) and 2016 (37.5%). A similar trend was recorded in Cost reduction, growing from less than 10% (44.1%) in 2012, to more than 10% in 2013 (36.4%), 2014 (40.4%) and 2015 (37.3%). Timely Purchases-stock out reduction further recorded positive growth with a majority affirming to less than 10% in 2012 (37.9%) and 2013 (35.9%), to 10% in 2014 (35.9%) and 2015 (35.3%) then by more than 10% in 2016 (36.2%).

It can be deduced from the findings that key performance indicators have considerably improved as influenced by among other procurement management attributes, the influence of VMI, ERP, RFID and E-Procurement systems. Quality of goods purchased and Timely Purchases-stock out reduction have particularly improved by at least 10 percent across most of the gas manufacturing firms pointing to the significance of inventory management systems in the supply chain process.

**Table 7: Performance of Gas Manufacturing Firms**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased by less than 10%</td>
<td>42.3</td>
<td>37.7</td>
<td>31.6</td>
<td>30.7</td>
<td>29.5</td>
</tr>
<tr>
<td>Increased by 10%</td>
<td>31.8</td>
<td>32.9</td>
<td>36.1</td>
<td>28.2</td>
<td>33</td>
</tr>
<tr>
<td>Increased by more than 10%</td>
<td>25.9</td>
<td>29.4</td>
<td>32.3</td>
<td>41.1</td>
<td>37.5</td>
</tr>
<tr>
<td><strong>Cost reduction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased by less than 10%</td>
<td>44.1</td>
<td>35.2</td>
<td>33.4</td>
<td>25.7</td>
<td>27.1</td>
</tr>
<tr>
<td>Increased by 10%</td>
<td>31.7</td>
<td>32.6</td>
<td>30.2</td>
<td>33.9</td>
<td>35.6</td>
</tr>
<tr>
<td>Increased by more than 10%</td>
<td>23.5</td>
<td>32.2</td>
<td>36.4</td>
<td>40.4</td>
<td>37.3</td>
</tr>
<tr>
<td><strong>Timely Purchases-stock out reduction</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased by less than 10%</td>
<td>37.9</td>
<td>35.9</td>
<td>31.2</td>
<td>25.7</td>
<td>33.1</td>
</tr>
<tr>
<td>Increased by 10%</td>
<td>36.2</td>
<td>31.3</td>
<td>35.9</td>
<td>35.3</td>
<td>30.7</td>
</tr>
<tr>
<td>Increased by more than 10%</td>
<td>25.9</td>
<td>32.8</td>
<td>32.9</td>
<td>39</td>
<td>36.2</td>
</tr>
</tbody>
</table>
Multiple Regression Analysis

In addition, the study conducted a multiple regression analysis so as to test relationship among variables (independent) on the performance of gas manufacturing firms. The study applied the statistical package for social sciences (SPSS V. 22) to code, enter and compute the measurements of the multiple regressions for the study. According to the model summary Table 8, R is the correlation coefficient which shows the relationship between the independent variables and dependent variable. It is notable that there exists strong positive relationship between the independent variables and dependent variable as shown by R value (0.807). The coefficient of determination ($R^2$) explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable and the four independent variables that were studied explain 65.10% of the performance of gas manufacturing firms as represented by the $R^2$. This therefore means that other factors not studied in this research contribute 34.90% to the performance of gas manufacturing firms. This implies that these variables are very significant therefore need to be considered in any effort to boost performance of gas manufacturing firms in the study area. The study therefore identifies the variables as critical factors of inventory management systems on performance of gas manufacturing firms in the study area.

**Table 8: Model Summary**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.807</td>
<td>.651</td>
<td>.635</td>
<td>.008</td>
</tr>
</tbody>
</table>

Further, the study revealed that the significance value is 0.001 which is less than 0.05 thus the model is statistically significant in predicting how VMI, ERP, RFID, E-Procurement systems affect performance of gas manufacturing firms. The F critical at 5% level of significance was 11.876. Since F calculated (17.256) is greater than the F critical (value = 11.876), this shows that the overall model was significant. This implies that at least one of the independent variables has an effect on the dependent variable.

**Table 9: ANOVA**

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16.980</td>
<td>4</td>
<td>4.245</td>
<td>17.256</td>
<td>.001a</td>
</tr>
<tr>
<td>Residual</td>
<td>15.987</td>
<td>65</td>
<td>.2460</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>32.967</td>
<td>69</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NB:** F-critical Value = 11.876; **Predictors:** (Constant); VMI, ERP, RFID, E-Procurement systems

The study ran the procedure of obtaining the regression coefficients, and the results were as shown on the Table 10. Multiple regression analysis was conducted as to determine the relationship between performance of gas manufacturing firms and the four independent variables. As per the SPSS generated in Table 4.6, the model equation would be ($Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$) becomes: $Y = 13.745 + 0.743X_1 + 0.721X_2 + 0.633X_3 + 0.621X_4$. This indicates that performance of gas manufacturing firms = 13.745 + 0.743(VMI) + 0.721(ERP) + 0.633(RFID) + 0.621(E-Procurement). According to the regression equation established, taking all factors into account (VMI, ERP, RFID, E-Procurement systems) constant at zero performance of gas manufacturing firms was 13.745. The data findings analyzed also shows that taking all other independent variables at zero, a unit increase in VMI will lead to a 0.743 increase in performance of gas manufacturing firms.; a unit increase in ERP will lead to a 0.721 increase in performance of gas manufacturing firms, a unit increase in RFID will lead to 0.633 increase in performance of gas manufacturing firms and a unit increase in E-Procurement systems will lead to 0.621 increase in performance of gas manufacturing firms. This infers that VMI contributed most to performance of gas manufacturing firms. At 5% level of significance, VMI had a 0.000 level of significance; ERP showed a 0.001 level of significance, RFID showed a 0.004 level of significance and E-procurement showed a 0.005 level of significance hence the most significant factor was VMI.
Table 11: Regression Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>Std. Error</td>
<td>β</td>
<td></td>
</tr>
<tr>
<td>VMI</td>
<td>.743</td>
<td>.087</td>
<td>.502</td>
<td>3.455</td>
</tr>
<tr>
<td>ERP</td>
<td>.721</td>
<td>.156</td>
<td>.455</td>
<td>2.266</td>
</tr>
<tr>
<td>RFID</td>
<td>.633</td>
<td>.200</td>
<td>.305</td>
<td>2.011</td>
</tr>
<tr>
<td>E-Procurement</td>
<td>.621</td>
<td>.276</td>
<td>.259</td>
<td>1.969</td>
</tr>
</tbody>
</table>

CONCLUSIONS
Based on the study findings, the study concludes that performance of gas manufacturing firms in Nairobi, Kenya is affected by Vendor Managed Inventory (VMI) systems, Radio Frequency Identification (RFID) systems, Enterprise Resource Planning (ERP) systems and E-Procurement Systems are the major factors that mostly affect performance of gas manufacturing firms in Kenya.

The study concludes that Vendor Managed Inventory (VMI) systems are the first important factor that affects performance of gas manufacturing firms. The regression coefficients of the study show that Vendor Managed Inventory(VMI) systems has a significant influence on performance of gas manufacturing firms. This shows that Vendor Managed Inventory(VMI) systems has a positive influence on performance of gas manufacturing firms.

The study concludes that Radio Frequency Identification (RFID) system is the second important factor that affects performance of gas manufacturing firms. The regression coefficients of the study show that a Radio Frequency Identification (RFID) system has a significant influence on performance of gas manufacturing firms. This shows that Radio Frequency Identification (RFID) systems have a positive influence on performance of gas manufacturing firms.

Further, the study concludes that Enterprise Resource Planning (ERP) systems are the third important factor that affects performance of gas manufacturing firms. The regression coefficients of the study show that Enterprise Resource Planning(ERP) systems has a significant influence on performance of gas manufacturing firms. This shows that Enterprise Resource Planning(ERP) systems has a positive influence on performance of gas manufacturing firms.

Further, the study concludes that E-Procurement Systems is the fourth important factor that affects performance of gas manufacturing firms. The regression coefficients of the study show that Enterprise Resource Planning(ERP) systems has a significant influence on performance of gas manufacturing firms. This shows that Enterprise Resource Planning(ERP) systems has a positive influence on performance of gas manufacturing firms.

RECOMMENDATIONS
The study recommends for the Vendor Managed Inventory (VMI) systems in the gas manufacturing that has a stock management system to minimize the total holding and ordering costs annually thus leading reduction of stock out costs. The firms should have optimal stock levels; the employees get involved in the quality planning and labour requirements planning. The firm should also ensure that the replenishment of inventory minimizes the lead time for the timely delivery of goods.

The study recommends for a Radio Frequency Identification (RFID) system which ensure that there is a reduced machine setup time for the reduction of stock out costs. The RFID system can lead to the firms return on investments, quality and efficiency. The firms should ensure that they have a total preventive maintenance that emphasizes that production creates items that arrive when needed to reduce wastes, yielded minimum inventories, lead to improved quality, least amount of resources and provide maximum motivation to source problems as soon as they occur.
The study recommends for firms to put in place ERP systems to ensure that there is planning for inventory to improve decision making for the timely delivery of goods. The connectivity with the suppliers of the firms is important as it enhances reduction of stock out costs and inventory accuracy facilitates flow of information for timely delivery of goods. Further, the firm should ensure that there is planning of inventory that coordinates all resources and activities for the reduction of wastes and connections with the outside stakeholders to reduce of stock out costs.

The study recommends E-procurement systems in the gas manufacturing firms as an important element in its supply chain. The E-procurement system can be done through digitalization of information and data, rationalization to improve efficiency in administration process. The success of E-procurement systems will depend on the increase of bidders (suppliers) that participate to procurement auctions.

REFERENCES


