International Journal of Academic Research in Business and Social Sciences
2016, Vol. 6, No. 9
ISSN: 2222-6990

Influence of Operational Excellence on the management of efficiency levels in the pharmaceutical industry in Kenya

Antony Muse (Corresponding Author)
Jomo Kenyatta University of Agriculture and Technology
P.O. Box 62000-0100, Nairobi, Kenya
Email: antonymuse@yahoo.com

Dr. Agnes W. Njeru
PhD, Jomo Kenyatta University of Agriculture and Technology
P.O. Box 62000-0100, Nairobi, Kenya
Email: agneswnjeru@yahoo.co.uk

Dr. Esther Waiganjo
Jomo Kenyatta University of Agriculture and Technology
P.O. Box 62000-0100, Nairobi, Kenya
Email: ewaiganjo@jkuat.ac.ke

DOI: 10.6007/IJARBSS/v6-i9/2310 URL: http://dx.doi.org/10.6007/IJARBSS/v6-i9/2310

Abstract
This article assessed the Influence of Operational Excellence on the management of efficiency levels in the pharmaceutical industry in Kenya. In research methodology, the study adopted cross sectional survey design. The population of interest was composed of registered Kenyan pharmaceutical manufacturing companies as availed by the KAM directory. Sampling technique was purposively sampling. The research instrument was a questionnaire. Analysis of the data was done using (SPSS). Regression and correlation analysis was done to test the relationship between the study variables. The study findings indicated that there was a positive and significant relationship between operational excellence and the management of efficiency levels. The study concluded Kenyan pharmaceutical industry have put a lot effort in producing high quality generic pharmaceutical products but are trying to implement strategic management practices. The study recommends that Kenyan Pharmaceutical companies need to implement operational excellence in order to manage its efficiency levels.

Key Words: Operational Excellence, efficiency, Pharmaceutical companies in Kenya.

International Journal of Academic Research in Business and Social Sciences
2016, Vol. 6, No. 9
ISSN: 2222-6990

Introduction

Globalization and rapid technological advancement have immensely transformed the way companies do business worldwide, spurred innovation and development in various sectors, and driven the world economic changes (Kotler, 2001). Operational Excellence is the execution of the business strategy more consistently and reliably than the competition. Operational Excellence is evidenced by results. Given two companies with the same strategy, the operationally excellent company will have lower operational risk, lower operating costs and increased revenues relative to its competitors, which creates value for customers and shareholders (Seifert, 2013). Operational excellence translates to increased production flexibility, improved customer responsiveness and cost minimization, and, as such, confers the organization a competitive advantage. Operational excellence drives at helping the organization delivering value at a competitive cost with ease of purchase and use for the customers. It requires effective and efficient processes, high productivity and quicker delivery to market. Observations show that operationally excellent organizations: Follow a well-defined strategy and operational planning, translate their objectives into measurable success indicators and ensure alignment among the different constituents of their setup, are process oriented that enjoy proficient management, value chain and support processes and have the right attitude, capabilities and motivation (Seifert, 2013).

Statement of the Problem

Pharmaceutical companies face complex issues that grow more challenging by the day. The United Nations Industrial Development Organization (UNIDO) has embarked on a project to strengthen local manufacturing capacities in the production of a range of essential generic drugs in selected developing and Least Developed Countries (LDCs), with funding from Germany's Federal Ministry for Economic Cooperation and Development (BMZ). Kenya, which has a strong base from which to develop its pharmaceutical industry, decided to collaborate with UNIDO in an effort to further develop this sector. The project aims at the expansion and upgrading of small and medium size enterprises (SMEs) for the local manufacture of essential generic drugs (with a particular emphasis on those combating the three major pandemics: HIV/AIDS, malaria and tuberculosis) with the aim of improving access for the poor to these drugs at affordable prices. It is against the backdrop of disease burdens for countries like Kenya that the African Union Commission (AUC) resolved to develop a Pharmaceutical Manufacturing Plan for Africa within the framework of the New Partnership for Africa's Development (NEPAD), under the theme "to pursue, with the support of our partners, the local production of generic medicines on the continent, and to make full use of the flexibilities within the Trade and Related Aspects of Intellectual Property Rights (TRIPS) and the Doha Declaration on TRIPS and Public Health. The bulk of locally manufactured preparations are non-sterile, over the-counter (OTC) products. The number of companies engaged in manufacturing and distribution of pharmaceutical products in Kenya continue to expand, driven by the Government's efforts to promote local and foreign investment in the sector (Were, Sharif, & Samuel, 2008).

Yet doubts are often expressed as to the viability of pharmaceutical production in developing Countries such as Kenya, mainly with regard to: Small national markets, making it difficult for local manufacturers to achieve economies of scale in production, little value addition in local production, Reliance on government support or protection (Hasan and Wanyanga, 2010).Kenya vision 2030 has projected that pharmaceutical manufacturing as one of the possible areas of investment. This will include: Setting up of pharmaceutical manufacturing industries which can produce drugs, ARVs, and Vaccines (Macro Planning Directorate, 2008).

There are a number of constraints that hamper growth and development of the local pharmaceutical industry. High cost of production resulting from high cost of energy and labor. Kenya has prohibitive energy costs that make it difficult to compete with multinationals, majority of who carry out production in Asian countries (UNIDO, 2010). In addition to the high costs of production inputs, the government levies 16% value added tax on pharmaceutical raw materials, which makes production more costly. Purchasing of active raw materials is inhibited by low order quantities as the volume of raw materials requested by local industry is too small to justify shipment and wide fluctuations in cost per unit (Wamae & Kungu, 2014) Other factors that hinder the local pharmaceutical industry from being competitive: plants are relatively old with high maintenance costs and poor efficiency; there is little emphasis on achieving large production runs and machine utilization rates are low; planned maintenance is given low priority and there is little availability of spare parts. Much of the equipment has not been replaced or maintained (UNIDO, 2010). From the foregoing, it is clear, however, that investments in local medicine production will be efficient only if pharmaceuticals can be produced more cheaply locally than they can be imported on the open market. To respond to these needs various strategies have been practiced such as Porters generic strategies, various continuous improvement strategies such as ISO 9000, Total Quality Management, Kaizen, Enterprise Resource Planning, Business and Process Reengineering have been developed. A new paradigm in this area of strategic improvement is operational excellence.

In view of the above review the following study was investigated:

Research Objective

To establish the influence of Operational Excellence on the management of efficiency levels in the pharmaceutical industry in Kenya.

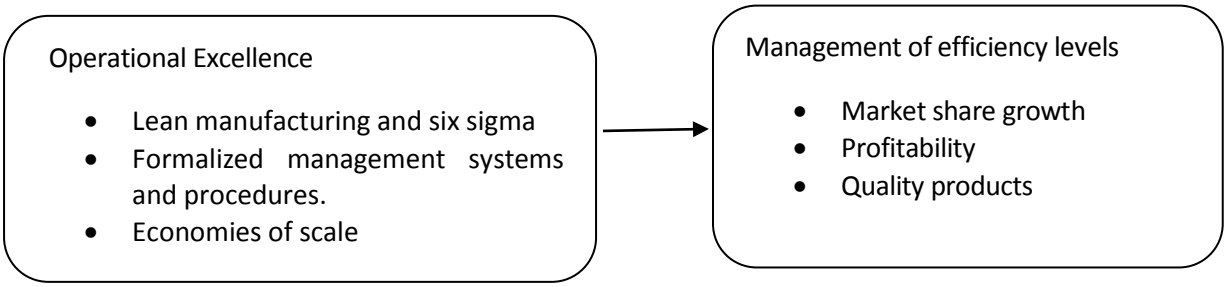
Hypothesis

H1: There is a positive significant influence of operational excellence on management of efficiency levels in the pharmaceutical industry in Kenya

Theoretical Framework

The resource-based view (RBV) as a basis for the competitive advantage of a firm lies primarily in the application of a bundle of valuable tangible or intangible resources at the firm's disposal Penrose, (1959) to transform a short-run competitive advantage into a sustained competitive advantage which requires that these resources are heterogeneous in nature and not perfectly mobile. Effectively, this translates into valuable resources that are neither perfectly imitable nor substitutable without great effort (Barney, 1991). If these conditions hold, the bundle of resources can sustain the firm's above average returns. RBV has been extensively applied in management and marketing to identify the firm's potential key resources which evaluates whether these resources fulfill the following criteria (referred to as VRIN): Valuable A resource must enable a firm to employ a value-creating strategy, by either outperforming its competitors or reduce its own weaknesses. Relevant in this perspective is that the transaction costs associated with the investment in the resource cannot be higher than the discounted future rents that flow out of the value-creating strategy. Rare – To be of value, a resource must be rare by definition. In a perfectly competitive strategic factor market for a resource, the price of the resource will be a reflection of the expected discounted future above-average returns (Barney, 1991). In-imitable – If a valuable resource is controlled by only one firm it could be a source of a competitive advantage. This advantage could be sustainable if competitors are not able to duplicate this strategic asset perfectly. The theory was applicable in this study because the researcher had theorized that within the framework of the resource-based view, is the assumption that resource bundles and capabilities are heterogeneous across firms. This difference is manifested in two ways. First, firms with superior resources can earn Ricardian rents (profits) in competitive markets because they produce more efficiently than others. What is key is that the superior resource remains in limited supply. Second, firms with market power can earn monopoly profits from their resources by deliberately restricting output. Heterogeneity in monopoly models may result from differentiated products, intra-industry mobility barriers, or first-mover advantages (Peteraf, 1993).

Conceptual Framework



International Journal of Academic Research in Business and Social Sciences
2016, Vol. 6, No. 9
ISSN: 2222-6990

Review of literature on Variables

Operational Excellence

Operational Excellence is the execution of the business strategy more consistently and reliably than the competition. Operational Excellence is evidenced by results. Given two companies with the same strategy, the Operationally Excellent Company will have lower operational risk, lower operating costs and increased revenues relative to its competitors, which creates value for customers and shareholders (Seifert, 2013) .

Operational excellence translates to increased production flexibility, improved customer responsiveness and cost minimization, and, as such, confers the organization a competitive advantage. Operational excellence drives at helping the organization delivering value at a competitive cost with ease of purchase and use for the customers. It requires effective and efficient processes, high productivity and quicker delivery to market. Observations show that operationally excellent organizations: Follow a well-defined strategy and operational planning, translate their objectives into measurable success indicators and ensure alignment among the different constituents of their setup, are process oriented that enjoy proficient management, value chain and support processes and have the right attitude, capabilities and motivation (Seifert, 2013).

Waste Elimination; The most effective way to reduce costs while keeping up with the competition is to become “Lean” by reducing, and preferably eliminating, waste (also referred to as muda - Japanese term for waste). In the world of Lean, every activity is differentiated as either a value adding or non-value adding activity. Lean techniques are aimed at identifying and eliminating non-value adding activities. These techniques also should be used to minimize or optimize essential non-value adding activities where possible. Eliminating or reducing the time spent on these wasteful activities can decrease cycle time and improve overall flexibility of the facility. While process and technological changes can help reduce the cycle time of value adding activities, these changes also can improve (reduce/eliminate) non-value adding activities and essential non-value adding activities. Anything the customer is unwilling to pay for can be termed waste. Waste, in any form, impacts both direct and indirect costs, which contribute to the overall price of the end product. Direct costs include costs associated with damaged or faulty product, product recalls, loss of resale value, etc. Indirect costs can include insurance premiums, damaged reputation, and loss in customer loyalty. Operational excellence through lean manufacturing focuses on eliminating waste from the process. The waste types are further discussed below (El-Namrouty and AbuShaaban, 2013) .

Defects- are the most common form of waste and can be identified easily as damaged goods or non-compliant product. Low yield is a good indicator of high levels of defects. In a pharmaceutical plant, a defect could be a broken tablet, or a label that does not adhere to the bottle it is attached to. Products that do not pass quality inspection are considered defective.

International Journal of Academic Research in Business and Social Sciences
2016, Vol. 6, No. 9
ISSN: 2222-6990

Anytime a product is discarded, it directly influences profitability (El-Namrouty and AbuShaaban, 2013).

Inventory- is often described as a necessary evil. Inventory consists of raw materials in a warehouse or on a shelf and finished goods. Low inventory (of raw materials) risks starving the process, while holding too much inventory can increase product lead times and warehouse space requirements. A study conducted by (Bellm, 2014) showed that pharmaceutical companies typically carry relatively huge inventories when compared to those of other industries. In a truly Lean process, there is no built up work in process or excess inventory.

Over-Processing- is the performance of operations beyond a set (or expected) quality level. If product or processes not only satisfies, but exceeds critical-to-quality and/or regulatory requirements (i.e., quality higher than a customer is willing to pay for), it can be described as over-processing. It also includes continuing to process an incorrect product. Such instances can occur if appropriate quality checks are not put in place. Processing or producing at rates exceeding requirements is also a form of over-processing waste (El-Namrouty and AbuShaaban, 2013).

Waiting- is time wasted waiting to proceed with value added activities. Delays can result from a number of factors. Waiting for release of material or unavailability of quality personnel for verifications/validations and clearances can be a large contributor to increased waiting. Bellm, (2014) posited that this waiting time could have been easily eliminated by proper scheduling of activities to ensure that the quality person is not required in more than one place at the same time.

Transportation and Motion-Excessive movement of raw materials, personnel, or paperwork can be considered NVA activities. Transportation may seem like an essential activity, but a process where every unit operation is physically located adjacent to its upstream and downstream operations does not require transportation (Vermaak, 2008). This waste can be combated by standardizing procedures, ensuring preparedness, efficient layouts, and organized work spaces, such as those seen when using the 5S concept, a Lean housekeeping technique (El-Namrouty and AbuShaaban, 2013).

Overproduction-Making more than is necessary is a very common practice among pharma companies. While it may seem logical to keep the shelves stocked and customers instantly gratified, there are some serious risks and costs involved in making more than necessary, such as product expiration, possible contamination from outside sources, deteriorating product quality, etc. In a truly Lean process, there would be one-piece flow with no intermediate inventory and the upstream operation would only produce enough to keep the downstream operation satisfied (Bellm, 2014). It is ideal to create a “pull” environment wherever applicable and feasible. Kanban’s can be used to indicate when a downstream operation is ready to receive the next batch. In such instances, the process will commence only after receiving a

customer order. Under-Utilized Talent-Improper utilization of talent and creativity loss is another form of waste that companies should pay close attention to. Examples of this type of waste include selecting an overqualified person to perform a menial task or paying for employee training and then not using his/her skills set (Vermaak, 2008).

Just in Time (J.I.T)-Operational excellence through Just-in-time (JIT) is a production and inventory control system in which materials are purchased and units are produced only as needed to meet actual customer demand. This system leads to the cancellation of the inventory in all stages and the high storage costs. This system is characterized precisely from the beginning of arrival of raw materials from trusted suppliers and binding contracts to delivery of raw materials in time, product and manufacturing accuracy and high quality, to delivery orders to customers, on time and at the lowest possible cost (Vermaak, 2008). The goal of this system is to; dispense with all kinds of stock, or reducing it to a minimum. Reducing waste in time and resources in the production processes. The purpose of this system is eliminating or reducing loss or wastage resulting from the large size of production, rejected production, machine malfunctions, and the long time required for moving materials under process between the stations work. JIT involves purchasing quantities in time to meet the needs of consumers in time. The JIT philosophy develops the confidence and relationship between the company and suppliers. In order to achieve the objectives of JIT, there must be multiple interrelated elements (Vermaak, 2008).JIT is concerned with having zero inventory, the suspension of work is a serious problem that must be addressed very quickly, so workers are trained to do small repairs that require limited skill. In addition, workers are trained to do preventive maintenance, such as cleaning machines and configuring them because the worker is more familiar with his machine and what is needed for maintenance. In addition, the workers in this system are responsible for checking quality and solving some problems and making improvements in production and quality.

The inability of some companies to identify the damage and waste makes the chances of achieving profits difficult; in addition, it makes them unable to recognize opportunities for improvement, so the companies do not determine what would add value and what does not add value, so they do not cancel the damaged products. This inability leads companies to exclude these activities, which increases costs, does not add value and focus to activities that are of interest to the customer directly (Vermaak, 2008) . There are many advantages for a business to adopt a JIT technique; Improvement in the relationship with suppliers, multi skilled employees are identified and used; there are reduced manufacturing and production lot sizes. Striking at the core of any problems associated with manufacturing processes. Responsive to the consumer needs is faster; there is elimination of wastages of various kinds such as inventory waste from the processes, time waste, waste arising out of over production etc. There is prevention of any sort of breakdown by maintaining the equipment's during the idle time of machinery and workers and there is less inventory of raw material, finally there is improvement in quality by aiming at zero defects (Bellm, 2014).

Six Sigma-Operational excellence through Six Sigma is a business performance improvement strategy that aims to reduce the number of mistakes/defects to as low as 3.4 occasions per million opportunities. Sigma is a measure of "variation about the average" in a process which could be in manufacturing or service industry. Six Sigma efforts are primarily focused on improving efficiency within an existing technological base of the firm (Benner and Tushman, 2003).

Six Sigma can be defined as a business process improvement approach that seeks to find and eliminate causes of defects and errors, reduce cycle times and cost of operations, improve productivity, better meet customer expectations, and achieve higher asset utilization and returns (Evans and Lindsay, 2005). Six sigma Process management activities have become widely popular in the last two decades as the shared underlying component of a series of quality-related initiatives, including TQM, ISO 9000, and Six Sigma. Such techniques focus on improving an organization's efficiency through rationalizing, coordinating, and repeating organizational processes. Six Sigma blends correct management, financial and methodological elements to make improvement in process and products in ways that surpass other approaches. Mostly led by practitioners, Six Sigma has acquired a strong perspective stance with practices often being advocated as universally applicable. Six Sigma has a major impact on the quality management approach, while still based in the fundamental methods & tools of traditional quality management. The final stage of Six Sigma implementation requires coordinating standardized best practices throughout an organization (Benner and Tushman, 2003).

Management of Efficiency Levels

Efficiency as "the quality of doing something well with no waste of time or money". In the context of a production environment, efficiency means the ability to produce a product using the fewest resources possible. Efficient production is achieved when a product is created at its lowest average total cost. Where a business has efficient production, it is operating at maximum output and at minimum cost per unit of output. Efficiency is, therefore, a measure of how well the production or transformation process is performing. However, this is not always easy to assess. There are several ways to measure efficiency (Guesmi, 2013).

Productivity- This measures the relationship between inputs into the production process and the resultant outputs. The most commonly used measure is labor productivity, which is measured by output per worker. High values of both efficiency and effectiveness lead to high productivity and therefore increased competitiveness. Defining productivity as relation between output and input efficiency is furthermore linked to the utilization of resources and mainly concerns the input of the productivity quota while, on the other hand, effectiveness is rather output-focused and relates to satisfying customer demand, linked to the output of the productivity quota. For example, assume a pharmaceutical manufacturer makes 100 batches of product a month and employs 25 workers. The labor productivity is 4 batches per person per

month. There are several other measures of productivity; Output per hour / day / week, Output per machine, Unit costs (total costs divided by total output). The unit cost measure is particularly important. A falling ratio would indicate that efficiency is improving. Achieving high production efficiency is important because; A more efficient business will produce lower cost goods than competitors. That means the business can either make a higher profit per unit sold (assuming that the product is sold for the same price as a competitor) or the business can offer customers a lower price than competitors (and still make a good profit). Secondly, investing in production assets (e.g. equipment, factory buildings) is expensive, therefore a business needs to maximize the return it makes on these assets (Lieder, 2014).

There are various ways in which a business can try to improve its productivity- Training – e.g. on-the-job training that allows an employee to improve skills required to work more productively, Improved motivation – more motivated employees tend to produce greater output for the same effort than de-motivated ones , More or better capital equipment (this links with the topic of automation) , better quality raw materials (reduces amount of time wasted on rejected products) and Improved organization of production – e.g. less wastage (Lieder, 2014)

Stock levels-A business will have set itself a target stock level of finished goods that it should achieve. This is calculated to satisfy the demand expected by the marketing department plans and based on what the production department thinks they can produce. If the stock level falls below this level then the productive efficiency has reduced since the output per worker has not met the planned requirements (Guesmi, 2013). Non-productive ("idle") resources- Which resources are not in constant use in the business? Are employees often left with nothing to do? Are machines only used for part of available time? Too many idle resources are a common sign of inefficiency in production.

Cost- For manufacturing, the most significant line item on an income statement is the cost of producing goods for sale (i.e., cost of goods sold or cost of sales). It is a figure which reflects the cost of raw materials used to produce a product to sell to customers. Lieder, (2014) suggest that COGS are the direct costs of producing a product for sale. It could be; Cost of items purchased for resale, cost of raw materials used to produce a product, or cost of parts used to construct a product. COGS also includes direct costs such as labor to produce the product, supplies used in manufacture or sale, shipping costs, costs of containers, freight in, and overhead costs directly related to the manufacture or production activity like rent and utilities for the manufacturing facility.

In summary-efficiency is an important measure of a company's performance. It requires the minimization of inputs and the maximization of profits for a given level of output. Efficiency, therefore, enables a business to make the best possible use of the company's resources. For example, an efficient company will produce a greater number of quality products, with less waste, using less energy and other resources during a given period than an inefficient company.

Increasing efficiency will also boost the capacity of a business, assuming there is no change in the number of inputs employed. The capacity of a firm refers to how much a business can produce during a specific period of time.

Methodology

This study adopted a cross-section survey design. According to Olsen and Marie, (2004), a cross-section design involves surveying a population for purposes of collecting data from them at a given single point in time. These studies therefore reveal that cross-section designs aim to collect findings on the relationship of variables of interest to the researcher and at a given specific time. The purpose of survey was to produce quantitative descriptions of some aspects of the study population. It sought to seek to confirm hypotheses about phenomena hence use highly structured methods such as questionnaires which are closed-ended and which helped to predict causal relationships between the variables. The choice of survey as a preferred method was because survey analyses are primarily concerned with relationships between variables (Kothari, 2004).

The study only collected findings concerning the problem at a single point because the aim was not to show the trend of changes but rather to identify the responses without manipulating the variables in producing insights into the influence of operational excellence strategy in the management of efficiency levels in the pharmaceutical industry in Kenya taking pharmaceutical companies located in Nairobi and its environs, it was felt that they would best help the researcher in achieving this. Analysis of the data was done using descriptive statistics and inferential statistics using Statistical Package for Social Scientists (SPSS) software in analyzing data. Analysis of the data was done using a combination of designs including descriptive statistics, frequencies and percentages.), In research methodology, the study adopted cross sectional survey design. The population of interest was composed of all registered Kenyan pharmaceutical manufacturing companies as availed by the KAM directory. The sampling frame was composed of only firms engaged in manufacturing, distribution and marketing of pharmaceutical products in Kenya that formed the researcher's body of interest. Sampling technique was purposively sampling. The research instrument was a questionnaire. Analysis of the data was done using descriptive statistics and inferential statistics using Statistical Package for Social Scientists (SPSS) through the use of tools such as chi square test and regression models were fitted and hypothesis testing carried using multiple regression analysis.

Results and Discussion

Results of Reliability Tests

Reliability is a measure of the degree to which a research instrument yields consistent result or data after repeated trials (Mugenda and Mugenda, 2003). Reliability in research is influenced by random error. Reliability was tested using Cronbach's coefficient Alpha. Cronbach's Alpha

measures how well a set of items or variables, measure a single uni-dimensional latent construct that is a coefficient of reliability or consistency. Reliability is expressed as a coefficient between 0 and 1.00. The higher the coefficient, the more reliable is the test. A threshold of a Cronbach Alpha of 0.7 and above is acceptable (Cronbach, 1951). Cronbach Alpha was used to test the reliability of the proposed constructs. The findings indicated that, operational excellence had a coefficient of 0.745.

Independent Variable	Reliability Cronbach's Alpha	Comments
Operational Excellence	0.745	Reliable

Sampling Adequacy

To examine whether the data collected was adequate and appropriate for inferential statistical tests such as the factor analysis, regression analysis and other statistical tests, two main tests were performed namely; Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. For a data set to be regarded as adequate and appropriate for statistical analysis, the value of KMO should be greater than 0.5 (Field, 2000). Findings in Table 1:0 showed that the KMO statistic was 0.708 which was significantly high; that is greater than the critical level of significance of the test which was set at 0.5 (Field, 2000). In addition to the KMO test, the Bartlett's Test of Sphericity was also highly significant (Chi-square = 1395.650 with 630 degrees of freedom, at $p < 0.05$). The results of the KMO and Bartlett's Test are summarized in Table 1:0. These results provided an excellent justification for further statistical analysis to be conducted

Table 1:0 KMO and Bartlett's Test

Indicator	**Coefficient**
Kaiser-Meyer-Olkin Measure of sampling Adequacy	0.708
Bartlett's Chi- Square	1395.650
Bartlett's Test of Sphericity df	630
Bartlett's Sig.	0.000

Operational Excellence and management of efficiency levels

Factor Analysis

Factor analysis was conducted after successful testing of sampling adequacy and reliability using KMO coefficient and cronbach alpha results. Factor analysis was conducted using Principal Components Method (PCM) approach. The extraction of the factors followed the Kaiser Criterion where an eigen value of 1 or more indicates a unique factor. Total Variance analysis indicates that the 6 statements on waste reduction can be factored into 1 factor, as shown in Table 1:2.

Table 1:2 Elements of waste reduction

Waste Reduction	KMO	Factor loadings	Overall Cronbach's Alpha	Corrected Item-Total Correlation	Total variance explained
The teams understand the concepts of overproduction	0.688	.834	0.767	0.767	43.15%
The teams understand the concepts of waiting		.641		0.533	
The teams understand the concepts of inventory / working capital		.781		0.446	
The teams understand the concepts of underutilized talent		.688		0.422	
The teams are able to measure wastage per batch		.723		0.705	
The teams are organized and participate in continuous process improvement		.536		0.221	

Total Variance analysis indicates that the 6 statements on Management Practices can be factored into 1 factor. The total variance explained by the extracted factor is 52.42% as shown in Table 1:3. All the factors attracted coefficients of more than 0.4 hence all the statements were retained for analysis. According to Rahn (2010) and Zandi (2006) a factor loading equal to or greater than 0.4 is considered adequate. This is further supported by Black (2002) who asserts that a factor loading of 0.4 has good factor stability and deemed to lead to desirable and acceptable solutions.

International Journal of Academic Research in Business and Social Sciences
2016, Vol. 6, No. 9
ISSN: 2222-6990

Table 1:3 Management Practices

Management Practices	KMO	Factor loadings	Overall Cronbach's Alpha	Corrected Item-Total Correlation	Total variance explained
Do you have modern manufacturing techniques including just-in-time delivery from suppliers, automation, flexible manpower, support systems?	0.627	.631	0.875	0.413	52.42%
Are process improvements made only when problems arise, or are they actively sought out for continuous improvement as part of a normal business processes?		.667		0.476	
Is tracking ad hoc and incomplete, or is performance continually tracked and communicated to all staff?		.743		0.476	
Is performance reviewed infrequently and only on a success/failure scale, or is performance reviewed continually with an expectation of continuous improvement?		.763		0.619	
Are the goals exclusively financial, or is there a balance of financial and non-financial targets?		.571		0.655	
Are performance measures ill-defined, poorly understood, and private, or are they well-defined, clearly communicated, and made public?		.634		0.786	

Total Variance analysis indicates that the 3 statements on Economics of Scale can be factored into 1 factor. The total variance explained by the extracted factor is 51.05% as shown in Table 1:4. All the factors attracted coefficients of more than 0.4 hence all the statements were retained for analysis. According to Rahn (2010) and Zandi (2006) a factor loading equal to or greater than 0.4 is considered adequate. This is further supported by Black (2002) who asserts that a factor loading of 0.4 has good factor stability and deemed to lead to desirable and acceptable solutions.

Table 1:4 Economies of Scale

Economics of Scale	KMO	Factor loadings	Overall Cronbach's Alpha	Corrected Item-Total Correlation	Total variance explained
Do Mergers and consolidations create more profit?	0.574	.787	0.757	0.635	51.05%
Does your firm have specialization and division of labor?		0.728		0.434	
Does your firm buy raw and pack materials in bulk?		.868		0.926	

Table 1:2, Table 1:3 and Table 1:4 shows the factor loadings for operational excellence statements. All the factors attracted coefficients of more than 0.4 hence all the statements were retained for analysis. According to Rahn (2010) and Zandi (2006) a factor loading equal to or greater than 0.4 is considered adequate. This is further supported by Black (2002) who asserts that a factor loading of 0.4 has good factor stability and deemed to lead to desirable and acceptable solutions.

Descriptive results

i. Lean manufacturing and six sigma

The study sought to examine the respondent's level of extent with the variable concerning influence of lean manufacturing and six sigma. The findings in table 1:5 indicate that majority of the respondents (50%) agreed that the teams understand the concepts overproduction (Mean 1.52 and Std. Deviation 0.545). 81% of the respondents agreed that the teams understand the concepts of waiting with Mean 1.85 Std. deviation 0.416. 66% of the respondents agreed that the teams understand the concepts of inventory / working capital with Mean1.86 and Std. deviation 0.564. 67% of the respondents agreed that The teams understand the concepts of over processing with Mean 1.79and Std. deviation0.536 64 % of the respondents agreed that the teams understand the concepts of underutilized talent with Mean 1.74 and Std. deviation 0.561. 57% of the respondents agreed that the teams are able to measure wastage per batch with Mean 1.72 and Std. deviation0.596. 49% of the respondents strongly agreed that the teams have a formal wastage review meeting periodically with Mean1.52 and Std. deviation 0.531. 64% of the respondents also agreed that the teams have a wastage reduction strategy with Mean 1.66 and Std. deviation 0.492. 54% of the respondents strongly agreed that the teams are organized and participate in continuous process improvement with Mean 1.49 and Std. deviation 0.559

Table 1:5 Elements of waste reduction

Elements of waste reduction.	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)	Mean	Std. deviation
The teams understand the concepts overproduction.	49	50	0	1	0	1.52	.545
The teams understand the concepts of waiting.	17	81	2	0	0	1.85	.416
The teams understand the concepts of inventory / working capital.	24	66	10	0	0	1.86	.564
The teams understand the concepts of over processing.	27	67	6	0	0	1.79	.536
The teams understand the concepts of underutilized talent.	31	64	4	1	0	1.74	.561
The teams are able to measure wastage per batch	36	57	7	0	0	1.72	.596
The teams have a formal wastage review meeting periodically.	49	49	1	0	0	1.52	.531
The teams have a wastage reduction strategy.	35	64	1	0	0	1.66	.492
The teams are organized and participate in continuous process improvement.	54	43	3	0	0	1.49	.559

ii. Formalized management systems and procedures

The study sought to examine the respondent's level of extent with the variable concerning influence of lean manufacturing and six sigma. The findings in table 1:6 indicate that majority of

International Journal of Academic Research in Business and Social Sciences
2016, Vol. 6, No. 9
ISSN: 2222-6990

the respondents (99%) agreed that have modern manufacturing techniques including just-in-time delivery from suppliers, automation, flexible manpower, support systems (Mean 1.54 and Std. Deviation 0.515). 95% of the respondents agreed that the process improvements made only when problems arise, or are they actively sought out for continuous improvement as part of a normal business processes with Mean 1.87 Std. deviation 0.472. The findings indicate that majority of the respondents (88%) agreed Performance reviewed infrequently and only on a success/failure scale, or is performance reviewed continually with an expectation of continuous improvement Mean 1.88 and Std. deviation 0.649.

Table 1:6 Elements of management practices

Elements of management practices.	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean	Std. deviation
Do you have modern manufacturing techniques including just-in-time delivery from suppliers, automation, flexible manpower, support systems?	47	52	1	0	0	1.54	.515
Are process improvements made only when problems arise, or are they actively sought out for continuous improvement as part of a normal business processes?	19	76	5	0	0	1.87	.472
Is tracking ad hoc and incomplete, or is performance continually tracked and communicated to all staff?	28	65	7	0	0	1.78	.553
Is performance reviewed infrequently and only on a success/failure scale, or is performance reviewed continually with an expectation of continuous improvement?	25	63	9	2	0	1.88	.649
Are the goals exclusively financial, or is there a balance of financial and non-financial targets?	35	63	1	1	0	1.67	.531
Are performance measures ill-defined, poorly understood, and private, or are they well-defined, clearly communicated, and made public?	38	57	4	0	0	1.66	.561

iii. Economies of scale

The study sought to examine the respondent's level of extent with the variable concerning influence of lean manufacturing and six sigma. The findings in table 1:7 indicate that majority of the respondents (49%) agreed that mergers and consolidations create more profit (Mean 1.567 and Std. Deviation 0.568). 81% of the respondents agreed that the Does your firm have specialization and division of labor with Mean 1.821 Std. deviation 0.404. 99% of the respondents agreed that Does your firm buy raw and pack materials in bulk with Mean 1.597 and Std. deviation 0.522

Table 1:7 Elements of economies of scale

Elements of economies of scale.	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)	Mean	Std. deviation
Do Mergers and consolidations create more profit?	47	49	4	0	0	1.567	0.568
Does your firm have specialization and division of labor?	19	81	1	0	0	1.821	0.404
Does your firm buy raw and pack materials in bulk?	42	57	1	0	0	1.597	0.522

iv. Influence of Operational Excellence on the management of efficiency levels

The objective of the study was to establish the influence of Operational Excellence on the management of efficiency levels in the pharmaceutical industry in Kenya. From the summary in table 1:5, table 1:6 and table 1:7 above indicate that majority of the respondents (50%) agreed that the teams understand the concepts overproduction. 81% of the respondents agreed that the teams understand the concepts of waiting. 66% of the respondents agreed that the teams understand the concepts of inventory / working capital with . 57% of the respondents agreed that the teams are able to measure wastage per batch. 49% of the respondents strongly agreed that the teams have a formal wastage review meeting periodically. The findings in table 4:12, table 4:13 and table 4:14 indicate that majority of the respondents (99%) agreed that they have modern manufacturing techniques including just-in-time delivery from suppliers, automation, flexible manpower, support systems. 95% of the respondents agreed that the process improvements are made only when problems arise, or are they actively sought out for continuous improvement as part of a normal business processes. The findings indicate that majority of the respondents (88%) agreed performance is reviewed infrequently and only on a success/failure scale. The findings in table 1:5, table 1:6 and table 1:7 indicate that majority of

the respondents (49%) agreed that mergers and consolidations create more profit. 81% of the respondents agreed that their firm have specialization and division of labor with. 99% of the respondents agreed that their firms buy raw and pack materials in bulk. These findings are in line with Philipp, Martin and Ulf, (2009) in their article titled "Maximizing efficiency in pharma operations" who concluded that by matching the productivity of top drug makers, average ones could enjoy labor and unit-cost savings worth five to six percentage points of earnings before interest and taxes.

Test of Assumptions of the Study Variables

When the assumptions of the linear regression model are correct, ordinary least squares (OLS) provides efficient and unbiased estimates of the parameters (Long & Ervin, 2000). To ensure that there was no violation of the assumptions, this study tested for linearity, homoscedasticity, and multicollinearity. Linearity refers to the consistent slope of change that represents the relationship between an independent variable and a dependent variable. If the relationship between the independent and the dependent variables is radically inconsistent, then structural equation modeling analyses will be difficult to carry out (Mark, 2003). If the significant value for deviation from linearity is less than 0.05, the relationship between independent and dependent variables is not linear, and this presents problems during modeling. Mark also states that issues of linearity can also be fixed by removing outliers. This shall be shown by the normal Q-Q plot.

Outliers and Normality Tests of the Study Variables

Outliers were tested univariately on the dependent variable because the dependent variable constructs were in continuous scales. Univarate outliers are extreme values for a single variable (Tabachnick and Fidell, 2007). The results did not show outliers. This was further evidenced in the testing of normality, where the cut-off points for skewness and kurtosis are shown to be outside the -1 and +1 range and more than three times the standard deviation (Kline, 2005).

Normality Test

The normality of data distribution was assessed by examining its skewness and kurtosis (Kline, 2005). A variable with an absolute skew-index value greater than 3.0 is extremely skewed while a kurtosis index greater than 8.0 is an extreme kurtosis (Kline, 2005). Cunningham and Heathcote, (1989) stated that an index smaller than an absolute value of 2.0 for skewness and an absolute value of 7.0 is the least violation of the assumption of normality. The results of the normality test of the dependent variable indicated skewness and kurtosis in the range of -1 and +1 as shown in table 1:8. Table 1:8 shows that operational excellence had a skewness coefficient of -0.579 and its kurtosis coefficient being -0.243. Based on these it was concluded that data was normally distributed since they lie within the ± 1 range recommended by (Myoung , 2008)

Table 1:8 O.E Normality Test

Operational Excellence	Statistic	Std. Error
Mean	1.8103	.02456
Median	1.8848	
Std. Deviation	.28431	
Skewness	-.579	.209
Kurtosis	-.243	.416

To corroborate the skewness and kurtosis results, the graphical analysis results showed the line representing the actual data distribution closely follow the diagonal in the normal Q-Q plot as shown in figure 1:1, suggesting normal distribution (Hair,Black, Babin,Anderson & Tatham, 2006). In Q-Q plot, or the normal probability plot, the observed value for each score is plotted against the expected value from the normal distribution, where, a sensibly straight line suggests a normal distribution. By and large, if the points in a Q-Q plot depart from a straight line, then the assumed distribution is called into question (Aas and Haff, 2006).

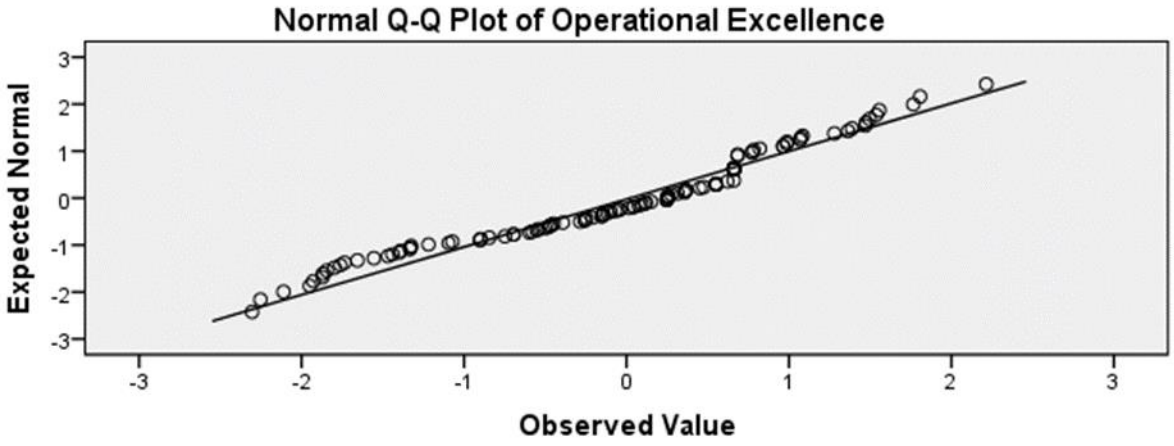


Fig 1:1 Q-Q Plot for O.E

International Journal of Academic Research in Business and Social Sciences
2016, Vol. 6, No. 9
ISSN: 2222-6990

The dependent variable should be normally distributed because the study was using a multiple linear regression model, where the condition of normality must be satisfied. One way to make it very likely to have normal residuals is to have a dependent variable that is normally distributed and predictors that are all normally distributed (Shenoy and Madan, 1994). Figure 1:1 shows the normal Q-Q plot which indicates that the condition of normality for operational excellence is satisfied .The quantile-quantile (Q-Q) plot is an excellent way to see whether the data deviate from normal (the plot has been set up to see whether the data deviate from other distributions but only interested in the normal distribution). Quantile plot determines whether the proportion of the observed scores fall below any one score, then the z score that would fit that proportion if the data were normally distributed is calculated, and finally that z score that would cut off that proportion (the expected normal value) is translated back into the original metric to see what raw score that would be. According to Shenoy and Madan (1994), for a variable to be normally distributed most of the points should lie on the theoretical Quantile line. The theoretical Quantile line of the data is fitted and from the Normal Q-Q Plot it indicates that the observed values versus the expected normal values are randomly distributed along the line of best fit indicating that the dependent variable is normally distributed. In case the dependent variable is not normally distributed then normality has to be sought for before proceeding to check whether the dependent variable is influenced by the other independent variables

Relationship between O.E and the Management of Efficiency Levels

Table 1:9 shows the correlation results which indicate that there was a positive and significant relationship between operational excellence and the management of efficiency levels. This reveals that any positive change in operational excellence led to increased efficiency. The relationship has been illustrated by the correlation co-efficient of 0.182, implying a positive relationship between operational excellence and the management of efficiency levels. This was also evidenced by the p value of 0.035 which is less than that of critical value (0.05).

Table 1:9 Correlation of O.E

Correlations

		Management Efficiency	Operational Excellence
Management Efficiency	Pearson Correlation	1	.182*
	Sig. (2-tailed)		.035
	N	134	134
Operational Excellence	Pearson Correlation	.182*	1
	Sig. (2-tailed)	.035	
	N	134	134

*. Correlation is significant at the 0.05 level (2-tailed). Hence the it is positive and significant coz 0.182, p value is 0.035 which is less than 0.05

Regression analysis was conducted to empirically determine whether operational excellence was a significant determinant of management of efficiency levels in pharmaceutical industry in Kenya. The coefficient of determination R2 and correlation coefficient (r) shows that the degree of association between the independent variable and market promotion. The results of the linear regression indicate R2= 0.145 and R= .380 as shown in table 1:10. This is an indication that there is a significant relationship between independent variable operational excellence and the dependent management of efficiency levels.

From the model summary table 1:10 adjusted R2 was 0.137 this indicates that operational excellence can explain 14.5% of variations in management of efficiency levels. Therefore further research should be conducted to investigate these other factors that affect management of efficiency levels in pharmaceutical industry in Kenya.

Table 1:10 Model summary of O.E

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.380[a]	.145	.137	.80707

a. Predictors: (Constant), Operational Excellence

b. Dependent Variable: Management Efficiency

The overall model significance was presented in table 1:11 An F statistic of 7.247 indicated that the overall model was significant as it was less than the critical F value of 7.247 with (1, 109) degrees of freedom at the P=0.05 level of significance. The findings indicates that operational excellence was statistically significant in explaining management of efficiency in the pharmaceutical industry in Kenya.

Table 1:11 ANOVA of O.E

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.720	1	4.720	7.247	.008[b]
	Residual	70.347	108	.651		
	Total	75.067	109			

a. Dependent Variable: Management Efficiency

Table 1:12 Coefficients of O.E

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.280	.108		2.604	.011
	Operational Excellence	.477	.177	.380	2.691	.008

a. Dependent Variable: Management Efficiency

The operational excellence coefficients are presented in table 1:12. The results show that operational excellence contributes significantly to the model since the p-value for the constant and gradient is less than 0.05. The fitted equation is as shown below.

Y= Management Efficiency; X1= Operational Excellence

Y= 0.280+ 0.477 Operational Excellence

These findings are in line with Pavlovic and Božanic, (2012) who found out that lean thinking and Six Sigma have been utilized by manufacturing industries to decrease cost and improve quality and productivity by reducing variation and production defects. Because of the dramatic successes in manufacturing, there is rising interest among companies in the pharmaceutical industry, which chooses to implement lean in order to accomplish such goals as decreased wait time to release product to the market, reduce production waste, and improve communication with end users and raise quality level both in the production and in testing laboratories.

Management of Efficiency Levels

This section presents the results for the dependent variable which is management of efficiency levels in the pharmaceutical industry in Kenya

Factor Analysis

Factor analysis was conducted after successful testing of sampling adequacy and reliability using KMO coefficient and cronbach alpha results. Factor analysis was conducted using Principal Components Method (PCM) approach. The extraction of the factors followed the Kaiser Criterion where an eigen value of 1 or more indicates a unique factor. Total Variance analysis indicates that the 2 statements on management of efficiency levels can be factored into 1 factor. The total variance explained by the extracted factor is 60.96% as shown in table 1:13

Table 1:13 Product Quality KMO

Product Quality.	KMO	Factor loadings	Overall Cronbach's Alpha	Corrected Item-Total Correlation	Total variance explained
Quality Management has a critical role in the success of the business	0.5	.781	0.785	0.775	60.96%
There are defined specification limits for Critical to Quality Product Attributes		.781		0.775	

Table 1:13 shows the factor loadings for management of efficiency levels. All the two factors attracted coefficients of more than 0.4 hence all the statements were retained for analysis. A factor loading equal to or greater than 0.4 is considered adequate. This is further supported by Hair,Black, Babin,Anderson & Tatham, (2006) who asserts that a factor loading of 0.4 has good factor stability and deemed to lead to desirable and acceptable solutions

Descriptive Analysis

The study sought to examine the respondent's level of extent with the dependent variable management of efficiency levels. The summary of the findings in table 1:14 indicate that majority of the respondents (60%) agreed that profit within expectations. This is in line with the report by Simonetti, Clark and Wamae, (2016) who opinioned that Kenya's pharmaceutical production grew continuously from 2007 to 2013. In that period total production of tablets, capsules, liquid preparations for oral use and creams/ointments alone increased from US$34.1 million to US$154 million

Table 1:14 Profitability for Four Years

Overall level of profitability for the last four years

	Frequency	Percent
profit above expectation	2	1
profit within expectations	80	60
profit below expectations	6	4
Break even within expectations	45	34
Loss making bearable	1	1
Total	134	100

Normality Test

The normality of data distribution was assessed by examining its skewness and kurtosis (Kline, 2005). A variable with an absolute skew-index value greater than 3.0 is extremely skewed while a kurtosis index greater than 8.0 is an extreme kurtosis (Kline, 2005). Cunningham (2008) stated that an index smaller than an absolute value of 2.0 for skewness and an absolute value of 7.0 is the least violation of the assumption of normality. The results of the normality test of the dependent variable indicated skewness and kurtosis in the range of -1 and +1 as shown in table 1:15. This implies that the assumption of normality was satisfied. The results presented in table 1:15 shows that management of efficiency levels had a skewness coefficient of -0.642 and its kurtosis coefficient being -0.331. Based on these it was concluded that data was normally distributed since they lie with the ± 1 range recommended by Myoung (2008).

Table 1:15 Normality of Management of Efficiency Levels

Management of efficiency levels	Statistic	Std. Error
Mean	3.8528	.09964
Median	3.5587	
Std. Deviation	1.15343	
Skewness	.642	.209
Kurtosis	-.331	.416

To corroborate the skewness and kurtosis results, the graphical analysis results showed the line representing the actual data distribution closely follow the diagonal in the normal Q-Q plot as shown in figure 1:15, suggesting normal distribution (Hair, Tatham, Anderson & Black, 2006). In Q-Q plot, or the normal probability plot, the observed value for each score is plotted against the expected value from the normal distribution, where, a sensibly straight line suggests a normal distribution. By and large, if the points in a Q-Q plot depart from a straight line, then the assumed distribution is called into question (Aas & Haff, 2006).

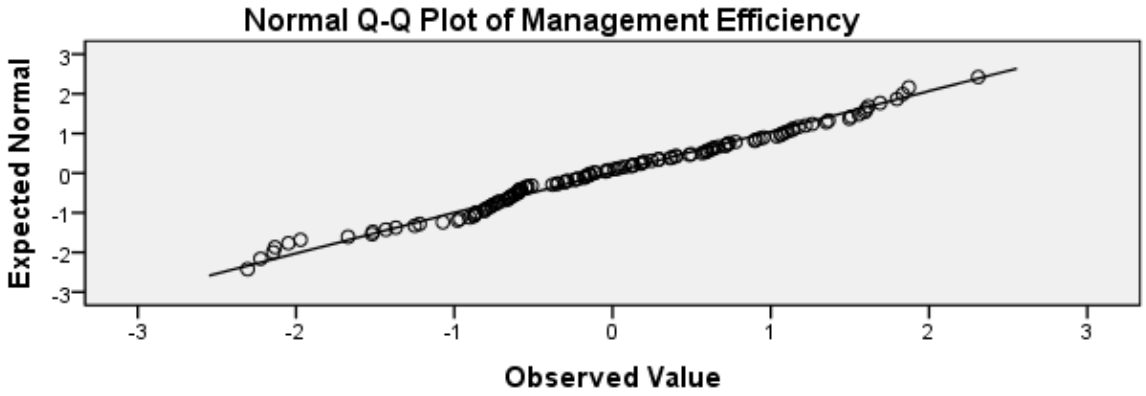


Fig 1:2 Q-Q Plot Management of Efficiency

The dependent variable should be normally distributed because the study was using a multiple linear regression model, where the condition of normality must be satisfied. According to Shenoy and Madan (1994), for a variable to be normally distributed most of the points should lie on the theoretical Quantile line. The theoretical Quantile line of the data is fitted and from the Normal Q-Q Plot it indicates that the observed values versus the expected normal values are randomly distributed along the line of best fit indicating that the dependent variable is normally distributed.

Multicollinearity Test

Multicollinearity is the undesirable situation where the correlations among the independent variables are strong. In other words, multicollinearity misleadingly bloats the standard errors. Thus, it makes some variables statistically insignificant while they should be else significant. Tolerance of a respective independent variable is calculated from 1 - R2. A tolerance with a value close to 1 means there is little multicollinearity, whereas a value close to 0 suggests that multicollinearity may be a threat (Belsley, Kuh, and Welsch, 1980) . The reciprocal of the tolerance is known as Variance Inflation Factor (VIF). Equally, the VIF measures multicollinearity in the model in such a way that if no two independent variables are correlated, then all the VIF values will be 1, that is, there is no multicollinearity among factors. But if VIF value for one of the variables is around or greater than 5, then there is multicollinearity associated with that variable. Table 1:16 indicates the test results for multicollinearity, using both the VIF and tolerance. With VIF values being less than 5, it was concluded that there was no presence of multicollinearity in this study. The VIF shows us how much the variance of the coefficient estimate is being inflated by multicollinearity.

Table 1:16 Multicollinearity Test

	Collinearity Statistics	
Variables	Tolerance	VIF
Operational Excellence	.639	1.565

Test of Operational Excellence Hypothesis

The hypothesis states that there is a significant positive influence of operational excellence on management of efficiency levels in the pharmaceutical industry in Kenya.
To test the hypothesis linear multiple regression is done which gives outputs given in table 1:17, table 1:18 and table 1:19. The value of R = 0.380 which shows that the relationship between operational excellence and management of efficiency levels in the pharmaceutical industry in Kenya is strong and positive. Coefficient of determination is 0.145 which implies that 14.5% changes in management of efficiency can be explained by variation in operational excellence.

Table 1:17 O.E Hypothesis Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.380[a]	.145	.137	.80707

a. Predictors: (Constant), Operational Excellence
b. Dependent Variable: Management Efficiency

The ANOVA table 4:66 shows F value = 7.247, alpha (α) = 0.01 and P value = 0.008. F value falls within the rejected region. Since α is > than P value, and we fail to reject the Alternative hypothesis.

Table 1:18 O.E Hypothesis ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.720	1	4.720	7.247	.008[b]
	Residual	70.347	108	.651		
	Total	75.067	109			

a. Dependent Variable: Management Efficiency
b. Predictors: (Constant), Operational Excellence

Table 1:19 O.E Hypothesis Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.280	.108		2.604	.011
	Operational Excellence	.477	.177	.380	2.691	.008

a. Dependent Variable: Management Efficiency

There is a positive significant influence of operational excellence on management of efficiency levels in the pharmaceutical industry in Kenya as the regression Coefficient of Operational Excellence is .477 which is positive and significant (p value is 0.008 which is less than 0.05) hence the study fails to reject the hypothesis and concludes that there is a positive significant influence of operational excellence on management of efficiency levels in the pharmaceutical industry in Kenya.

Discussion of Research Findings

The result on the influence of operational excellence on management of efficiency levels in the pharmaceutical industry in Kenya s has shown a relatively strong positive relationship. The overall model was found to have a fit with a high Pearson's correlation coefficient. The research found that the strategy was popular. There is a significant positive influence of operational excellence on management of efficiency levels in the pharmaceutical industry in Kenya. If the firm's cost of sale or cost of raw material is lower than its competitors, then the firm can offer lower prices, higher quality, or both (Spulber, 2009). Operationally excellent companies deliver a combination of quality, price, and ease of purchase that no one else in their market can match. They are not product or service innovators, nor do they cultivate one-to -one relationships with customers. They execute extraordinarily well, and their proposition to customers is guaranteed low price or hassle-free service, or both. Supply chains and basic services that have been optimized and streamlined to minimize costs and hassle. Operations that are standardized, simplified, tightly controlled, and centrally planned, leaving few decisions to the discretion of rank-and-file employees. Management systems that focus on integrated, reliable, high-speed transactions and compliance to norms. A culture that abhors waste and rewards efficiency.

Conclusion

The objective of the study was to establish the influence of operational excellence on the management of efficiency levels in the pharmaceutical industry in Kenya. The study findings indicated that there was a positive and significant relationship between operational excellence and the management of efficiency levels. This reveals that any positive change in operational excellence led to increased efficiency.

These results are in line with the resource-based view (RBV) theory as a basis for the competitive advantage of a firm which lies primarily in the application of a bundle of valuable tangible or intangible resources at the firm's disposal Penrose, (1959) to transform a short-run competitive advantage into a sustained competitive advantage which requires that these resources are heterogeneous in nature and not perfectly mobile. The firm is a bundle of resources and capabilities. These resources and capabilities are made up of physical, financial, human and intangible assets. The theory is conditioned on the fact that resources are not homogenous and are limited in mobility. The firm can translate these resources and capabilities

into a strategic advantage if they are valuable, rare, and inimitable. This difference is manifested in two ways. First, firms with superior resources can earn profits in competitive markets because they produce more efficiently than others. What is key is that the superior resource remains in limited supply. Second, firms with market power can earn monopoly profits from their resources by deliberately restricting output. Heterogeneity in monopoly models may result from differentiated products, intra-industry mobility barriers, or first-mover advantages

Recommendation

Based on the results, findings and conclusions the following recommendations have been proposed.

The study established that the pharmaceutical firms were adopting various competitive strategies in order to achieve competitive advantage. It is recommended that the firms adopt strategies that would ensure that the production of drugs is maintained at its lowest cost so that they can offer products at the lowest price and achieve competitive advantage over its competitors.

Operational excellence was found to be statistically significant in explaining management of efficiency levels in the pharmaceutical industry in Kenya and therefore in order to survive and prosper in a rapidly changing environment, the firms should strive to implement operational excellence by providing value by offering the best total cost for a product, with an emphasis on a combination of quality, price and delivery systems. Given two companies with the same strategy, the operationally excellent company will have lower operational risk, lower operating costs and increased revenues relative to its competitors, which creates value for customers and shareholders.

Acknowledgement

First and foremost, I would like to thank my supervisors Dr. Esther Waiganjo and Dr. Agnes Njeru who taught me and for their support and feedback on my work, for the fruitful collaboration on papers, and for always responding to my questions at any time of day or night. In particular, I also would like to express my gratitude to my superiors Ahsan Manji and Pritpal Deogun for their strong support and for giving me time to study. I would like to express my sincere gratitude to my mentors Mike Tyler, Clive Ernstzen and Susan Munyiri for always encouraging me to practice Lean Six Sigma. Last but not least, I would like to express my sincere gratitude to my family for the sacrifice made during my study.

References

Aas and Haff, K. (2006). The Generalized Hyperbolic Skew Student's t-Distribution,. *Journal of Financial Econometrics, 4(2)*, 275–309.

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management, 17(1):*, 99-120

Bellm, D. (2014). *Operational Excellence in the Pharmaceutical Industry – An Architecture for Emerging Markets.* St.Gallen: University of St.Gallen, School of Management, Economics, Law, Social Sciences and International Affairs.

Benner and Tushman, M. J. (2003). Exploitation, exploration, and process management: the productivity dilemma revisited. *Academy of Management Review 28 (2),* , 238–256.

Belsley, Kuh, and Welsch, D. A. (1980). *Regression Diagnostics: Identifying Influential Data and Sources of Collinearity.* New York: : John Wiley and Sons.

El-Namrouty and AbuShaaban, K. (2013). Seven Wastes Elimination Targeted by Lean Manufacturing Case Study "Gaza Strip Manufacturing Firms''. *International Journal of Economics, Finance and Management Sciences. Vol. 1, No. 2,*, 68-80

Guesmi, B. (2013). *The productive efficiency in agriculture: recent methodological advances.* Barcelona: Universitat Politècnica de Catalunya.

Hair,Black, Babin,Anderson & Tatham, J. (2006). *Multivariate Data Analysis (6th Edition).* Upper Saddle River, NJ: : Prentice-Hall.

Hasan and Wanyanga, S. (2010). *Pharmaceutical Sector Profile: Kenya Global UNIDO Project: Strengthening the local production of essential generic drugs in the least developed and developing countries.* Nairobi: UNIDO Project.

KAM. (2015, January). *11th Edition Kenya Manufacturers and Exporters Directory 2015*. Nairobi: Kenya Association of Manufacturers

Kline, R. B. (2005). *Principles and practice of structural equation modeling.* New York: The Gilford press.

Kothari , C. (2004). *Research Methodology: Methods and Techniques, 2nd edition.* New Delhi, India: New age International Publishers.

Kotler, P. (2001). *A Framework for Marketing Management.* New Delhi: Pearson.

Lieder, M. (2014). *Integrated evaluation of resource efficiency and cost effectiveness in production systems.* Stockholm: KTH Royal Institute of Technology.

Long and Ervin, S. J. (2000). *Using Heteroscedasticity Consistent Standard Errors in the Linear Regression Model.* Indiana: Indiana University.

Macro Planning Directorate . (2008). *A Summary of key investment opportunities in Kenya.* Nairobi: Vision 2030,.

Mugenda & Mugenda , O. M. (2003). *Research Methods Quantitative and qualitative approaches.* Nairobi: Acts Press.

Myoung , H. P. (2008). *Univariate Analysis and Normality Test Using SAS ,Stata, and SPSS.* Indiana: The Trustees of Indiana University.

Olsen and Marie, D. (2004, February 20). *Cross-Sectional Study Design and Data Analysis.* Retrieved from http://www.collegeboard.com: http://www.collegeboard.com/prod_downloads/yes/4297_MODULE _05.pdf

Pavlovic and Božanic, K. (2012). Lean and Six Sigma concepts application in Pharmaceutical Industry. *International Journal for Quality research Vol.6, No. 1,*, 23-28.

Peteraf , M. A. (1993). The Cornerstones of Competitive Advantage: A Resource-Based View. *Strategic Management Journal , Vol. 14,*, 179-191

Philipp , Martin and Ulf , P. (2009, August 15). *Maximizing efficiency in pharma operations.* Berlin: McKinsey & Company. Retrieved from http://www.mckinsey.com/business-functions/operations/our-insights/maximizing-efficiency-in-pharma-operations: http://www.mckinsey.com/business-functions/operations/our-insights/maximizing-efficiency-in-pharma-operations

Seifert, C. (2013). *Achieving Operational Excellence in the Face of Complexity . .* London,: Wilson Perumal & Company, Ltd .

Simonetti,Clark and Wamae, R. (2016). *Pharmaceuticals in Kenya:The Evolution of Technological Capabilities.* Nairobi: Creative Commons Attribution.

Shenoy and Madan, G. V. (1994). *Statistical methods in business and social sciences.* New Delhi: Macmillan.

Spulber, D. F. (2009). *Economics and Management of Competitive Strategy.* World Scientific Publishing Company.

UNIDO. (2010). *Pharmaceutical Sector Profile: Kenya: Global UNIDO Project.* Nairobi: United Nations Industrial Development Organization.

Vermaak, T. D. (2008). *Critical success factors for the implementation of lean thinking in South African manufacturing organizations.* Johannesburg: University of Johannesburg

Wamae & Kungu, W. J. (2014). *Pharmaceutical manufacturing in Kenya:key trends and developments.* Nairobi: African centre for Technology studies.

Were, Sharif, & Samuel, S. (2008, December). *National HealthStrategic Plan for Kenya.* Retrieved from Ministry of Public Health and Sanitation: www.publichealth.go.ke/ministy_of_public_health_and_sanitation_. National Health Strategic Plan