OPERATIONAL EXCELLENCE AND COMPETITIVENESS OF KENYAN MANUFACTURING FIRMS

BY

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REGISTRATION NO. D61/72461/2011

THIS RESEARCH PROJECT IS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DEGREE OF MASTER OF BUSINESS ADMINISTRATION OF THE UNIVERSITY OF NAIROBI, SCHOOL OF BUSINESS.

October, 2015

DECLARATION

I hereby declare that this research proposal is my own work and that it has not been submitted anywhere for any award.

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APPROVAL

This research project has been submitted for examination with my approval as the University Supervisor.

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ACKNOWLEDGEMENTS

I recognize my project supervisor Dr. Owino Okwiri for his guidance and support in writing the research proposal, data collection and analysis and final report compilation. I am also grateful to the academic staff of the School of Business for facilitating this research project in their various capacities.

DEDICATION

To my family and friends.

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ABSTRACT

The operations function of a business plays a critical role in the attainment or sustainment of a competitive advantage in the market. Firms must develop certain core capabilities that enable them create more customer value than their competitors by balancing product cost with product quality and delivery flexibility with delivery speed thus achieving operational excellence. This study sought to determine the process-based and system-based capabilities employed by Kenyan manufacturing firms, to model operational excellence in terms of these capabilities and to determine how operational excellence as a concept influences customer value perception as an indicator of competitiveness. Self-administered questionnaires were used to collect data from a sample of 51 manufacturing firms obtained through stratified random sampling from the Manufacturers and Exporters Directory list of the Kenya Association of Manufacturers. A test of mean differences was used to determine the process-based and system-based capabilities emphasized by sampled firms. Multiple regression was used to model operational excellence in terms of process-based and system-based capabilities and liner regression was be used to determine the relationship between operational excellence and customer value perception. A test for goodness of fit was used to assess the validity of the relationships established from both multiple regression and linear regression.

CHAPTER ONE INTRODUCTION

1.1. Background of the Study

Economic growth is driven by an increase in aggregate demand (local and foreign) and aggregate supply which is predominantly achieved through both government spending and private enterprises. For a country to achieve sustainable economic growth, high levels of efficiency and effectiveness must be achieved in its key growth sectors to make them competitive. The manufacturing sector is a key growth sector particularly in developing economies due to its high value addition capacity which can lead to a favorable balance of payments. The competitiveness of manufacturing firms is traceable to efficient and effective production operations which leads to an increase in productivity enabling the firms to create superior value for their customers.

The operations element of a business represents the part of the business where a firm employs its capabilities in its day to day activities to transform a set of inputs into outputs that have more value for the end user than the sum of the inputs combined (Tan and Rupert, 2009). Inputs can be in the form of people, information, energy, materials and technology while outputs are in the form of services, physical products or both. Transformation can be in the form of physical transformation of materials into products, transportation of products to the intended customers, storing products to increase their value, repackaging etc.

To guide the day to day activities within the operations function of a business, firms employ an operations strategy with is a reconciliation of the business strategy with internal process capabilities. At the heart of the operations strategy is the maximization of customer value. In pursuing customer value maximization, firms seek to achieve one or more of the four operations performance objectives; cost, quality, flexibility and speed (Waters, 2006). Excelling in one or more of these operations performance objectives in a given target market is what entails operational excellence. However, operational excellence can only lead to a competitive advantage in a given target market if it is used with responsiveness to customer requirements (Barnes, 2008).

A firm attains a competitive advantage in a given market when it is able to create more customer value than competing firms. Customer value is the difference between product benefits as perceived by buyers and the cost of producing the product (Barnley and Hesterly, 2008). Operational excellence is one route firms may use to achieve greater customer value.

1.1.1. Operational Excellence

Operational excellence entails having superior performance in one or more of the following operations performance objectives; quality, cost, flexibility and speed (Barnes, 2008). For a firm's products to remain competitive in a given target market, the firm must determine the relative importance of these competitive factors in the market and effectively deploy an operations strategy that is consistent with market requirements. Firms have a set of conflicting objectives at the operational level: to offer superior customer value and to efficiently utilize internal resources to produce products. This entails balancing cost with quality and flexibility with speed.

Quality takes several dimensions depending on customer requirements and the nature of operations namely service operations or manufacturing operations. For manufacturing operations, these dimensions include performance, features, reliability, conformance, durability, serviceability, aesthetics, perceived quality etc. (Zhang, 2001). These are determined by product design but the operations function contributes to their attainment through conformance to design specifications (Dilworth, 1992). Cost represents the monetary value of producing a firm's products. Buyers generally seek the maximum gain from a product for the cost they have to bear. Maximization of this gain, an aspect of quality, might involve extra costs but a firm must price its products at a price that its customers can sacrifice for the product. Excelling in these two conflicting performance objectives simultaneously requires high levels of efficiency and effectiveness by carrying out the right activities correctly (Tan and Rupert, 2009)

Flexibility is achieved through short production runs which allow delivery of a wide range of products so as to accommodate changes in customer requirements. A firm's flexibility can also be evaluated by its ability to quickly change production volume to suit high or low customer demand (Barnes, 2008). To perform excellently on flexibility, a firm may require reserve capacity, multi-skilled workers, versatile processing equipment, low setup time and cost etc. High delivery speed is characterized by shorter lead times associated with short queues, fast production throughput, efficient flow of materials etc. To excel on delivery speed, a firm may need to keep higher levels of inventory, highly effective supply chains, low equipment failures, efficient scheduling etc.

Operational excellence seeks to achieve some or all the operational objectives of a firm by producing products that are perceived to have superior value in the market while retaining high internal efficiency.

1.1.2. Drivers of Operational Excellence

Organizational success in operations is driven by certain core capabilities that differentiate a firm from its competitors; these are process-based capabilities, system-based capabilities and organization based capabilities (Chase et al., 2004). Process-based capabilities relate to the activities that transform inputs into outputs such as process selection or design, planning and control and project management. System-based capabilities involve a broad engagement of the entire operating system for example supply chain management and quality management systems. Organization based capabilities are developed at the strategy level and involve decisions such as new product or technology deployment, facility location etc. Operational excellence is driven by both process and system-based capabilities (Chase et al., 2004). For a firm to attain and retain a competitive advantage in the market, these capabilities must be superior to those of competing firms in their efficiency, effectiveness and responsiveness to customer requirements.

Process-based capabilities are developed by selecting or designing, operating and controlling processes and/or projects that create value for the customer. The objective of a firm is to design and operate processes which give the firm an ability to produce at an advantage compared to competing firms thus enabling the firm to offer superior customer value (Dilworth, 1992). To create superior customer value, process-based capabilities must be both more efficient and effective than those of competing firms. Efficiency is improved by use of fewer resources to produce by consistently doing the right things correctly which minimizes the unit production cost. A firm can improve the effectiveness of its processes by focusing on doing the right things to create the most value for the customer by eliminating non-value adding activities. The quality of a product is directly related to value created therefore process-based capabilities enable a firm to achieve operations competitive factors of both quality and cost (Chase et al., 2004).

System-based capabilities relate to the coordination of the process-based capabilities enabling the firm to achieve operations competitive factors such as flexibility and delivery speed (Chase et al., 2004). Through supply chain management, a firm can shorten order lead times by coordinating process-based capabilities such as materials management and production scheduling with the external factory for quick supply of materials and delivery of the products to customers. Quality management enables a firm to coordinate process capabilities with customer requirements enabling the firm achieve flexibility objectives such as customizing demand volume, product modifications etc. System-based capabilities help a firm maximize customer value through the effective

coordination of process-based capabilities and linking them to the broader organizational capabilities. These capabilities must also therefore be more efficient and more effective than those of competitors for the firm to attain a competitive advantage.

1.1.3. Manufacturing Industry in Kenya

The manufacturing industry in Kenya is ranked fourth in the list of sector contribution to Kenya's GDP behind wholesale and retail trade, transport and communication and agriculture and forestry (KNBS, 2014). According to KNBS, the sector contributed 9.7% to Kenya's GDP in 2013 after an annual growth rate of 4% from the year 2010. The sector's growth rate is below the target envisioned in Kenya's development blueprint (Vision 2030) of 10% (www.vision2030.go.ke). Due to the sector's ability to create wealth and employment for people from different demographic levels, it is a key sector that should be improved if Kenya is to meet her ambitious goal of joining the ranks of other high income countries by the year 2030 (Kenya Economic Update December 2014 Edition No. 11)

The sector's growth rate has remained relatively low compared to Kenya's peers in the 1960s such as Korea and Malaysia (Kenya: Policies for prosperity 2010). Korea and Malaysia registered trade surpluses in their balance of payments of $81 billion and $11 billion in 2013 while Kenya had a deficit of $4 billion. This can be attributed to the low value of Kenyan exports, particularly manufactured goods. For instance, while Kenyan exports in services where 25 times and 9 times less in value compared to Korea and Malaysia respectively in 2013, Kenyan exports in manufactured goods were 221 times and 63 times less in value compared to Korea and Malaysia respectively (World Bank development indicators 2015). Although a deficit in a country's balance of payments is not detrimental to its economic growth provided the country can service the debt, Kenya needs to boost her exports to gain the hard currency required to acquire capital goods needed for value addition.

Structural inefficiencies such as poor infrastructure, ineffective sector regulation to allow fair competition, poor access to finance etc. are a source of this poor sector competitiveness although productivity differences across firms in the sub-sectors are also very high while companies with higher productivity are also not growing as fast as younger companies in certain subsectors (Kenya Economic Update December 2014 Edition No. 11). Existence of firm level productivity differences indicate that apart from the structural inefficiencies, the operational inefficiency at the

firm level across some firms in the subsectors could also be fueling the low competitiveness of the Kenyan manufacturing industry. With competitively priced exports from China and India finding access to Kenya's traditional export markets as well as inside Kenya, the sector's low competitiveness will continue to negatively impact Kenya's balance of payments and hinder the overall long-term economic growth. To reverse the current trend, firms have to develop innovative ways to address the key issues that lead to low competitiveness. These are low process efficiency which leads to low productivity and process ineffectiveness which results in low customer value creation.

1.2. Research Problem

There are two types of internal capabilities that a firm can use to achieve operational excellence: these are process-based or system-based capabilities. Through operational excellence, a firm can improve its competitiveness by creating a high customer value perception in its target market. Customer value perception is driven by effective and efficient deployment of the internal capabilities to achieve high levels of product quality and productivity. High productivity enables a firm to reduce its production cost per unit, deliver orders quickly and retain product or production volume flexibility. To sustain a high customer value perception however, the firm's internal capabilities must be responsive to changes in customer requirements.

The primary objective of managers is to improve the company's net-worth by increasing the profits realized from sales. This objective is realized through the marketing and operations functions of the business. The operations function plays a key role of efficiently utilizing the firm's productive resources to create the highest value at the minimum cost possible. Seeking enhanced productivity and product quality improvement can alleviate the firm level inefficiencies that still exist in the sub-sectors resulting to high productivity differences across competing manufacturing firms (Kenya Economic Update December 2014 Edition No. 11).

Several scholarly studies have been undertaken with a view of providing practitioners with guidelines of how to improve the performance of the operations function. However, most of these studies have only focused on a macro level approach particularly linking operations strategy or manufacturing strategy to business performance or competitiveness. Few scholarly studies have been reported that focus on how a firm's internal processes or systems contribute to operational performance or competitiveness. Muthama (2014) focused on the relationship between

manufacturing strategy and operational performance in Kenyan manufacturing firms in the metal and allied sector. Avella et. Al, (2001) study focused on Spanish manufacturing firms to determine whether there was a relationship between manufacturing strategy and competitiveness. Cessaroti and Spada (2009) examined whether operational excellence as applied in manufacturing firms to achieve a culture of operational excellence could be applied in service operations.

None of these studies focused on the specific drivers of operational excellence. This study examined Kenyan manufacturing firms to determine the core drivers of operational excellence. The study sought to answer the questions: what are the key drivers of operational excellence and how does operational excellence influence customer value perception as a measure of a firm competitiveness.

1.3. Research Objectives

To obtain answers to the research questions identified, the study sought to achieve the following specific objectives:

1. To determine the process-based capabilities in Kenyan manufacturing firms
2. To determine the system-based capabilities in Kenyan manufacturing firms
3. To model operational excellence in terms of system-based and process-based capabilities
4. To determine the influence of operational excellence on customer value perception

1.4. Value of the Study

The findings of this study provide valuable information to managers of Kenyan manufacturing firms to be better prepared to compete effectively in an increasingly competitive global market by providing information on how firm level capabilities can contribute to a firm's competitiveness in the market through operational excellence. The findings also contribute to the current scholarly research in operational excellence.

CHAPTER TWO LITERATURE RIVIEW

2.1. Introduction

Literature is reviewed along three main themes; operations strategy content, the concept of operational excellence and customer value perception. The reviewed literature is summarized in Table 2.1 and research gaps that this study examined indicated. Figure 2.1 illustrates a conceptual framework that was developed to guide the study.

2.2. Operations Strategy Content

From a resource-based perspective, an operations strategy contains of certain building blocks which consist of core capabilities, tactical activities, resources and technologies (Lowson, 2002). A fit between innovation and improvement capabilities with competitive priorities and its effect on operational performance is examined (Xiaosong et. al, 2011).

A study by Lowson (2002) examined the composition of an operations strategy to investigate whether there were commonalities across firms in an industry on the components of an operations strategy. The study also sought to find out the forces that influence how an operations strategy is customized across different firms. It used a statistical research design to determine a firm's strategic focus across different industries and whether specific approaches were applied by firms to adapt the strategy of choice in its operating environment. The study finds that industry and market forces influence the development of an operations strategy within firms. These findings also suggest that some strategies are more generic and are applied across different firms. A key finding of the study indicated that the different approaches applied by firms are dependent on their compatibility in deploying their chosen operations strategy or strategies.

Based on the study findings, Lowson (2002) categorizes operations strategy content into four building blocks: core capabilities, resources, technologies and tactical activities. The capabilities were further classified as process-based, system-based, organization-based and network-based. The market forces that influence operations strategy content are product demand behavior and supply network structure. The study finds that market and industry forces affect operations strategy content by influencing the emphasis firms place on each of operations strategy building blocks. This indicates that the core drivers of operational excellence can vary across industries, markets and geographical regions. The finding by Lowson (2002) that internal capabilities drive operations strategy implementation are supported by those of another study by Xiaosong et al., (2011).

Xiaosong et al., (2011) study focused on how the relationship between competitive priorities and internal capabilities influences operational performance. Using data from a statistical study conducted on 238 manufacturing firms operating in eight developed countries, the study sought to find how a fit between operations competitive priorities and internal capabilities influences operational performance. The findings indicate that improvement capability and innovation capability are associated with different competitive priorities and also have varying impact on different operational performance dimensions. The findings also indicate that not all competitive priorities can be associated with improvement and innovation capabilities and that the influence of innovation and improvement capability on operational performance is not affected by the competitive priorities chosen by the firm.

Xiaosong et al., (2011) study was limited to two internal capabilities and thus the findings cannot be used to conclusively determine the influence of a fit between competitive priorities and internal capabilities on operational performance. The sampling criterion was based on firms' significant presence in their respective countries and not their performance which could be the cause of the limited influence of competitive priorities and internal capabilities on operational performance. Lowson (2002) study indicated that market and industry forces influence the importance placed on internal capabilities hence Xiaosong et al., (2011) study could produce different results in a different geographical setting.

2.3. Operational Excellence

The success of an organization in achieving operational excellence is traceable to specific activities that support the day to day value creating processes or systems of the firm (Gilgeous and Gilgeous, 1999), (Cesarotti and Spada, 2009).

Gilgeous and Gilgeous (1999) study sought to develop a framework for manufacturing firms to translate strategic objectives of meeting customer requirements into action items at the operations level. Using a statistical research design, the study obtained data from manufacturing firms in the UK to develop a framework of achieving manufacturing excellence. This framework consisted of eight initiatives: empowerment, management, the learning organization, commitment to quality, technology and information systems, innovation and change, customer focus and win-win relationship with suppliers. Each initiative was supported by a set of enablers which were specific activities carried out at the operations level. The findings of Gilgeous and Gilgeous (1999) study

are consistent with those of (Cesarotti and Spada, 2009).

Cesarotti and Spada (2009) study classifies operational excellence drivers into a hard-phase stage consisting of service system design which involves use of technology and information systems and a soft-phase stage which involves measures taken to maintain and improve the service system such as leadership and employee empowerment. Both studies also identify the role of operational activities and the importance of incorporating customer requirements in internal operations in achieving operational excellence.

Cesarotti and Spada (2009) study sought to develop a framework for application of the industrial culture of operational excellence in service operations. By focusing on hotel businesses, a framework consisting of a hard phase and a soft phase was developed. The hard phase involves translating customer requirements into specific actionable items at the operations level though service process or system design. The soft phase involved developing creating a system to maintain and improve the service system developed in the hard phase. The study identifies quality function deployment as an effective tool for implementing the hard phase and total productive maintenance and failure modes and effects analysis as effective in implementing the soft phase. The findings suggest that the framework has a high potential for operational performance improvements in service operations with a high degree of tangible factors.

Cesarotti and Spada (2009) work was a conceptual paper hence an empirical study based on the proposed framework must be done to validate or invalidate the framework. Gilgeous and Gilgeous (1999) study was carried out in the UK and therefore its findings may not be generalizable in geographical settings especially those in developing countries such as Kenya.

2.4. Customer Value Perception

The structure of customer value perception can be viewed from two domains: sacrifice and benefits each driven by product, service and relationship based drivers (Lapierre, 2000). The level of customer value perception can be evaluated on the basis of three levels: functional value, emotional value and social value (Carlos et. al, 2006).

A study by Lapierre (2000) sought to provide information on the structure of customer value perception by testing the existence of two proposed structures in the information technology sector.

A statistical study was conducted in Canada on four industries within the information technology sector: information, communication, entertainment, distribution and finance to determine the relative importance of 13 value-based drivers. These drivers were: alternative solutions, product quality, product customization, responsiveness, flexibility, reliability, technical competence, supplier's image, trust, supplier solidarity with customers, price, effort and conflict. The respondents were senior executives drawn from the supplier and customer sides of business to business relationships. The findings supported the existence of a value domain structure consisting of sacrifices and benefits. Price, effort and conflict drivers were associated with sacrifice and the rest of the drivers were associated with benefits. The relative importance of the drivers was influenced by the scope of the benefits received or sacrifice made supporting the existence of another structure consisting of product, service and relationship.

The multidimensionality of customer value concept in Lapierre (2000) study is supported by the findings of another study by Carlos et. al, (2006) which was conducted in Spain. The argument that customer perceived value results from the evaluation of perceived benefits and sacrifice is also consistent in both studies. However, while Lapierre (2000) study focused on both customers and sellers in business to business relationships, Carlos et. al, (2006) study focused on individual customers only.

Carlos et. al, (2006) study sought to analyze the dimensionality of the concept of perceived value in the banking sector. A statistical study was used to obtain data from individual bank customers using self-administered questionnaires. The findings of the study indicate that the level of perceived customer value is composed of six dimensions: functional value of the establishment, functional value of the personnel; functional value of the service; functional value price; emotional value and social value. Emotional value and the functional value of the personnel providing the service were the most important determinants of customer perceived value.

However, Carlos et. al, (2006) study only focused on price as a measure of sacrifice while Lapierre (2000) studied two none-monetary sacrifice drivers along with price. In Carlos et. al, (2006) study, none-monetary sacrifice measures such as waiting times and service times could have had a significant influence on perceived value. Although the studies were conducted in different

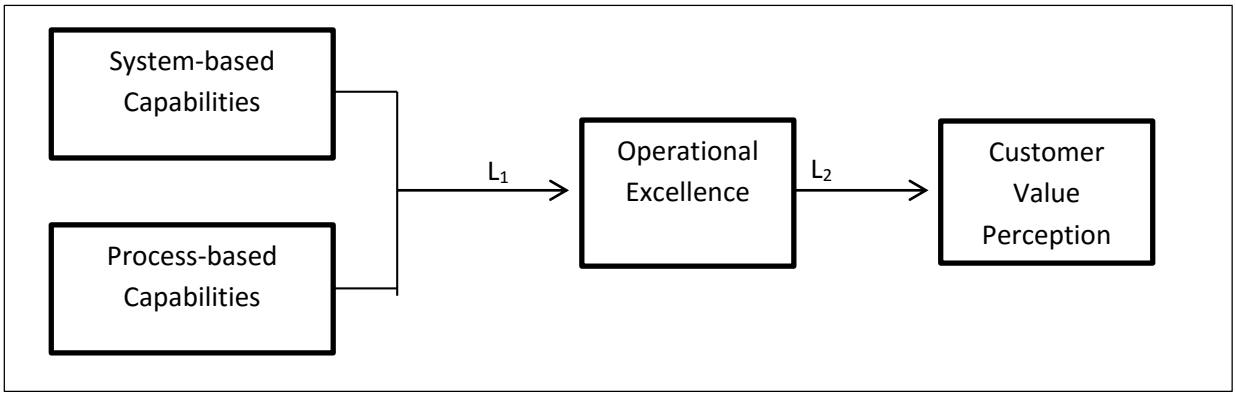
geographical regions, the countries sampled are both developed economies hence different results could be observed if both studies were conducted in a developing country such as Kenya.

Table 2.1: Summary of Literature Review

Literature Reviewed	Research Findings	Gaps investigated in this study	How this study resolved the knowledge gaps
Lowson (2002)	Operations strategy content consists of building blocks: core competencies, capabilities & processes, tactical activities, resources and technologies. The emphasis placed on the building blocks is influenced by environmental factors such as market and industry.	It is not explicitly stated how data was collected and from where it was collected. The findings can therefore not be generalized in all geographical regions.	This study examined the internal capabilities applied in Kenyan manufacturing firms and their influence on competitiveness.
Xiaosong et. al, (2011)	Improvement capability and innovation capability are associated with different competitive priorities and also have varying impact on different operational performance dimensions.	It is possible to model a construct consisting of the capabilities examined that has distinct impact on operational performance	This study modelled operational excellence as a concept in terms of process and system based capabilities
Gilgeous and Gilgeous (1999)	A framework for achieving manufacturing excellence consisting of initiatives each backed by a set of enablers was identified. The initiatives were empowerment, management, the learning organization, commitment to quality, technology and information systems, innovation and change, customer focus and win-win relationship with suppliers. The enablers were specific activities performed to support each initiative	The initiatives and enabler activities were not linked to any processes or systems that drive operational excellence	This study modelled operational excellence as a concept in terms of process and system based capabilities
Cesarotti and Spada (2009)	A framework for implementing the industrial culture of operational excellence in service operations consisting of service system design, monitoring and control and improvement was developed. The framework is however appropriate for service firms with a high degree of tangible factors.	The proposed theory is based on conceptual arguments but was not empirically tested.	This study empirically tested the existence of relationships between a firms internal capabilities, the concept of operational excellence and customer value perception.
Lapierre (2000)	Customer value perception consists of two domains: benefits and sacrifice each consisting of product, service and relationship based drivers.	Geographical difference can lead to different results.	This study examined customer value perception in a Kenyan manufacturing industry context.
Carlos et. al, (2006)	Customer value perception is multidimensional and consists of functional value classified as establishment, price, personnel & service functional value, social value and emotional value.	The framework only uses price as a measure of sacrifice and does not consider none-monetary sacrifice measures.	This study measured the sacrifice domain using both monetary and none-monetary measures.

The reviewed literature identified possible relationships among a set of variables. These relationships were conceptualized in Figure 2.1 below.

Figure 2.1: Proposed Study Conceptual Framework



This theoretical framework was examined by testing the following set of hypothesis:

i. **H_1** Operational excellence is driven by a set of system-based and process-based capabilities
ii. **H_2** There is a positive and significant relationship between operational excellence and customer value perception

CHAPTER THREE RESEARCH METHODOLOGY

3.1. Introduction

This section outlines the method that was followed in carrying out the study. A description of the research and sampling design, target population and methods of collecting and analyzing primary data are outlined.

3.2. Research design

The study adopted a descriptive approach to determine the relationships that exist among the variables that had been identified during the literature review: internal capabilities, operational excellence and customer value perception. To obtain data that can be generalizable across the Kenyan manufacturing industry, a statistical approach was used so as to focus on as many Kenyan manufacturing firms as possible. Since the study was conducted within a limited amount of time, a cross-sectional approach was adopted.

3.3. Population

The population of the study was drawn from 502 firms (Appendix I) listed in The Kenya Manufacturers and Exporters Directory List (Kenya Association of Manufacturers, 2014). The directory has 563 firms but only 502 firms were considered since the 61 firms classified under Services and Consultancy firms did not engage in manufacturing activities directly.

3.4. Sample design

A sample size of 51 firms which represented 10% of the total population of firms was used. Gay and Dieh (1992) recommend a sample size of 10% of the total population if it constitutes more than 30 units of analysis. Since the 502 manufacturing firms were classified into 13 sectors depending on the activities they engage in, stratified random sampling was used to determine the number of firms to select per sector (Cooper and Schindler, 2006). The number of firms sampled per manufacturing sector (n) was calculated as shown below:

$$n = \frac{Total\ number\ of\ firms\ in\ the\ sector}{Total\ Population\ (502)}\ X\ 51$$

Simple random sampling was used to select the manufacturing firms to be studied in each manufacturing sector. Appendix II shows the sampled firms per manufacturing sector.

3.5. Data collection

Primary data was obtained from staff members of the selected firms using self-administered questionnaires. The questionnaires were coded for identification on the basis of the manufacturing sector (strata) for common grouping**.** To obtain representative data, 10 questionnaires were availed to staff members in the production and sales/marketing functions of each firm. The questionnaire was used to collect data for measuring seven variables across the various firms in the sample: customer value perception, operational excellence, supply chain management, quality management, process design, planning and control and project management capabilities.

Customer value perception was indicated by the manufacturer's perception of their customer's valuing of certain value attributes associated with their products in comparison with competing products. Operational excellence was indicated by the manufacturer's perception of the firm's performance level on four generic competitive priorities of cost, quality, flexibility and delivery speed in comparison with its competitors. Supply chain management, quality management, process design, planning and control and project management capabilities were indicated by the manufacturer's degree of emphasis placed on practices associated with each capability so as attain or sustain a competitive advantage in the industry.

The questionnaire consisted of four sections as outlined in Appendix III. Section A was used to collect general background information about the respondent and consisted of both closed and open ended questions. Section B focused the five internal firm capabilities and a point scoring method was used to collect data on the level of emphasis placed on the five internal firm capabilities. The respondents were required distribute 10 points between a set of practices associated with the different capabilities. Section C focused on the four generic competitive priorities chosen by the firm using a five point Likert scale to determine the level of excellence in comparison with its competitors. Section D collected data on customer value perception using a five point Likert scale to assess the manufacturer's perception of their customers' valuing of various value attributes associated with their product offering in comparison with competing products.

Data obtained from questionnaires from a single firm was used to compute the means for each indicator for the firm. The indicators for each firm were converted to a scale of 1-5 and aggregated into a single score per variable and the mean score calculated.

The mean and standard deviation for the entire distribution per variable was then computed. The scoring was computed as shown:

$$\text{Variable Score} = \frac{\text{Indicator 1 score} + \text{Indicator 2 score} + \cdots + \text{Indicator n score}}{\text{Maximum Possible Score}} \text{ X } 5$$

3.6. Data Analysis

To achieve the objectives of the study, the data obtained was analyzed using various data analysis techniques. To determine the most emphasized capability for process-based and system-based capabilities per firm, the average score was compared with the average mean score. To determine the most emphasized capability for the entire distribution, a test of mean differences in each category of internal capabilities was used. To model operational excellence in terms of system and process based capabilities, multiple regression technique was used with operational excellence as the dependent variable and the system and process based capabilities as the independent variables. To determine the relationship between customer value perception and operational excellence, linear regression was used with customer value perception as the dependent variable and operational excellence as the independent variable. To determine the strength of the relationships obtained through regression analysis, a test of goodness of fit was used.

CHAPTER FOUR DATA ANALYSIS, RESULTS AND DISCUSSION

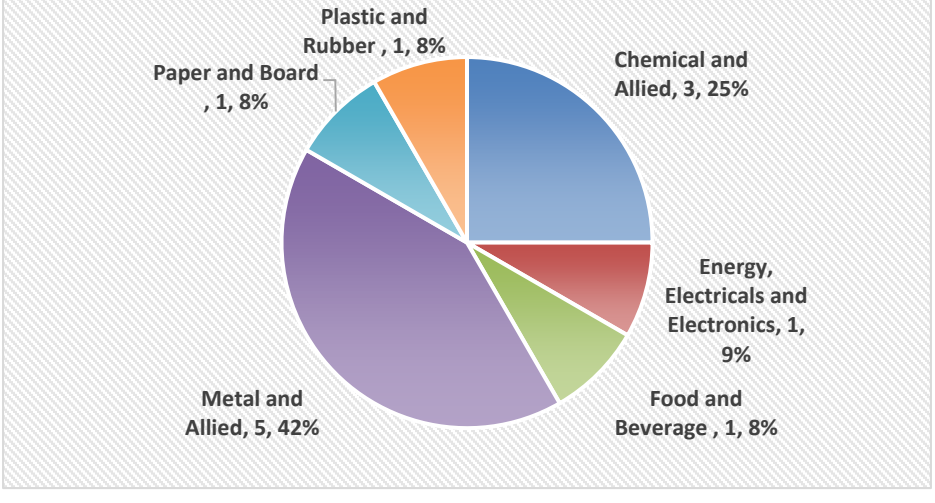
4.1. Introduction

This chapter covers analysis of the data obtained, presentation and discussion of the results or findings. Out of the total sample of 51 firms, 12 firms respondent with filled questionnaires indicating a response rate of 23.5%. The response rate was low due to the limited data collection time available.

4.2. Characteristics of Participating firms and respondents

The study sample comprised of 51 manufacturing firms drawn from 13 sectors according to the Kenya Manufacturers and Exporters Directory List (Kenya Association of Manufacturers, 2014). Responses were received from 7 out of the 13 sectors in the sample as shown in Figure 4.1.

Figure 4.1: Response rate per sector



All the respondents were staff members performing supervisory roles in manufacturing and sales functions in their respective firms. Figure 4.2 shows the distribution of the respondents' years of experience in their respective departments.

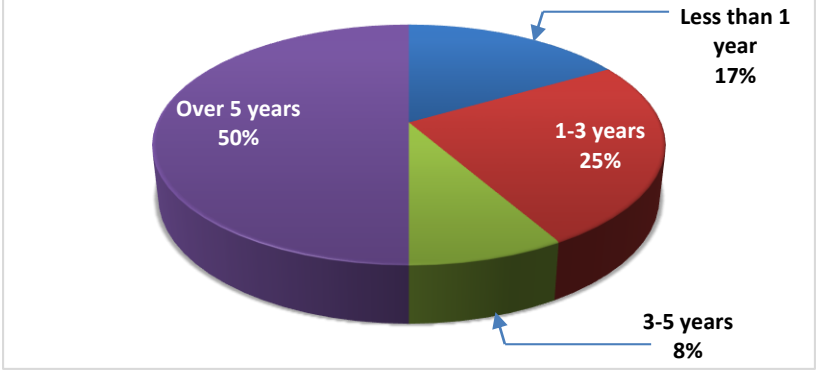


Figure 4.2: Respondents work experience

4.3. Results

The study sought to determine the process based and system based capabilities employed by manufacturing firms in Kenya. The study also sought to model operational excellence in terms of process based and system based capabilities and to determine the influence of operational excellence on customer value perception. The results presented in table 4.1 are the average scores obtained from a set of indicators associated with each variable under examination. The average score for operational excellence and customer value perception which were indicated using a five point Likert scale (1, 2, 3, 4, 5) was 3.00 for each. The scores for process and system based capabilities were indicated by distributing 10 points in four sets of process based and system based capability indicators. The average score for each capability was determined by obtaining the average of the aggregate average scores in each set of capability indicators as shown below.

$$\text{Average process based capability score} = \frac{2 + 3.33 + 3.33 + 3.33}{40} \text{ X } 5 = 1.50$$

$$\text{Average system based capability score} = \frac{2 + 5.0 + 5.0 + 5.0}{40} \text{ X } 5 = 2.125$$

Table 4.1: Overall variable Results

	Process-based capability score			**System-based capability score**		**Operational excellence score**	**Customer value perception score**
Firm	**Process Design**	**Planning & Control**	**Project Management**	**Supply chain Management**	**Quality Management**		
MS02-03	1.6250	1.6250	1.2500	2.0000	2.2500	3.6667	4.2308
MS02-05	1.6250	1.8750	1.0000	2.1250	2.1250	4.0000	4.3846
MS02-06	1.0000	2.3750	0.7500	1.8750	2.7500	3.8333	4.4615
MS03-11	2.0000	1.2500	1.1250	1.3750	3.0000	3.3333	3.4615
MS04-15	1.8750	1.3750	1.0000	2.0000	2.5000	3.5000	4.2308
MS07-23	1.3750	1.6250	1.5000	2.5000	1.7500	4.8333	4.8462
MS07-24	2.0000	1.8750	0.7500	1.6250	2.5000	3.4167	4.0000
MS07-25	2.1250	1.1250	1.0000	2.3750	2.1250	3.5000	2.3846
MS07-26	1.7500	1.7500	1.0000	1.3750	2.8750	4.4167	4.0000
MS07-27	2.0000	1.7500	0.5000	1.1250	3.3750	4.1667	3.6154
MS09-37	0.8750	2.0000	1.3750	2.7500	1.7500	4.7500	5.0000
MS11-44	1.6250	1.6250	1.1250	1.7500	2.6250	4.6667	4.7692
Mean	**1.6563**	**1.6875**	**1.0313**	**1.9063**	**2.4688**	**4.0069**	**4.1154**
Standard deviation	**0.3993**	**0.3392**	**0.2776**	**0.4889**	**0.4946**	**0.5499**	**0.7175**

4.4. Data Analysis

This section presents the results of data analysis techniques and statistical tests performed on the research data to achieve the specific objectives of the study.

4.4.1. Determining process based capabilities in Kenyan manufacturing firms

The point scoring method adopted in determining the process-based capabilities employed by Kenyan manufacturing firms sought to determine the emphasis placed on three process based capabilities; process design, planning and control and project management. A capability was considered to be emphasized if its score was above the average score range calculated with a 5% accuracy level. The average process-based capability score range = $1.50 \pm 0.075 = (1.425 – 1.575)$. Table 4.2 presents the process-capability scores and indicates the emphasized capability in each of the 12 participating firms in the sample.

Table 4.2: Emphasis placed on process-based capabilities by Kenyan manufacturing firms

Firm	Process Design	Planning & Control	Project Management	Process-based capability emphasized
MS02-03	1.6250	1.6250	1.2500	Process Design & Planning & Control
MS02-05	1.6250	1.8750	1.0000	Process Design & Planning & Control
MS02-06	1.0000	2.3750	0.7500	Planning & Control
MS03-11	2.0000	1.2500	1.1250	Process Design
MS04-15	1.8750	1.3750	1.0000	Process Design
MS07-23	1.3750	1.6250	1.5000	Planning & Control & Project Management
MS07-24	2.0000	1.8750	0.7500	Process Design & Planning & Control
MS07-25	2.1250	1.1250	1.0000	Process Design
MS07-26	1.7500	1.7500	1.0000	Process Design & Planning & Control
MS07-27	2.0000	1.7500	0.5000	Process Design & Planning & Control
MS09-37	0.8750	2.0000	1.3750	Planning & Control
MS11-44	1.6250	1.6250	1.1250	Process Design & Planning & Control
Mean	1.6563	1.6875	1.0313	
Standard deviation	0.3993	0.3392	0.2776	
Variance	0.1594	0.1151	0.0771	
Calculated t-value	0.2066		5.1865	

A test for mean differences (the t-test) was used to determine whether the mean score of the most emphasized process-based capability was significantly different from the other means scores using a set of two test hypothesis (H_0 and H_A).

1. H_0: There is no significant difference between the mean score of the most emphasized process-based capability and the other process-capability mean scores.
2. H_A: There is a significant difference between the mean score of the most emphasized process-based capability and other process-capability mean scores.

A critical test value was determined from t-statistical table at 95% confidence level and 11 degrees of freedom to be 2.201. If the calculated t value was higher than the critical test value, the null hypothesis would be rejected.

Among the three process-based capabilities examined, both process design and planning and control were considered to be equally emphasized since their mean scores were not significantly different. Project management was however not emphasized compared to the other two process-based capabilities. This can be explained by the fact that the sampled firms were all manufacturing firms and hence put more emphasis on the day to day activities of their operations in order to remain competitive in the market. These day to day activities are predominantly managed through process design and planning and control capabilities.

4.4.2. Determining system-based capabilities in Kenyan manufacturing firms

The point scoring method adopted in determining the system-based capabilities employed by Kenyan manufacturing firms sought to determine the emphasis placed on two system based capabilities; quality management and supply chain management. A capability was considered to be emphasized if its score was above the average score range calculated with a 5% accuracy level. The average system-based capability score range = 2.125 ± 0.10625 (2.01875 – 2.23125). Table 4.3 presents the system-capability scores and indicates the emphasized capability in each of the 12 participating firms.

A test for mean differences (the t-test) was used to determine whether the mean scores of the two system-based capabilities were significantly different using a set of two test hypothesis (H_0 and H_A).

1. H_0: There is no significant difference between the mean scores of the two system based capabilities.
2. H_A: There is a significant difference between the mean scores of the two system based capabilities

A critical test value was determined from t statistical table at 95% confidence level and 11 degrees of freedom to be 2.201. If the calculated t value was higher than the critical test value, the null hypothesis would be rejected.

Table 4.3: Emphasis placed on system-based capabilities by Kenyan manufacturing firms

Firm	Supply chain Management	Quality Management	System-based capability Emphasized
MS02-03	2.0000	2.2500	Quality Management
MS02-05	2.1250	2.1250	No emphasis
MS02-06	1.8750	2.7500	Quality Management
MS03-11	1.3750	3.0000	Quality Management
MS04-15	2.0000	2.5000	Quality Management
MS07-23	2.5000	1.7500	Supply Chain Management
MS07-24	1.6250	2.5000	Quality Management
MS07-25	2.3750	2.1250	Supply Chain Management
MS07-26	1.3750	2.8750	Quality Management
MS07-27	1.1250	3.3750	Quality Management
MS09-37	2.7500	1.7500	Supply Chain Management
MS11-44	1.7500	2.6250	Quality Management
Mean	1.9063	2.4688	
Standard deviation	0.4889	0.4946	
Variance	0.2390	0.2447	
Calculated t-value	2.8018		

Quality management was the most emphasized system-based capability since its mean score was above the average value while supply chain management was not emphasized. The average score for quality management was also significantly higher than that of supply chain management. Only two out of the twelve sampled firms focused more on supply chain management and all the firms sampled indicated that they had a quality management system in place to manage the quality of their operations. The more emphasis placed on quality management can be explained by the fact that some key aspects of supply chain management such as the quality of supplies are incorporated in quality management systems.

4.4.3. Modelling operational excellence in terms a firm's internal capabilities

Operational excellence mean scores were determined by taking the average of the scores of 12 indicators of four dimensions of operational performance (quality, cost, flexibility and delivery speed) which were measured using a five point Likert scale. By taking the average of the scores of the four dimensions of performance, the extreme values obtained from firms that attain operational excellence through a trade-off of some of the performance dimensions would provide a more or

less equal score to firms that attain operational excellence through the cumulative approach. All the firms in the sample had an average operational excellence score above the average range of 2.85-3.15 (calculated with a 5% accuracy level).

Table 4.4: Focus on Operational Excellence Dimensions

	Operational Excellence Dimension					
Firm	**Cost**	**Quality**	**Flexibility**	**Speed**	**Overall Score**	**Focus**
MS02-03	3.6667	3.6667	4.0000	3.3333	3.6667	All
MS02-05	2.6667	5.0000	3.6667	4.6667	4.0000	Quality, Flexibility and Speed
MS02-06	3.6667	4.6667	3.3333	3.6667	3.8333	All
MS03-11	3.0000	3.3333	3.6667	3.3333	3.3333	All
MS04-15	4.0000	3.6667	2.3333	4.0000	3.5000	Cost, Quality, Speed
MS07-23	4.3333	5.0000	5.0000	5.0000	4.8333	All
MS07-24	3.6667	3.3333	3.3333	3.3333	3.4167	All
MS07-25	2.0000	4.6667	4.6667	2.6667	3.5000	Quality, Flexibility and Speed
MS07-26	4.3333	4.6667	4.6667	4.0000	4.4167	All
MS07-27	4.0000	4.3333	4.3333	4.0000	4.1667	All
MS09-37	4.3333	5.0000	5.0000	4.6667	4.7500	All
MS11-44	4.3333	4.3333	5.0000	5.0000	4.6667	All
Mean	**3.6667**	**4.3056**	**4.0833**	**3.9722**		
Variance	**0.5657**	**0.4133**	**0.7096**	**0.5547**		
Calculated t-value	**2.2368**		**0.7265**	**1.1736**		

Although all firms recorded above average scores on all operational excellence dimensions, it was noted that the cost dimension score was significantly lower than quality, flexibility and speed. Since quality recorded the highest operational excellence score, this reinforces the trade-off theory which indicates that a firm may not excel in all performance dimensions and may have to trade-off with a conflicting dimension. However, the mean scores of flexibility and speed were not significantly different indicating that it is possible for a firm to also cumulatively attain some of the conflicting operational excellence dimensions.

Multiple regression was used to develop a model indicating the relationship between operational excellence as the dependent variable and the various internal capabilities employed by Kenyan manufacturing firms as independent variables using IBM SPSS software.

Table 4.5: Regression of system and process based capabilities on operational Excellence results

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.656[a]	.430	-.045	.5621
a. Predictors: (Constant), Project Management, Planning & Control, Supply Chain Management, Process Design, Quality Management				

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.430	5	.286	.905	.534[b]
	Residual	1.896	6	.316		
	Total	3.326	11			
a. Dependent Variable: Operational Excellence						
b. Predictors: (Constant), Project Management, Planning & Control, Supply Chain Management, Process Design, Quality Management						

Coefficients[a]								
		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	-35.652	100.643		-.354	.735	-281.917	210.612
	Quality Management	4.467	11.428	4.018	.391	.709	-23.495	32.429
	Supply Chain Management	4.155	11.305	3.694	.368	.726	-23.508	31.818
	Process Design	4.119	11.807	2.910	.349	.739	-24.772	33.011
	Planning and Control	4.866	11.584	3.002	.420	.689	-23.480	33.212
	Project Management	5.482	11.535	2.773	.475	.651	-22.742	33.706
a. Dependent Variable: Operational Excellence								

The regression model summary indicates that the coefficient of determination for the model (R square) was 0.43 indicating that system-based and process-based capabilities explain 43% of variation in operational excellence. The coefficients of the regression analysis indicate a positive relationship exists between operational excellence and the five internal capabilities examined, however the firm has to overcome other unexplained factors in order to attain operational excellence.

Operational Excellence = -35.652 + 4.467 Quality Management + 4.155 Supply Chain Management + 4.119 Process Design + 4.866 Planning & Control + 5.482 Project Management

A test of goodness of fit (F-test) was performed to determine whether the model above was suitable in predicting operational excellence level.

1. Test Hypothesis
   - H_0: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$
   - H_A: at least one $\beta_i \neq 0$

Where:

β_1, β_2, β_3, β_4 and β_5 are the coefficients of quality management, supply chain management, process design, planning & control and project management respectively

2. The critical F value (obtained from the F statistical tables) was found to be $F_{5,6} = 4.39$ at a p-value of 0.05.

3. Interpretation: Since the calculated F value of 0.905 was lower than the critical F value of 4.39, the null hypothesis was not rejected. The model obtained was therefore not suitable in predicting the level of operational excellence in Kenyan manufacturing firms with a 95% confidence level.

The point scoring method used in determining the capabilities applied by manufacturing firms to achieve operational excellence revealed that although firms employ all the five capabilities, they tend to focus more on certain internal capabilities. This finding is consistent with Lowson (2002) study which identified that market and industry have an influence on the level of emphasis firms put on their internal capabilities in order to remain competitive. This indicates that firms can achieve the same level of operational excellence or even higher by emphasizing on a different process and system based capability depending on industry or market conditions. Therefore, developing a model that solely uses the emphasis firms place on the five internal capabilities may not accurately predict the level of operational excellence in a firm. This is evident in the correlation matrix between the different process-based and system-based capabilities below obtained using IBM SPSS software.

Table 4.6: Internal Capabilities Correlation Matrix

		Process Design	Project Management	Planning and Control	Supply Chain Management	Quality Management
Process Design	Pearson Correlation	1	-.402	-.725**	-.534	.443
	Sig. (2-tailed)		.195	.008	.074	.150
	N	12	12	12	12	12
Project Management	Pearson Correlation	-.402	1	-.232	.684*	-.748**
	Sig. (2-tailed)	.195		.468	.014	.005
	N	12	12	12	12	12
Planning & Control	Pearson Correlation	-.725**	-.232	1	.030	-.004
	Sig. (2-tailed)	.008	.468		.926	.990
	N	12	12	12	12	12
Supply Chain Management	Pearson Correlation	-.534	.684*	.030	1	-.953**
	Sig. (2-tailed)	.074	.014	.926		.000
	N	12	12	12	12	12
Quality Management	Pearson Correlation	.443	-.748**	-.004	-.953**	1
	Sig. (2-tailed)	.150	.005	.990	.000	
	N	12	12	12	12	12

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Among the three process-based capabilities, a strong and negative correlation exits between process design and planning and control which were the most emphasized process-based capabilities. A strong and negative correlation also exists between the two system-based capabilities too. This indicates that different firms put strong emphasis on either of these capabilities in order to be competitive. A strong and positive correlation was found to exist between supply chain management and project management, however these capabilities were not emphasized by the firms sampled.

The relatively large negative constant (-35.652) indicates that manufacturing firms have to overcome other influencers of operational excellence not in the model to achieve a given level of operational excellence. This can be explained further by Gilgeous and Gilgeous (1999) study which identified other initiatives such as empowerment, management, a learning organization, technology and information systems and innovation and change as other factors influencing operational excellence. These factors influence operational excellence by contributing towards the effectiveness and efficiency of the internal capabilities examined.

4.4.4. Influence of Operational excellence on Customer value perception

Customer value perception score was obtained by taking the average score of 13 value drivers which were categorized into two domains: a domain consisting of benefits and sacrifices and another domain consisting of product, service and relationship. The score for each driver was indicated using a five point likert scale. Table 4.7 indicates the two domains of customer value.

Table 4.7: Customer value perception structure

Domain / Domain	Product	Service	Relationship
Benefits	-Alternative products -Product quality -Product - Customization	-Technical competence of suppliers staff -Flexibility of the supplier -Reliability of the supplier -Suppliers responsiveness	-Supplier's reputation -Ability to sustain long term relationships with customers -Suppliers trustworthiness
Sacrifices	-Price	-Price -Ease of order placement	-Effort made to sustain a good relationship with customers

Adapted from Lapierre (2000)

All the firms in the sample had an overall customer value perception score above the average range of 2.85-3.15 (calculated with a 5% accuracy level). Table 4.8 shows the mean scores of operational excellence and customer value perception obtained from the sampled firms.

Table 4.8: Customer Value Perception and Operational Excellence

Firm	Operational excellence score	Customer value perception score
MS02-03	3.6667	4.2308
MS02-05	4.0000	4.3846
MS02-06	3.8333	4.4615
MS03-11	3.3333	3.4615
MS04-15	3.5000	4.2308
MS07-23	4.8333	4.8462
MS07-24	3.4167	4.0000
MS07-25	3.5000	2.3846
MS07-26	4.4167	4.0000
MS07-27	4.1667	3.6154
MS09-37	4.7500	5.0000
MS11-44	4.6667	4.7692

The study sought to determine the influence of operational excellence on customer value perception as an indicator of competitiveness in Kenyan manufacturing firms. Linear regression was used to develop a model explaining this relationship with customer value perception as the dependent variable and operational excellence as the independent variable. Table 4.9 gives the results of the regression model obtained using IBM SPSS software.

Table 4.9: Regression of Operational Excellence on Customer Value Perception

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.643[a]	0.414	0.355	0.5761434

a. Predictors: (Constant), Operational Excellence

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.343	1	2.343	7.059	0.024[b]
	Residual	3.319	10	0.332		
	Total	5.663	11			

a. Dependent Variable: Customer Value Perception

b. Predictors: (Constant), Operational Excellence

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	0.752	1.277		0.589	0.569	-2.093	3.597
	Operational Excellence	0.839	0.316	0.643	2.657	0.024	0.135	1.543

a. Dependent Variable: Customer Value Perception

The regression model summary indicates a coefficient of determination (R square) of 0.414 indicating that 41.4% of the variation in customer value perception is influenced by operational excellence. The coefficient of operational excellence indicates a positive linear relationship between operational excellence and customer value perception as indicated below.

Customer Value Perception = 0.752 + 0.839 Operational Excellence

A test of goodness of fit (F-test) was performed to determine whether the model above was suitable in predicting the level of customer value perception.

1. Test Hypothesis Where β_i is the coefficient of operational excellence.
   - H_0: $\beta_i = 0$
   - H_A: $\beta_i \neq 0$
2. The critical F value (obtained from the F statistical tables) was found to be $F_{1,10} = 4.96$ at a p-value of 0.05.
3. Interpretation: Since the calculated F value of 7.059 was higher than the critical F value of 4.39, the null hypothesis was therefore not accepted. The model obtained could therefore be used to predict the level of customer value perception in Kenyan manufacturing firms with a confidence level of 95%.

Superior customer value is created through operations by balancing the four operations performance objectives which entails achieving operational excellence: cost and quality and flexibility with speed creating a product offering that is perceived to have a higher value than competing products by customers. A high customer value contributes to high levels of competitiveness through increased sales and low cost production per unit. However, data on customer value perception was obtained from the manufacturing firms examined in this study. This data was therefore susceptible to errors associated with respondents' biasness.

CHAPTER FIVE SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter summarizes the study and draws conclusions from the study findings. The shortcomings of the study are also highlighted and recommendations for further research made.

5.2. Summary

The study sought to determine the process and system based capabilities employed by Kenyan manufacturing firms, to model operational excellence in terms of these capabilities and to determine the influence of operational excellence on customer value perception. A statistical study was conducted using a sample of 51 firms which was equivalent to 10% of the study population of 502 manufacturing firms in the 2014 Kenya Manufacturers and Exporters Directory List of the Kenya Association of Manufacturers. Stratified random sampling was used to select firms from 13 manufacturing industry sectors. The response rate was 23.5% with all the respondents being staff members performing supervisory roles in manufacturing and sales or marketing business functions. It was also deemed necessary to assess the respondents' knowledge of the operations of the function they represented and the study used the respondents' number of years of experience. 83% of the respondents had more than one year of experience in their respective departments.

The findings indicated that Kenyan manufacturing firms employ all the process-based and system-based capabilities in their business operations to attain or remain competitive in their respective industries. However, among the three process-based capabilities, firms tend to emphasize process design and planning and control more than project management. Between the two system-based capabilities, firms focused more on quality management than on supply chain management.

A regression of operational excellence on process and system based capabilities revealed a positive relationship indicating that firms can utilize these capabilities to attain operational excellence. The model developed explained 43% of the variation in operational excellence. However, the model developed was not suitable for predicting the level of operational excellence with a confidence level of 95%. The established regression equation was:

> **Operational Excellence** = -35.652 + 4.467 Quality Management + 4.155 Supply Chain Management + 4.119 Process Design + 4.866 Planning & Control + 5.482 Project Management

This indicates that although firms may emphasize on some internal capabilities to the same degree, they may have different levels of operational excellence depending on the efficiency and effectiveness of the emphasized capabilities.

The results indicated a positive linear relationship between operational excellence and customer value perception indicating that firms can focus on improving operational excellence to achieve high levels of customer value perception. The model developed explained 41% of the variation in customer value perception and was suitable in predicting customer value perception level with a 95% confidence level. The established regression model was:

Customer Value Perception = 0.752 + 0.839 Operational Excellence

Since customer value perception is an indicator of a firm's level of competitiveness, the model indicates that the operations function is critical in improving a firm's level of competitiveness.

5.3. Conclusion

The results of the study indicate that a firm's internal capabilities (process-based and system-based) are critical in achieving operational excellence in a firm. Firms must however focus more on certain capabilities that position them best in achieving operational excellence in their industry so as to attain or remain competitive. However, a key finding of this study was that the degree of emphasis on certain internal capabilities may not be an appropriate indicator of the level of operational excellence in a firm and therefore firms must ensure they are effective and efficient in the capabilities they choose to focus on. The results indicate that operational excellence can be used to improve the level of customer value perception in a firm as indicated by the positive linear relationship between operational excellence and customer value perception.

5.4. Recommendations

This study contributes to the current scholarly research on operational excellence by focusing on a micro level study of the key internal capabilities that contribute to operational excellence. The results and findings provide valuable information on the firm level capabilities that operations managers can leverage to improve the competitiveness of their firms through operational excellence. However, the following recommendations provide opportunities to improve the findings of this study further.

Although the sample size chosen was appropriate for the population, the response rate of 23.5% was too low for the results obtained to be generalizable in the Kenyan manufacturing industry or even across other geographical areas. A similar study could be carried out over a longer period of time to attain an adequate response rate, Mugenda and Mugenda (2003).

Based on the results of this study, a similar study could be carried out focusing on the effectiveness and efficiency of the internal capabilities employed by Kenyan manufacturing firms. Such a study could produce an even better model to predict operational excellence level since using the level of emphasis is not sufficient.

This study relied on staff members' perception to determine the level of customer value perception in Kenyan manufacturing firms which was susceptible to errors associated with biasness. A similar study could be conducted on Kenyan manufacturing firms using their customers to obtain customer value perception data.

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Appendices

Appendix I: Kenya Manufacturers and Exporters Directory (2014)

No.	Category	Total Number of Firms	Firms to be Sampled
1	Building, Mining and Construction	20	2
2	Chemical and Allied	70	7
3	Energy, Electricals and Electronics	34	3
4	Food and Beverage	71	7
5	Fresh Produce	3	1
6	Leather and Footwear	7	1
7	Metal and Allied	66	7
8	Motor Vehicle and Accessories	27	3
9	Paper and Board	63	6
10	Pharmaceutical and Medical Equipment	21	2
11	Plastic and Rubber	68	7
12	Textile and Apparels	35	3
13	Timber, Wood and Furniture	17	2
14	Services and Consultancy	61	-
	TOTAL	**563**	**51**

Appendix II: List of sampled firms

Code	Name of Manufacturing Firm	Manufacturing Sector
MS01-01	Bamburi Cement Limited	Building, Mining and Construction
MS01-02	Central Glass Industries	Building, Mining and Construction
MS02-03	Henkel Kenya Ltd	Chemical and Allied
MS02-04	Basco Products (K) Ltd	Chemical and Allied
MS02-05	Bayer East Africa Ltd	Chemical and Allied
MS02-06	BOC Kenya Limited	Chemical and Allied
MS02-07	Orbit Chemicals Industries Limited	Chemical and Allied
MS02-08	Synresins Ltd	Chemical and Allied
MS02-09	Unilever East And Southern Africa	Chemical and Allied
MS03-10	East African Cables Ltd	Energy, Electricals and Electronics
MS03-11	Vivo Energy Kenya Ltd	Energy, Electricals and Electronics
MS03-12	Powerex Lubricants	Energy, Electricals and Electronics
MS04-13	Brookside Dairy Ltd	Food and Beverage
MS04-14	Farmers Choice Ltd	Food and Beverage
MS04-15	Kapa Oil Refineries Limited	Food and Beverage
MS04-16	Nestle Foods Kenya Ltd	Food and Beverage
MS04-17	New Kenya Co-Operative Creameries Ltd	Food and Beverage
MS04-18	Proctor and Allan (E.A.) Ltd	Food and Beverage
MS04-19	Unga Group Ltd	Food and Beverage
MS05-20	Avoken Limited	Fresh Produce

MS06-21	Bata Shoe Company (Kenya) Ltd	Leather and Footwear
MS07-22	ASL Limited- Steel Division	Metal and Allied
MS07-23	Devki Steel Mills Ltd	Metal and Allied
MS07-24	Doshi Enterprises Ltd	Metal and Allied
MS07-25	Booth Extrusions Limited	Metal and Allied
MS07-26	Mabati Rolling Mills Limited	Metal and Allied
MS07-27	Metal Crowns Ltd	Metal and Allied
MS07-28	Nampak Kenya Ltd	Metal and Allied
MS08-29	Bhachu Industries Ltd	Motor Vehicle and Accessories
MS08-30	General Motors East Africa Limited	Motor Vehicle and Accessories
MS08-31	Kenya Vehicle Manufacturers Limited	Motor Vehicle and Accessories
MS09-32	Associated Paper and Stationery Ltd	Paper and Board
MS09-33	Chandaria Industries Ltd	Paper and Board
MS09-34	East Africa Packaging Industries Limited	Paper and Board
MS09-35	Kartasi Industries Limited	Paper and Board
MS09-36	Ramco Printing Works Ltd	Paper and Board
MS09-37	Tetra Pak Ltd	Paper and Board
MS10-38	Beta Healthcare International	Pharmaceutical and Medical Equipment
MS10-39	Glaxo Smithkline Kenya Ltd	
MS11-40	Bobmil Industries Ltd	Plastic and Rubber
MS11-41	General Plastics Limited	Plastic and Rubber
MS11-42	Kenpoly Manufacturers Limited	Plastic and Rubber
MS11-43	Laneeb Plastic Industries Ltd	Plastic and Rubber
MS11-44	Premier Industries Limited	Plastic and Rubber
MS11-45	Sameer Africa Ltd	Plastic and Rubber
MS11-46	Sanpac Africa Ltd	Plastic and Rubber
MS12-47	Adpack Limited	Textile and Apparels
MS12-48	Spinners and Spinners Ltd	Textile and Apparels
MS12-49	Thika Cloth Mills Ltd	Textile and Apparels
MS13-50	PG Bison Ltd	Timber, Wood and Furniture
MS13-51	Rosewood Furniture Manufacturers	Timber, Wood and Furniture

Appendix III: Research Questionnaire

This questionnaire is structured for the purpose of collecting data from a few selected manufacturing firms to aid in understanding how Kenyan manufacturers can best utilize the operations function to improve their competitiveness. Your firm is among the few companies that have been selected to provide this valuable information and your expertise in your firm's operations is required. The information you are going to provide will be treated with utmost confidentiality and objectivity and will be used for academic purposes only.

Section A: Respondent Background Information

For each of the following questions, please check/tick only one box

1. Which department do you work in?	
Production or Manufacturing	☐
Sales or Marketing	☐
2. Kindly indicate your position in the department?	
Supervisor/Manager	☐
Non-supervisory role	☐

3. For how long have you been working in this department?			
Less than 1 Year	1 – 3 Years	3 – 5 Years	More than 5 Years
☐	☐	☐	☐

Section B: Operating Capabilities Assessment

For each of the five statements below, kindly distribute 10 points based on the emphasis your firm puts on each of them to attain competitiveness in the market.

		Points Allocated
1	Quality Management	
2	Supply Chain Management	
3	Process design aimed at continuous improvement and learning	
4	Planning and controlling of production processes meet required specifications	
5	Project Management in non-routine activities	
	Total Score	**10**

Section B: Operating Capabilities Assessment

Based on your own assessment of how your firm's operations are organized, kindly distribute 10 points for each set of three statements below.

		Points Allocated
Set 1	The layout of our facilities ensures cross functional efficiency and effectiveness	
	Production plans are scheduled to achieve high capacity utilization and labor productivity	
	Teams are created to deliver non-routine tasks to completion.	
	Total Score	**10**
Set 2	The design of our processes facilitates performance management across all functions	
	We use preventive maintenance to prevent production stoppages resulting from plant breakdowns	
	Project teams are evaluated based on their ability to meet project cost, time and quality requirements.	
	Total Score	**10**
Set 3	We rely on documented operating procedure notes to create consistency of what is expected of staff	
	Statistical process control enables us deliver quality products to our customers	
	Projects are regarded as part of the customer value creating activities in the organizations	
	Total Score	**10**

Based on your own assessment of how your firm's operations are organized, kindly distribute 10 points for each set of two statements below.

		Points Allocated
Set 1	We have an organized system to manage the quality of work done in all our functions.	
	We share information with our suppliers to maximize our ability to meet customer requirements on time.	
	Total Score	**10**
Set 2	Our top management is actively involved in implementing quality related initiatives.	
	We corporate with our suppliers on various initiatives e.g. product development	
	Total Score	**10**
Set 3	All employees are actively involved in building quality awareness in the organization	
	We have invested in long-term relationship with our suppliers on matters such as process integration e.g. ERP systems, capacity building e.g. trainings etc.	
	Total Score	**10**

Section C: Operational Excellence

Please evaluate the performance of your organization on the dimensions of performance provided below in relation to your competitors. *(Please check/tick one box per category)*

	Performance Dimension	Much worse than average	Worse than average	In the average	Better than average	Much better than average
1	Production Cost per Unit	☐	☐	☐	☐	☐
2	Ability to supply low cost products to the market	☐	☐	☐	☐	☐
3	Rate of inventory turn over	☐	☐	☐	☐	☐
4	Ability to supply high quality products to the market	☐	☐	☐	☐	☐
5	Number of defective products per production run	☐	☐	☐	☐	☐
6	Number of customer complaints per month	☐	☐	☐	☐	☐
7	Ability to adjust production volume to meet low or high market demand	☐	☐	☐	☐	☐
8	Ability to produce a wide range of products to meet or market requirements	☐	☐	☐	☐	☐
9	Ability to quickly adjust the product mix to meet changes in customer requirements	☐	☐	☐	☐	☐
10	Ability to deliver orders on time	☐	☐	☐	☐	☐
11	Duration of order placement to order delivery	☐	☐	☐	☐	☐
12	Ease of order placement by customers	☐	☐	☐	☐	☐

Section D: Customer Value Perception

Please indicate how you think your customers perceive your product offering on the following aspects in comparison to your competitors' products.

	Customer Value Attribute	Much better than others	Some-what better than others	Just about the same as others	Some-what worse than others	Much worse than others
1	Ability to offer a wide variety of products	☐	☐	☐	☐	☐
2	Offering high quality products	☐	☐	☐	☐	☐
3	Ability to customize products to suit customer requirements	☐	☐	☐	☐	☐
4	Quickly response to customer queries	☐	☐	☐	☐	☐
5	Ability to supply both low and high product volumes	☐	☐	☐	☐	☐
6	On time delivery of customer orders	☐	☐	☐	☐	☐
7	Competence of suppliers staff	☐	☐	☐	☐	☐
8	Reputation of the supplier in the market	☐	☐	☐	☐	☐
9	Suppliers trustworthiness	☐	☐	☐	☐	☐
10	Sustains long-term commitment with customers	☐	☐	☐	☐	☐
11	Offering relatively cheaper products than competing products	☐	☐	☐	☐	☐
12	Simple order to payment process	☐	☐	☐	☐	☐
13	Good relationship with customers	☐	☐	☐	☐	☐