EFFECT OF MASS CUSTOMIZATION ON OPERATIONAL PERFORMANCE OF FLOUR MILLING FIRMS IN KENYA

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DECLARATION

This research project report is my original work and was not submitted for examination for the award of a degree at any institution or university.

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This proposal has been presented for examination with our approval as the University supervisors.

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DEDICATION

I dedicate this project to the Almighty God who has given me strength to go through the whole process of writing this research project. A special mention goes to my family: my lovely husband Peter and our sons Shermeer, Shermmah and Shaunn for the support. To my parents who laid the foundation for me I say thank you.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVATIONS AND ACRONYMS

ERP	Enterprise Resource Planning
MC	Mass Customization
MRP	Materials Requirement Planning
PLC	Product Life Cycle Management
QM	Quality Management
RBV	Resource Based View
SPSS	Statistical Package for Social Scientists
VRIN	Valuable, Rare, Imperfectly, Non-Substitutable

ABSTRACT

Despite the generally accepted view that mass customization is a profitable business practice, little has been done to document the impact of mass customization in the manufacturing sector on operational outcomes in Kenya. The study attempted to analyze the influence of mass customization on operating performance among Kenyan flour milling firms. The analysis adopted Survey Research Style. The study focused on 35 firms involved in Maize Milling. Primary data for the studies were used. The collected data were tested for accuracy, continuity and redundancy. Data was analyzed using SPSS. Study of Regression and Correlation was used. Due to their capacity to produce a comparative form with the otherwise abstract existence of the results, tables were used in data presentation. Means, averages, standard deviation, and percentages, were determined. The research concludes that the product customization activities covered in this study were all conducted by the flour milling companies; solution space creation, robust process design, customer preference navigation, and information technology. There was also a correlation between the flour milling firms' practices and operational efficiency. There was also a correlation between the flour milling firms' practices and operational efficiency. Design of the solution space was found to correlate favorably with and important operational efficiency of flour milling companies. Rising levels of solution space production contribute to improved operational efficiency. Robust process architecture was positively associated with the operating efficiency of the flour milling companies and significantly. Rising the robust nature of the method contributes to an improvement in operational efficiency. Navigation of customer preference was found to correlate favorably with and important operational efficiency of the flour milling firms. This means an improvement in navigation of customer preference contributes to an improvement in operational efficiency. Information technology was found to have a strong correlation with and substantial operational efficiency of flour milling firms. This means that improved use of Information Technology contributes to organizational efficiency improvements. The research was restricted to flour milling companies and also limited to only four independent variables. Consequently, the report recommends similar research to be carried out using more experimental variables and even other firms to generalize the results. The modified r squared showed that the variance in operating efficiency was 70.8 percent due to mass customization activities. It indicates that other variables produced 29.2 per cent of the variance. Therefore, this thesis indicates more work should be conducted to determine these factors / practices.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Mass customization denotes the capacity to deliver tailored products and services at a similar cost and velocity of standardized equivalent offers. The traditional sacrifices of custom products have been minimized by implementing innovative product approaches, advanced manufacturing methods and organisational structures (Pine 2009). According to Liu, Shah and Schroeder (2012), heterogeneous consumer requirements have divided conventional mass markets into lower niches, resulting in huge interest in mass customisation among manufacturing firms. Mass customization offers the capacity to meet the individual requirements of each customer without significant price, distribution and quality trade off. Successfully implemented mass customization can improve performance. According to the survey by Ahlstrom and Westhrook (1999) performance is enhanced once Mass Customization has been introduced by businesses. These improvements include enhanced customer satisfaction, enhanced market share, enhanced client understanding, decreased response time for orders, decreased manufacturing costs, and enhanced profit.

The research will be anchored on the perspective of the resource and the theory of the institution. The company's (RBV) resource-based perspective attributes a company's superior efficiency and competitive advantage to the assets the company has. Resources include tangible and intangible assets owned, accessed or controlled by a company (Helfat & Peteraf, 2003). There are two basic assumptions for holding this theory. One, that resources are heterogeneous in such a way that no two companies have exactly the same resources and the other that the resources are immobile. Institutional theory deals with procedures that set structures, routines, rules and norms as the guidelines for acceptable conduct. Organizations act in a way that meets both client and legal requirements. Pressures from these two sides have an effect on environmentally responsible behavior execution (Laosirihongthong, Sohal & Rahman, 2013).

Kenya's flour milling industry consists of two types of private companies, i.e. small and big companies with no state-owned milling company. Most of the large milling firms are confined to Kenya's primary towns and the new market enables different milling firms to enter and exit the market for free. Raw material shortages combined with rising world market corn prices adversely

affect flour milling sector activities. With profitability and revenue mainly driven by market share and capacity usage, organic growth and cost leadership are key determinants of success for its players. With the difficulties that flour milling companies face, they are prudent in using mass customization in a bid to increase their operational efficiency.

1.1.1 Mass Customization

Mass customisation is the process of providing goods and services tailored to suit the needs of a specific customer. Mass customization is a marketing and manufacturing technique that combines flexibility and differentiation of the product with low unit costs and mass production. Certain names are made-to-order or built-to-order for mass customization ('Mass Customization', 2019). Product customization lets a consumer create different product features while retaining prices close to those of the mass-produced products. The component parts are in some cases modular. This versatility assists in mixing and matching choices to produce a finished semi-custom item (Mass Customization, 2019).

This study will delve into various mass customization practices. Solution Space Development, Space development capacity relates to the capacity of a company to recognize the characteristics that diverge client needs (Nielsen & Brunoe, 2014). The ability to develop space solutions enables companies to identify unique customer needs and meet appropriate product offerings. Robust Process Design, its capacity relates to the recycle or recombination of the resources of a company to reduce trade between variation and price. The design of the production system is regarded robust when it is stable, responsive and offers a vibrant product flow (Badurdeen & Masel, 2007).Customer Choice Navigation: On the other side, customer choice navigation promotes clients in generating their own alternatives while decreasing the complexity of choices, which makes it easier to reduce expenses during the co-design phase. The traditional tools for customer choice navigation have been co-design toolkits, configurations' and choice boards (Franke & Piller, 2004).

1.1.2 Operational Performance

Operational performance focuses on enhancing reliable effectiveness and efficient systems that can guarantee outstanding performance that exceeds client expectations. To achieve such sustainable operational outcomes, an operational strategy is created that supports the organisation in ensuring that the company's main operational elements are met; cost reduction, product development and manufacturing velocity, production system flexibility and product quality assurance (Wiley, 2010). As company organisations compete in the marketplace where market forces drive prices, most companies try to devise other ways to influence clients to purchase their products. This will require techniques such as decreasing product costs, decreasing lead times, enhancing product quality, demonstrating genuine attention to safety and protection of the environment, etc.

Independent functional performance metrics accumulate the general organisational performance. That is, to boost market share, product quality must be improved; quality must be improved and lead times reduced to attain customer satisfaction. The cost of the product must be decreased in order to attain economic development since the market forces dictate the item's final price. Therefore, in this study, we take a critical look at the performance components that are directly attributable to the parameters of operational performance, i.e. quality, price, lead time and ability.

1.1.3 Mass Customization and Operational Performance

The expected operational performance goal of mass customization capacities is to enable companies to deliver range without significantly trading off costs, quality or effectiveness of service (Lai, Zhang, Lee & Zhao, 2012). Operational performance is measured on the basis of a company's responsibility to plan and control a manufacturing company's quality, cost, flexibility and delivery functions (Ward, 1999; Lai, 2012).

Systems such as Enterprise Resource Planning, Materials Requirement Planning, and Product Life Cycle Management systems, among others, will promote metrics for evaluating a business' mass customization capabilities (Nielsen & Brunoe, 2014). Product costs, product quality, product distribution and flexibility in production are the primary competitive priorities of

operational efficiency in a manufacturing context (Squire, 2006). In this research, these measures are aggregated to form operational efficiency and addressed below.

Quality performance is multifaceted and can be regarded from various angles such as characteristics, conformance, durability, serviceability and aesthetics (Garvin, 1987; Squire, 2006). The conformance dimension is the most commonly used in the field of manufacturing activities and refers to the capacity of the manufacturing method to generate products that reliably and continuously match their predefined requirements (Ward, 1999). A specification-compliant item minimizes scraping and rework (Lai, 2012).

In flexibility performance, flexibility output is multi-dimensional and can be regarded from angles such as flexibility of quantity, flexibility of mixing, flexibility of layout, flexibility of method, velocity of fresh item implementation and flexibility of material handling (Sethi & Sethi, 1990). The most frequently used dimensions of flexible efficiency are volume and blend flexibility because they are externally motivated to meet business requirements (D'Souza & William, 2000; Hutchison & Das, 2007).

Under delivery performance, the performance is derived from two primary views, service reliability and delivery velocity, service efficiency can be regarded (Ward, 1996; Squire, 2006). Reliability of delivery refers to reliability and is shown through on-time deliveries (Berry & Cooper, 1999). It is about the capacity to perform on a promised timetable. On the other side, delivery velocity concerns the duration of the delivery cycle whereby the shorter the cycle, the better it is for a company (Berry & Cooper, 1999).

In cost performance, cost efficiency measures the funds used to make a product (Slack & Lewis, 2002; Boyer & Lewis, 2002). There are many dimensions that constitute cost performance, including cost of manufacturing, cost of running the production plant, cost of service, cost of added value and price of sale (Foo & Friedman, 1992). However, cost performance is of strategic importance, the distribution of cost reductions has managerial degrees of freedom (Boyer & Lewis, 2002). Each coin removed from the overall cost of production is a coin added to the profit of the bottom line (Slack & Lewis, 2002).

1.1.4 Flour Milling Firms in Kenya

Kenya's flour milling industry is composed of two classes of private firms, i.e. small and large firms without a state-owned milling business. Most of the big milling companies are limited to the main cities of Kenya, and the new competition enables different milling firms to enter and exit the competition for free. Raw material shortages combined with rising world market wheat prices adversely affect flour milling sector activities. Many significant characteristics that differentiate it from other industries of the economy characterize the flour milling sector. Organic growth and cost leadership are key determinants of success among its participants, with turnover and earnings guided primarily by market share and capacity utilization (Owuor, 2009).

Some of the issues faced by milling firms include competitive acts that divert attention from decision-making, changes in the duties of unclearly defined essential workers, key strategic decision formulators who do not play an active role in execution, issues which require top-level involvement that are not communicated as quickly as possible, advocates and followers (Al-Ghamdi, 1998).Ugali and Jambo brands of Premier Flour Mills Group Limited, Hostess and Jogoo brands of Unga Limited, Pendana and Soko brands of Capwell Industries, Dola, Ndovu and Taifa brands of Mombasa Maize Millers, and the Pembe brand of Pembe Group limited constitute of the industry key players (Munyoki & Karanja, 2016).

1.2 Research Problem

Literature can recognize many cases of mass customization, but the capacity to turn a company into a successful mass customizer mainly relies on three strategic capacities: development of space solutions, robust process design, and navigation of client selection (Nielsen, Storbjerg & Brunoe, 2013). A business that has mastered each of these three is more probable as a mass customizer to succeed (Piller, Salvador & Walcher, 2012; Piller, Harzer, Ihl & Salvador, 2014). However, the extent to which these are adopted by flour milling companies in Kenya is not recorded, although anecdotal evidence of their use is available.

Counterparty risk, price volatility, and margin profitability are the problems facing the milling sector (Rabobank Group, 2012). There is a common counterparty risk where grain imports are

used for raw materials. Price volatility, according to Rabobank Group, is an problem that involves both operational and strategic reactions that are needed to preserve margins and competitive position. In Kenya, high-cost energy and labor, fuel and transportation are the main difficulties facing the sector owing to bad roads (Gitau, Mburu, Mathenge and Smale, 2010). If milling companies embrace mass customization, effectiveness and productivity can be significantly improved. This will also allow these companies to deploy to a competitive advantage their core competencies. With this flour milling firm, price volatility and maintenance costs can be responded strategically. They can retain their margin of profitability without having to charge the end client with greater rates.

Despite the generally accepted view that mass customization is a profitable business practice, little has been done to document the impact of mass customization in the manufacturing sector on operational outcomes in Kenya. The few mass customization surveys in Kenya are in the hotel industry's service sector context in Kenya. For instance, Ayuma (2011) studied customization as a five-star hotel company approach in Nairobi and discovered that individual mass customization strategies may not be important for hotels, but combining strategies was useful. Njaramba (2017) also found that customer selection navigation and robust process design had a significant impact on operational performance while the development of spatial solutions was not statistically relevant when researching the effect of mass customisation on the operational output of multinational manufacturing companies in Kenya. It is therefore important to examine the effect of mass customisation on operational output in Kenya's flour milling companies. The study will try to fill this gap by answering the question: What is the effect of mass customization on operating performance among Kenyan flour milling companies?

1.3 Research Objective

To examine the effect of mass customization on operational efficiency among Kenyan flour milling firms.

1.4 Significance of the Study

The study provides useful theory and policy contributions. More importantly, the research provides importance to the discipline of operations management by defining the connection between mass customization and operational efficiency that will form the foundation for further research by defining the gap in understanding that emerges from this research.

Examining the connection between strategies for mass customization and operational efficiency may provide significant organizational consequences for flour milling professionals. For example, managers will be better placed to decide whether to apply mass customization strategies based on the nature of the connection between the various mass customization approaches investigated

The study will benefit academics in contributing to current literature as a helpful reference source in the field of mass customization and flour milling companies and further studies to refine and extend the present research will also serve as insight. Supply chain practitioners are anticipated to use the results in policy formulation and execution regarding the use of logistical methods in flour supply.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The chapter discusses mass customization, organizational efficiency and the theories involved. It also looks at the different studies and the gaps in mass customization and operational performance. The conceptual framework is also presented.

2.2 Theoretical Foundation

The theoretical basis reviews theories anchored on this research. The theories examined are resource-based theory and institutional theory in specific.

2.2.1 Resource Based Theory

The resources here determine an organization's benefit and general performance (Peteraf & Bergen, 2003). Most strategic management literature generally focuses on the search for competitive advantage (Liao & Hu, 2007). Looking at the assumptions that essential assets would be disseminated across organisations in a heterogeneous manner and that these contrasts should eventually be unwavering, Barney (1991) evaluated the interaction between company assets and managed aggressive focus. Four experimental indicators of the likelihood of strong assets may generate a centered point that is retained could be be non-substitutability, value, inimitability, and rarity.

While analyzing the sources of competitive advantage, the resource-based theory adopts two hypotheses (Peteraf & Barney, 2003). First, in terms of resource control, RBV assumes heterogeneity of industrial companies or within a strategic community. Second, there is the hypothesis that this heterogeneity persists over time owing to the ideal immobility of resources across companies as they are used in the execution of the policy. Resource uniqueness is a needed precursor condition and adds competitively to the benefit of the firm.

Priem and Butler (2001) postulated the following four-prong critiques. They are; (a) RBV represents the same thing; in other words, it is tautological (b) distinct resource combinations may generate the same value for organisations and therefore may not create a competitive advantage (c) this theory is restricted in its prescriptive consequences and (d) underdevelopment

in the position of consumer markets is argued. Nevertheless, Barney (2001) put forward some arguments against them. The criticisms are; it is difficult to come across resources which meets the VRIN (Valuable, Rare, Imperfectly, Non-Substitutable) expectations. Another assumption is that companies can make profits in a highly competitive market as long as they make good use of advantageous resources, but this is not usually the case. It does not take into consideration the equally important analysis of the Porters industry structure.

2.2.2 Institutional Theory

This theory makes individuals comprehend the methods of leadership and organisation not from an financial point of perspective, but from a cultural point of perspective. His popularity emerged because it was able to explain organizational behavior that did not follow the economic rationale. The institutional theory clarified why businesses embraced organizational innovations or improved broad organisation of diffusion despite not being able to improve organizations ' effectiveness and efficiency (Scott, 1995).

Institutional theory better explains how institutions shape diversity, change and stability in organisations and people with action logics behind the scenes. This theory has different hypotheses: institutions have cultural and material uniqueness, Appended agency: values, concerns, organizational and individual assumptions are integrated in the institution's logic (Peteraf & Barney, 2003). This theory helps clarify an organization's performance from a social perspective, hence corporate values and dedication to organisation.

Because of its widespread acceptance, Greenwood, Oliver, Sahlin and Suddaby (2002) related institutional theory to endless discussions on important problems and constructs. An institution's definition is laced from a realistic philosophy to be ambiguous and lack the ability to be a credible study epithet. This ambiguity has created many scientists lack methodological and theoretical principles towards the process of institutionalization.

While various researchers doubt whether the institutional theory's ethno methodology and school of thought will provide a micro-sociological foundation that will help the idea of having strong organizations. Several scientists, drawing on Bourdieu's work, decide to notice a greater micro-

foundation, others argue that micro-level elaboration is not necessary since the theory has a macro-perspective. Scholars also tend to believe that the theory has gone beyond their correct domain and has gone beyond their intellectual limits (Greenwood & Suddaby, 2006).All the maize milling firms are institutions and the interplay of the dynamics therein allows the performance of the organization. Therefore this theory is relevant to the study.

2.3 Mass Customization Practices

2.3.1 Solution Space Development

Space development capacity relates to the capacity of a company to recognize the characteristics that diverge client needs (Nielsen & Brunoe, 2014). The ability to develop space solutions enables companies to identify unique customer needs and meet appropriate product offerings (Salvador et al., 2009). Information about customer needs is crucial in the development of space solutions (Piller, Lindgens & Steiner, 2015). This is data about requirements, preferences, wishes and intentions that assist construct the customer's in-depth knowledge. The following sizes can meet customer demands; design, fit and functionality (Piller, 2006). Design has to do with taste and shape; fit has to do with shape, measure and size; functionality has to do with velocity, accuracy and energy (Piller, 2006).

Previous studies have discovered that companies capable of responding efficiently to recognized customization requirements within a choice bracket are achieving their operational efficiency objectives (Tu et al., 2001; Piller et al., 2014). This is because the development of a working solution space reduces complexity, waste of time and manufacturing costs resulting from increased variety leading to improved operational performance (Huffman & Khan, 1998; Nielsen et al., 2013). In order to develop a working solution space, having a pool of client needs data is a prerequisite. Information on various aspects of design, fit and functionality provides a mass customer with an edge in demand forecasting that helps them plan ahead on how to attain operational goals such as high product quality, flexible production activities, low manufacturing expenses and quick delivery (Bhatia & Asai, 2015). For this reason, organisations need the ability to cope with variation and complexity to achieve mass customization (Blecker et al., 2005).

However, another school of thought argues that the development of space solution is not easy and often leads to confusion (Pine, 1993; Huffman & Kahn, 1998; Squire et al., 2006). For example, a customer may be so imaginative that they end up proposing a product that is not economically viable to the manufacturer or that can not move in quantity. In this perspective, scholars claim that a moving goal is to develop a variety envelope to generate an ideal solution room (Squire et al., 2006). A manufacturer that has managed to access a big pool of client data needs to evaluate it in order to develop the most lucrative variety sets to construct into this envelope (Bhatia & Asai, 2006). However, customer demands are dynamic, so the design of space solutions is a constant method (Piller, 2006). This may demonstrate not to be cost-effective, yet a company must also guarantee that they stay in company as they go about mass customizing goods for customers ' advantage. Customized mass products are often purchased at a premium price and hardly satisfy the cost-effectiveness operational dimension (Tseng & Jiao, 2001).

On the nature of the connection between solution space development and operational performance, Piller et al. (2014) argue that the connection is not direct but depends on the contribution to operational performance of all three strategic mass customization capacities. Su and Huang (2016) support this opinion in their results that the growth of solution space affects firm efficiency in second order.

Therefore, there is controversy over the impact on operational efficiency of solution space development. While one school of thought argues that complexity can be managed within a working solution space by increasing product variety to satisfy heterogeneous needs, another argues that operational performance goals must be sacrificed by mass customizing firms. Therefore, further empirical analysis of the impact of this capability on operational efficiency is required.

2.3.2 Robust Process Design

Robust process design capacity refers to the reuse or recombination of a company's funds to decrease trade between variation and cost (Salvador et al., 2009; Piller et al., 2014). The design

of the production system is regarded robust when it is stable, responsive and offers a vibrant product flow (Tu et al., 2001; Badurdeen & Masel, 2007).

Scholars who suggest that solid process design enhances operational efficiency claim that companies can do this by integrating flexibility into the product design stage that is feasible through the postponement principle (Hoek, 2001; Piller et al., 2014). This concept means moving downstream customization attempts near end customers (Tseng & Jiao, 2001). This allows manufacturing companies to reuse parts by reconfiguring standard modules to form a range of products to meet distinctive client demands. This shortens cycle time, decreases cost of customization, increases flexibility and leads to operational efficiency improvements (Hoek, 2001; Tu et al., 2001).

The main difference between mass customization and craft customization, according to this school of thought, is value creation in strong structures. Craft manufacturers reinvent their products as well as their manufacturing procedures, while mass customers only use stable procedures to produce high-variety goods within a pre-defined solution room (Piller et al., 2015). Additive production techniques such as 3D printing play a main role in ensuring robust process design (Piller et al., 2014). This requires a transition from prototyping to 3D printing (Thorsten et al., 2013). Adaptive human resources also contribute to the solid design of the method (Salvador & Piller, 2013). Employees must be empowered to offset potential rigidities in process and technology structures. This school of thought claims that by making the process design truly robust, the adverse impacts of introducing manufacturing variants can be decreased (Salvador & Piller, 2013). This is through stable and flexible process design (Tu et al., 2001).

Contrary to the above arguments, academics have also asserted that attempting to produce a solid process design is based on trial and error and is a slow process, thus often impairing flexibility and cost operational efficiency objectives (Piller et al., 2015). For instance, during the transition from one item to another, the manufacturing process is stopped leading to moment wastage (Bhatia & Asai, 2015). Manufacturing firms also need to maintain inventory in warehouses resulting in large investment in capital (Rautenstrauch et al., 2002). Tseng and Jiao (2001) add

that enhanced variability in the requirements of clients causes manufacturing companies to incur important lead time and expenses along the supply chain, resulting in poor operating results.

Mass customization causes complexity in the two primary subsystems manufacturing scheme (Rautenstrauch et al., 2002). The first is a push system which, according to forecasts, often converts raw materials into semi-finished products. The second is a customer-driven pull system whose output is not projected to happen. Complexity caused by pull system uncertainty can lead to delayed product shipment, elevated manufacturing costs, and quality compromises (Thorsten et al., 2013).

With regard to the nature of the impact between solid process design and operational efficiency, Piller et al. (2014) and Su and Huang (2016) argue that this connection can best be developed as a second-order structure that relies on the synergy generated by the two remaining strategically important mass customization capacities. However, Zhang et al. (2015) refute this and discover that there is a direct and indirect connection between solid process design and firm efficiency. Conclusively, there is no agreement on the corporate operational performance influence of robust process design.

2.3.3 Customer Choice Navigation

Customer choice navigation capability on the other hand supports customers in creating their own solutions while reducing choice complexity, which facilitates the reduction of costs during the co-design process (Salvador et al., 2009). The traditional tools for customer choice navigation have been co-design toolkits, configurators and choice boards (Franke & Piller, 2004; Salvador et al., 2009; Hvam et al., 2008). These tools guide the user though the elicitation process and are not limited to software tools (Piller et al., 2015).

On the effect of customer preference navigation on operational efficiency, one think tank believes businesses can speed up the decision-making process by relying on acquired customer experience, decrease lead times, and enhance product flexibility, leading to an increase in operational performance (Zhang et al., 2015). The co-design method between producer and client provides a chance to build enduring client relationships. By converting them into repeat clients,

these relationships boost each customer's income and boost their switching expenses (Bhatia & Asai, 2015). Customer integration in the marketing setting and ongoing learning also contribute to the improvement of a mass customizing company's operational results (Su & Huang, 2016).

Other academics, on the other hand, refute this beneficial connection and argue that operational efficiency is negatively affected by client choice navigation. These scientists acknowledge that it is not free to access client data (Piller, 2006). During the process of acquiring consumer requirements, costs arise from client interaction. These expenses include heavy technology investment to assist select customer readings and requirements (Bhatia & Asai, 2015). In order to create the navigation capacity of client selection, companies must first invest in setting up the technology or infrastructure needed to do this (Blecker & Abdelkafi, 2007). Customer-producer co-design processes also waste time because most customers can not readily articulate what they want (Pine, 1993).

Zhang et al. (2015) discovered on the nature of the connection between client choice navigation and operational efficiency that this capacity has a direct and indirect performance connection as measured by economic performance metrics. However, Piller et al. (2014) discovered that the navigation capacity of client selection is only related to operational efficiency in the second order. Conclusively, there is no consensus on the impact on operational efficiency of choice navigation and further study is required in this region.

2.3.4 Information Technology

IT 's role has expanded from its early use as a means of automating manufacturing processes to its current status as an enabler for product design, dynamic device configuration and inter firm integration. Mass customization activities include customizing the products quickly and cost-effectively for different consumer needs. Since mass customization requires manufacturing tasks that vary across different customer orders, mass customization manufacturers need to process more information in order to perform these tasks correctly and in good time. Customizing the mass also increases interdependence among multiple functional units. Mass customization within the company includes close marketing and operations collaboration to better respond to increasingly differentiated consumer needs (Liu, Shah & Schroeder 2010).

Knowing consumer expectations is essential for mass customization, thereby creating incentives for improved network management and deeper links between output and marketing. Such distinct needs need to be sensed rapidly at consumer touch points between companies and passed to supply chain partners (Wind & Rangaswamy, 2001). Therefore, diverse market preferences, high product volatility and increased interdependence across the supply chain increase the difficulty of the job and the amount of information to be handled in an atmosphere of mass customization. In such an environment a company needs to improve its information processing capacity to address the increased need for information processing. IT can be used to process vast volumes of information efficiently, and thus would be conducive to mass customization. Modern IT has the ability to enhance the production and distribution of information within the company as well as across organizational frontiers (Gattiker and Goodhue, 2004). IT makes data storage less expensive, making it more economical to handle mass customization activities (Argyres, 1999).

IT improves a company's information processing capabilities to meet the enhanced information processing requirements of a mass customization program. Therefore, IT will play an even more important supporting role in a mass customization environment than in a traditional mass production setting. IT can be used to simplify and integrate processes at different levels of an enterprise, and to help product customization teams communicate and increase response time to customer requests (Yassine, Kim, Roemer & Holweg, 2004). A streamlined IT system-enabled information management process is critical to addressing the complexity of mass customization. At the other hand, one of the key obstacles to future product customization was a lack of IT support (Ahlstrom and Westbrook, 1999). To order to align a producer with its vendors, manufacturers embraced supplier partnership IT. Supplier partnership IT is increasingly being implemented as internet based applications that automate business transactions and enable supply chain partners to jointly develop goods and schedule supply chain activities.

2.4 Empirical Literature Review

Boney & Hvam (2013) conducted a survey on efficiency measures in an ETO setting for mass customization approaches. The study suggested a fresh way to implement Mass customization strategies effectively and efficiently. This investigates carefully the differences between the contribution margins and between pre-and post-calculation operating steps. The findings indicate the adverse effect of elevated deviations on results.

Hei, Liu, and Peng(2011) investigated the impact of information technology on the manufacturing plant 's product customization capability. The report defined four types of IT capable of meeting MC needs, including configuration of IT products, IT new product development, IT manufacturing and IT provider partnerships. The research, based on the theory of corporate information processing, blends the four main forms of IT with the MC power of a supplier. A model of structural equation was evaluated using survey data from a sample of manufacturing plants that focused on product customization. Empirical studies have shown that two of the four forms of IT strongly support the ability of a producer to mass customize (MC). There was no direct link between the IT configuration and the MC that would require more analysis. By fact the data used is cross-sectional. A series of systematic IT measures should be established in future studies the report recommends.

Westbrook & Ahlstrom (1999) studied, an exploratory review, the consequences of the management of mass customization operations. The results addressed market trends driving customization, approaches used to manufacture customized products, customization positive and negative effects, and implementation difficulties. It is seen in a mass customization strategy that academic operations management has important implications for operations management and hence important potential for further investigation.

Kumar & Piller (n.d) examined mass customization: providing mass production flexibility for personalized products and services, and arguing that mass customization has excellent potential as a source of viable economic and strategic advantage. The market features of today and competitive difficulties in many sectors and market conditions favor mass customization. We

invite executives to know more about this strategy and explore how to better fit their companies with a tailored mass customization approach.

Taghiyareh & Pishdad (2011) studied FIRM (a firm) development of mass customization approach. The research found that FIRM would help strategic decision-makers define their business ' specific policies and settings. Clear guidance on how to handle customization strategies is given for each company that belongs to a unique cluster.

Njaramba (2017) discovered that the space manufacturing approach was the most frequently adopted mass customization capability followed by efficient process design and then market selection navigation, as its overall mean performance has demonstrated. Spatial architecture approaches and robust process design were not statistically important to explain operational performance improvements due to the effect on operational performance of increasing mass customization efficiency, while operational performance was significantly influenced by customer selection navigations. Nonetheless, findings on the synergetic effect of mass customization capabilities on operating performance showed that customer preference navigation and robust process design had a substantial positive impact on operating performance, although designing solution space was not statistically important

2.4 Summary of Literature and Knowledge Gaps

Boney & Hvam(2013) showed that the respective performance was negatively affected by elevated deviations. In a policy of mass customization, Westbrook & Ahlstrom (1999) discovered significant consequences for operations management and thus significant scope for further studies by academic operations management. As a business strategy for five-star hotels in Nairobi, Ayuma (2011) investigated mass customization and found that individual strategies for mass customization might not be relevant for hotels, but it was beneficial to combine strategies. Njaramba (2017) also found that customer preferential navigation and robust process design had a significant impact on operating performance while space construction of the solution was not statistically crucial when examining the effect of mass customization on the operating performance of multinational production companies in Kenya. There is no study on corn milling firms based on the researcher’s understanding.

2.5 Conceptual Framework

A conceptual framework is a set which the researcher thinks may better describe the natural development of the phenomenon to be studied (Camp, 2001).

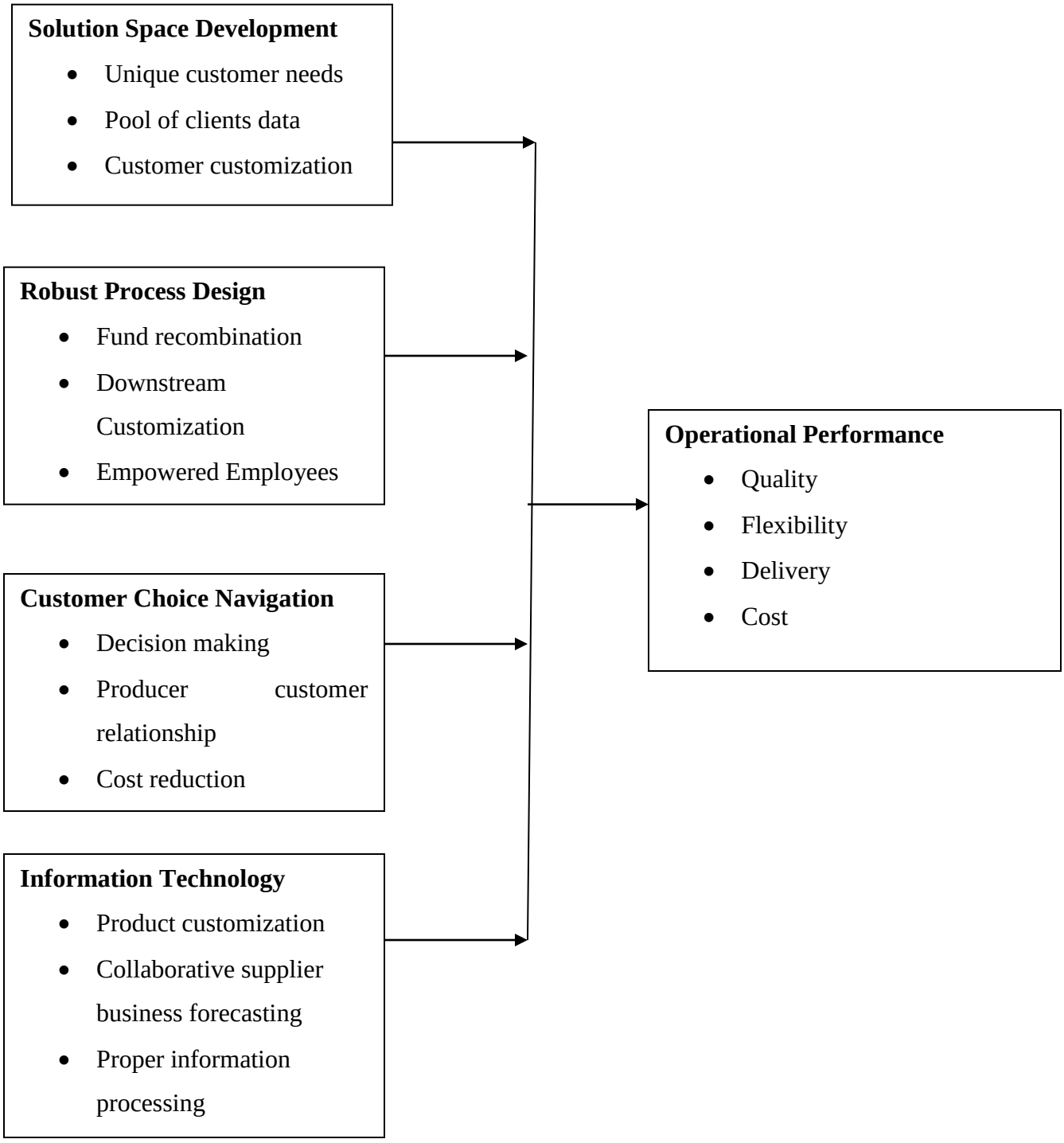

Figure 1 Conceptual Framework

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The research issue can be easily and reliably addressed by the use of a research methodology. This chapter addresses the research methodology, the sample population, the instrument used in the analysis, the data collection technique used and how it was analyzed.

3.2 Research Design

Survey study designs are procedures in quantitative research in which investigators administer a survey to a sample or to the whole population of people to identify the views, beliefs, habits, or characteristics of the population. Survey methodology was implemented whereby a standardized questionnaire was given to a big target population of maize milling companies in Kenya by the investigator. A cross-sectional study focusing on events was conducted in a snapshot of time. This was good at identifying, profiling and examining associative relationships at a specified moment between variables (Ahlstrom & Westbrook, 1999).

3.3 Study Population

The maize milling companies in Kenya was the population for this research. Kenya has 35 Maize Milling companies, according to Cereal Kenya, as shown in Appendix II. There was a census of these companies as the population is not big.

3.4 Data Collection

Primary information was used for studies. This was accumulated through the distribution of questionnaires to respondents and the subsequent use of the drop and pick up method. Questionnaires provide a relatively cheap, fast and efficient way to get large amounts of information from a large sample of individuals (McCleod, 2018). There was also be exploration of email alternatives. This is due to the tiny sample size requiring the greatest level of achievement.

The questionnaires included close-ended, 5-point Likert scale questionnaires. Variables contained various parts of the questionnaire with issues that measured it. Part A contained overall data of the participants, part B contained the mass customization practices and part C lastly contained operational efficiency.

3.5 Data Analysis

The information gathered was checked for precision, consistency and redundancy. SPSS was used to analyze information. Regression and correlation analysis were used. Tables were used in data presentation due to their capacity to generate a comparative form to the otherwise abstract nature of the outcomes. Means was calculated, frequencies, standard deviation and percentages. The model of regression was the following;

$$\mathbf{Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon;}$$

Where= Operational performance,

X_1=Solution Space Development,

X_2=Robust Choice Design,

X_3= Customer Choice Navigation.

X_4= Information Technology

α, Constant term for the performance level in the lack of any independent variables

β_1, β_2, β_3 and $\beta_4$coefficients of the independent variables

ε= error or noise term indicating the unexplained variation outside the model.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND FINDINGS

4.1 Introduction

This chapter summarizes the findings, assumptions and explanations analyzes from the research review. The findings are provided in the form of tables and figures that indicate frequencies, ratios, mean and standard deviations. Correlation, study of regression; tests and conclusions will be discussed respectively. Data was collected from the questionnaires so administered in the flour milling firms to the respondents.

4.2 Response Rate

The questionnaires returned were from 21 flour milling firms out of the set 35 target, this represents a 60% response rate. There were 14 questionnaires that were not returned which represent 40%. A response rate of 50 per cent is acceptable, 60 per cent is good and 70 per cent and above is outstanding Mugenda and Mugenda (2012). This response rate was therefore considered good and deemed suitable for the analysis.

Table 4. 1 Response Rate

Details	Frequency	Percentage
Response	21	60%
Non- Response	14	40%
Total	35	100%

4.3 Demographics

4.3.1 Work Position

The results on the work position were tabulated below. The junior staff comprised of 2 which was the minority with 9.5%. The supervisors were 14, which is the majority of the total number of respondents with 66.7 per cent. The managers were 5, representing 23.8%.

Table 4. 2 Work Position

Work Position	Frequency	Percent
Junior Staff	2	9.5
Supervisors	14	66.7
Managers	5	23.8
Total	21	100.0

It can be concluded that a majority were the supervisors. This lot of respondents is majorly those involved in mass customization practices in the flour milling firms. They are better placed to answer the questions of the questionnaires and give a holistic view.

4.3.2 Work Experience

The result on the work experience was tabulated below. Those that had worked for less than 1 year were 2 which represent 9.5% of the total. Those who had worked for between 1 to 5 years were 5 which represent 25.8%. Those who had worked for 6 to 10 years were 7 a joint majority with those who worked for above 10 years each representing 33.3%.

Table 4. 3 Work Experience

Work Experience	Frequency	Percent
Less than one year	2	9.5
1 to 5 years	5	23.8
6-10 Years	7	33.3
Above 10 Years	7	33.3
Total	21	100.0

The results above show that the respondents had the necessary work experience to have seen experienced mass customization practices in the flour milling firms. This therefore enabled them understand and answer the contents of the questionnaire as required by the researcher.

4.4 Descriptive Statistics for Independent Variables

Various statements relating to mass customization practices for the flour milling firms were posed to the respondents. Mass customization activities were divided into: Space Creation Approach, Robust Process Design, Navigation Customer Preference, and Information Technology.

4.4.1 Solution Space Development

Under solution space growth, to meet the heterogeneous needs of customers, our company's product variety increases had the highest average of 4.81 which is close to 5 on the Likert scale indicating that the respondents strongly agreed to this argument. The corresponding standard deviation was the lowest at 0.402 which indicated that the responses were similar to each other. Our company has a pool of data on customer needs had the second highest average of 4.67 which is close to 5 suggesting that the respondents were strongly in agreement with this fact. In order to improve operational performance, our company has recognized flexibility criteria within a option bracket and our company has the opportunity to create room solutions in a bid to identify specific consumer needs had the same average of 4.24 which is close to 4 indicating that the respondents agreed. The standard deviations were 0.889 and 0.768, with the former results varying greatly.

Table 4. 4 Solution Space Development

Solution Space Development	Mean	Std. Deviation
To satisfy the customers' heterogeneous needs, our company increases product variety	4.81	.402
Our company has a pool of client needs data	4.67	.483
Our company has recognized customization requirements within a choice bracket to achieve operational efficiency	4.24	.889
Our company has the ability to develop space solutions in a bid to identify unique customer needs	4.24	.768

4.4.2 Robust Process Design

The company knows exactly when to use the push and pull method on robust process design and the company recombines its funds to decrease between variance and cost, getting the same mean of 3.90 which is close to 4 on the Likert Scale indicating that the respondents agreed to these statements. The former had a standard deviation of 0.831, the second largest while the later had the least standard deviation of 0.301 showing that the answers were close to each other and near homogeneous. The company moves downstream customization attempts to increase operational efficiency to near-end customers had an average of 2.71 which is nearly 3 implying that the respondents were neutral on this statement; the corresponding standard deviation was 0.784. Employees at the organization are motivated in the rigorous design process to offset possible rigidities, and development systems had the lowest average of 2.19, which is nearly 2 indicating that respondents disagreed with this assertion. The answers were very diverse due to the 0.873 standard deviation which was the highest.

Table 4. 5 Robust Process Design

Robust Process Design	Mean	Std. Deviation
The company knows exactly when to use the push and the pull system	3.90	.831
The company recombines its funds to decrease between variation and cost	3.90	.301
To increase operational efficiency, the company moves downstream customization attempts to near end customers	2.71	.784
At the company employees are empowered to offset potential rigidities in the robust design process and technology structures	2.19	.873

4.4.3 Customer Choice Navigation

On consumer preference navigation, there is a relationship between supplier and consumer that boosts the income of each had the highest average of 4.81, which is close to 5 on the Likert Scale, indicating that the respondents strongly agreed to this argument. Responses were close to each other since the standard deviation of 0.402 was the least. Relying on gained customer expertise, the company can speed up its production decision making process have a mean of 4.24 which is near 4 showing agreement by the respondents. The standard deviation of 0.436 indicates near homogeneity. The company has integrated customers in its marketing settings in a bid to improve its operational results had a mean of 3.62 which is near 4 showing agreement to the statement. The responses were varied and not similar with a 0.498 standard deviation figure. During consumer contact, the organization has taken steps to minimize costs, and commitments had the lowest average of 3.57, which is close to 4, indicating that the respondents agreed to the assertion. The standard deviation of 0.507 showed high variety in the responses.

Table 4. 6 Customer Choice Navigation

Customer Choice Navigation	Mean	Std. Deviation
There is a mutual producer-customer relationship that boosts the income of both	4.81	.402
Relying on gained customer expertise, the company can speed up its production decision making process	4.24	.436
The company has integrated customers in its marketing settings in a bid to improve its operational results	3.62	.498
The company has put in measures to reduce costs during customer interaction and engagements	3.57	.507

4.4.4 Information Technology

The last practice on mass customization was usage information technology. IT allowed scheduling and inventory management had the highest average of 4.86, which is nearly 5, indicating that the respondents were strongly in agreement with this argument. The results were identical with the least standard deviation of 0.359. IT allowed the rapid and cost-effective customization of goods to different customer needs to have an average of 4.43, which is close to 4, which means that the respondents agreed to this assertion. The standard deviation was 0.598 which is the second largest of the responses showing non-homogeneity. IT improved information management and communication, both within the firm and across company borders, had an average of 4.14, which is similar to 4 indicating approval on the argument by the respondents. The standard deviation was at least 0.573 at second. The company has collaborative business forecast with suppliers had an average of 2,05 which is similar to 2 on the Likert Scale indicating disagreement with suppliers on the collaborative business forecast of the company. The standard deviation of 0.805 was the highest and means that the responses were very varied.

Table 4. 7 Information Technology

Information Technology	Mean	Std. Deviation
Scheduling and inventory management is enabled by IT	4.86	.359
IT has allowed products to be quickly and cost effectively tailored to different consumer needs	4.43	.598
IT has improved the collection and synchronization of information both within the business and across firm borders	4.14	.573
The company has collaborative business forecasting with suppliers	2.05	.805

4.5 Descriptive Statistics for Operational Performance

Various statements relating to operational performance as enabled by mass customization practices for the flour milling firms were posed to the respondents. Operational efficiency was divided into: efficiency in quality , performance in reliability , performance in execution and performance in cost.

4.5.1 Quality Performance

The business improved serviceability under quality performance had the highest mean of 4.67, which is close to 5 on the Likert Scale, indicating that the respondents were strongly in agreement with this argument. The corresponding standard deviation was at least 0.483 which indicated that the responses were similar to each other. There is increased conformance due mass customization and due to mass customization the company has witnessed improved durability had a joint mean of 4.24 showing agreement to both statements. However the former statement had the largest standard deviation showing highly varied responses and the later had a standard deviation of 0.539.

Table 4. 8 Quality Performance

Quality Performance	Mean	Standard Deviation
The company has improved serviceability	4.67	.483
There is increased conformance due mass customization	4.24	.831
Due to mass customization the company has witnessed improved durability	4.24	.539

4.5.2 Flexibility Performance

Mass customization for mixing flexibility on the production of flexibility had the highest average of 4.57, which is close to 5 on the Likert scale, suggesting that respondents were strongly in agreement with this claim. Their responses were similar to each other, with the least standard deviation of 0.507. Thanks to mass customization there is quantity consistency with an average of 4.14 which suggests that the respondents agreed to this statement. The responses were not as varied, with a standard deviation of 0.793. Unit consistency was made possible by an average mass variance of 3.86, equivalent to 4 on the Likert Scale, suggesting that the respondents agreed to this statement and that the responses were generally variable with a standard deviation value of 0.910 (the largest).

Table 4. 9 Flexibility Performance

Flexibility Performance	Mean	Standard Deviation
Mass customization has enabled flexibility of mixing	4.57	.507
There is flexibility of quantity due to mass customization	4.14	.793
Flexibility of method has been made possible by mass customization	3.86	.910

4.5.3 Delivery Performance

That mass customization has allowed faster delivery velocity on delivery results; the average was 4.00, which means that the respondents agreed. The standard deviation was 0.000 showing the responses all said the same thing (purely homogeneous). The reliability of the service is at its peak had an average of 3.48 which is close to 3 indicating that the respondents were indifferent on whether reliability of the service was at its peak. The answers were widely ranged with a standard deviation of 0.512.

Table 4. 10 Delivery Performance

Delivery Performance	Mean	Std. Deviation
Mass customization has enabled faster delivery velocity	4.00	.000
The service reliability is at its peak	3.48	.512

4.5.4 Cost Performance

Under cost efficiency, there was an average of 4.95 on whether the cost of manufacturing has dropped due to mass customization, which is close to 5 indicating that the respondents strongly agreed with this argument. The standard deviation of 0.218 was the least to indicate that the responses were similar to one another. The cost of service is manageable due to product customization with an average of 4.43 which is close to 4 indicating that this assertion was accepted by the respondents. The corresponding standard deviation was 0.870 which showed

high response variance. Owing to mass customization, the sale price had a mean of 4.29, which means the respondents agreed to this assertion. The standard deviation corresponding was 0.845.

Table 4. 11 Cost Performance

Cost Performance	Mean	Standard Deviation
The cost of manufacturing has gone down due to mass customization	4.95	.218
The cost of service is affordable due to mass customization	4.43	.870
The selling price has reduced because of mass customization	4.29	.845

4.6 Correlation Analysis of the Study Variables

The production of solution space was found to correlate positively with the operational performance of flour milling firms at 0.843 and significantly with 0.000<0.05 at 5 percent significance level. Increasing levels of solution space production lead to improved operational efficiency. Robust process design was positively associated with operating efficiency of flour milling firms at 0.736 and substantially with 0.000<0.05 at 5 percent significance point. Rising the robust nature of the method contributes to an improvement in operational efficiency.

Navigation of customer preference was found to correlate favorably with operational efficiency of flour milling firms at 0.518 and significantly with 0.000<0.05 at 5 percent significance point. This means an improvement in navigation of customer preference contributes to an improvement in operational efficiency. Information technology has been found to correlate positively with operational performance of flour milling firms with a value of 0.752 and a significant level of significance of 0.000<0.05at 5 per cent. This means that improved use of Information Technology contributes to organizational efficiency improvements. The table is stated in Appendix III.

4.7 Regression Analysis

Regression analysis was performed to determine the linearity of the relation between the study's dependent and independent variables. The findings have been tabled and discussed as shown in the subsections below;

4.7.1 Multiple Regression Model Summary

The Modified R-square value of 0.708 means that the model explains 70.8 per cent of the overall operating output variance of flour milling firms. This means that the model can not describe 29.2 per cent of the overall variation in operating efficiency. The findings thus show that the independent variables influence the operating efficiency of flour milling companies. The following table 4.12 displays the results for differences between the dependent variables and the independent.

Table 4. 12 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.875[a]	.766	.708	.36554	1.823

4.7.2 Analysis of the Variance of the Study Variables (ANOVA)

The residuals are positive, implying that there was a significant relationship between the dependent and independent variables used in the study. From the ANOVA Table 4.13 below, it was established that solution space development, robust process design, customer choice navigation, information technology affected operational performance significantly since $F_{critical}$at (4, 20) degrees of freedom is 3.10< $F_{calculated}$ 13.106 at 5% level of significance. The ANOVA table was generated from the Analysis.

Table 4. 13 Analysis of Variance

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	7.005	4	1.751	13.106	.000[b]
Residual	2.138	16	.134		
Total	9.143	20			

a. Dependent Variable: Operational Performance

b. Predictors: (Constant), Solution Space Development, Customer Choice Navigation, Information Technology, Robust Process Design

4.7.3 Coefficients of the Regression Model

The co-efficients of the regression model were obtained from the analysis and presented as below

Table 4. 14 Co-efficients of the Regression Model

Model		Coefficients[a] Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.439	.287		.635	.527
	Solution Space Development(X_1)	.473	.206	.563	3.534	.001
	Robust Process Design(X_2)	.097	.189	.108	5.965	.000
	Customer Choice Navigation(X_3)	.138	.103	.185	3.037	.003
	Information Technology(X_4)	.115	.151	.154	4.818	.000

a. Dependent Variable: Operational Performance(**Y**)

$$\mathbf{Y=0.439+0.473X_1+0.097X_2+0.138X_3+0.115X_4}$$

Y –Operational Performance of Flour Milling Firms

$\mathbf{X_1}$–Solution Space Development

$\mathbf{X_2}$–Robust Process Design

$\mathbf{X_3}$ –Customer Choice Navigation

$\mathbf{X_4}$–Information Technology

When the independent variables are all zeros, this means that the operating output of flour milling firms will be at 0.439. Operating capacity decreases by 0.473 units as space production of a solution increases by one unit. The operating output improves by 0.097 units as one unit improves robust process design. When consumer preference navigation increases by one unit, the operational effectiveness rises by 0.138 units. Finally, the operational performance increases by 0.367 units as one unit boosts the information technology.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The study sought to examine the impact of mass customization on Kenya's flour milling firms' operational efficiency. Statistics were collected using questionnaires in the flour milling firms which were used for respondents. The review, conclusion and recommendations for further study are provided in this chapter.

5.2 Summary of the Findings

The study targeted 35 flour milling firms. However the questionnaires returned were from 21 flour milling firms, this represents a 60 percent response rate. This response rate was considered good and deemed fit for the study. On demographics, supervisors were majorly involved in mass customization practices in the flour milling firms. The respondents had the necessary work experience to have seen experienced mass customization practices in the flour milling firms. This therefore enabled them understand and answer the contents of the questionnaire as required by the researcher.

Descriptive analyses for the study variables were conducted. Under solution space development the respondents strongly agreed that to satisfy the customers' heterogeneous needs, our company increases product variety. They also strongly agreed that the firms have a pool of client needs. The respondents agreed that the firms have recognized customization requirements within a choice bracket to achieve operational efficiency and our company has the ability to develop space solutions in a bid to identify unique customer needs.

On robust process design, the respondents agreed that the company knows exactly when to use the push and the pull system and the company recombines its funds to decrease between variation and cost. To increase operational efficiency, the respondents were neutral on whether the company moves downstream customization attempts to near end customers. However the respondents disagreed on whether the company employees are empowered to offset potential rigidities in the robust design process and technology structures.

On customer choice navigation, the respondents strongly agreed that there is a mutual producer-customer relationship that boosts the income of both had the highest. Relying on gained customer expertise, the company can speed up its production decision making process was agreed upon by the respondents. The company has integrated customers in its marketing settings in a bid to improve its operational results was agreed upon by the respondents also the company has put in measures to reduce costs during customer interaction and engagements.

The last practice on mass customization was usage information technology. Scheduling and inventory management is enabled by IT was strongly agreed to by the respondents. IT has allowed the rapid and cost-effective modification of goods to particular consumer needs to be accepted by the respondents in the same way as IT has facilitated the collection and coordination of knowledge both within the business and across firm boundaries. However respondents disagreed on whether the firms have collaborative business forecasting with suppliers.

5.3 Conclusion

The research concludes that the product customization activities covered in this study were all conducted by the flour milling companies; solution space creation, robust process design, customer preference navigation, and information technology. There was also a connection between the flour milling firms' practices and operational efficiency.

Design of the solution space was found to correlate favorably with and important operational efficiency of flour milling companies. Rising levels of solution space production contribute to improved operational efficiency. Robust process architecture was positively and substantially associated with the operating efficiency of the flour milling firms. Raising the robust nature of the method contributes to an improvement in operational efficiency.

Navigation of customer preference was found to correlate favorably with and important operational efficiency of the flour milling firms. This means an improvement in navigation of customer preference contributes to an improvement in operational efficiency. Information technology was found to have a strong correlation with and substantial operational efficiency of flour milling firms. It means that increased use of IT contributes to improved organizational efficiency.

5.4 Suggestion for Further Research

The study was confined to flour milling firms and also restricted to only four independent variables. The study therefore suggests similar studies to be done using more independent variables and also other firms in order to generalize the findings.

The adjusted r squared indicated that the variation of operational performance due to mass customization practices were at 70.8%. This shows that 29.2% of the variation was caused by other factors. This study therefore suggests that further research be done to ascertain these factors/practices.

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APPENDICES

Appendix I: Questionnaire

In the specified spaces, tick(√) the box that matches your answer to the questions and provide the answers as appropriate. You will keep the information you provide as confidential as possible.

Part A: General Information

1. Indicate your working position at the company

Junior Staff [ ]

Supervisors [ ]

Production Managers [ ]

General Managers [ ]

2. For how long have you been working in the company?

Less than one year [ ]

1 to 5 years [ ]

6 to 10 years [ ]

More than 10 years [ ]

Part B: Mass Customization

3. Please tick the level of agreement or disagreement on the following issues of mass customization at your flour milling firm. Where 1 represents (Strongly Disagree), 2 represents (Disagree), 3 represents (Neutral), 4 represents (Agree) and 5 represents (Strongly Agree). There is no right or wrong answer, just express your opinion.

Mass Customization Practices	**1**	**2**	**3**	**4**	**5**
Solution Space Development					
Our company has the ability to develop space solutions in a bid to identify unique customer needs					
Our company has recognized customization requirements within a choice bracket to achieve operational efficiency					
Our company has a pool of client needs data					
To satisfy the customers' heterogeneous needs, our company					

increases product variety					
Robust Process Design					
The company recombines its funds to decrease between variation and cost					
To increase operational efficiency, the company moves downstream customization attempts to near end customers					
At the company employees are empowered to offset potential rigidities in the robust design process and technology structures					
The company knows exactly when to use the push and the pull system					
Customer Choice Navigation					
Relying on gained customer expertise, the company can speed up its production decision making process					
There is a mutual producer-customer relationship that boosts the income of both					
The company has put in measures to reduce costs during customer interaction and engagements					
The company has integrated customers in its marketing settings in a bid to improve its operational results					
Information Technology					
Scheduling and inventory management is enabled by IT					
The company has collaborative business forecasting with suppliers					
IT has enabled customizing products to specific customer needs in a quick and cost-effective manner					
IT has enhance information processing and coordination both within the firm and across firm boundaries					

Part C: Operation Performance

4.

Operation Performance	**1**	**2**	**3**	**4**	**5**
Quality Performance					
Due to mass customization the company has witnessed improved durability					
The company has improved serviceability					
There is increased conformance due mass customization					
Flexibility Performance					
There is flexibility of quantity due to mass customization					
Mass customization has enabled flexibility of mixing					
Flexibility of method has been made possible by mass customization					
Delivery Performance					
Mass customization has enabled faster delivery velocity					
The service reliability is at its peak					
Cost Performance					
The cost of manufacturing has gone down due to mass customization					
The cost of service is affordable due to mass customization					
The selling price has reduced because of mass customization					

End Thank You

Appendix II: List of Major Flour Milling Firms in Kenya

1. Bakhresa Grain Milling (K) Limited
2. Kitui Flour Mills Limited
3. Atta Kenya Limited

4. Mombasa Maize Millers
5. Malindi Flour Mills
6. Manji Food Industries
7. Karibu Floor Mills
8. Pembe Flour Mills
9. Grain Industries Limited
10. TSS Grain Mills
11. Capwell Industries
12. Rafiki Flour Mills
13. Eldoret Grains Ltd
14. Unga Ltd
15. Nairobi Flour Mills
16. Osho Grains
17. Eastern Flour Mills
18. Milly Grains
19. Uzuri Limited
20. Chania Mills
21. Kabansora Millers
22. Kitale Industries
23. United Millers Limited
24. Kifaru Maize Millers
25. Sava Industries
26. Katex Enterprises
27. Pan African Grain Millers
28. Sunrise Grain Millers
29. Sweet Maize Flour
30. Uchumi Grain Millers
31. Summer Millers Limited
32. Range Food Products
33. Daiga Millers
34. Batian Grain Millers
35. Royal Maize Millers

Appendix III: Correlation Analysis Table

Correlations

		Solution Space Development	Robust Process Design	Customer Choice Navigation	Information Technology	Operational Performance
Solution Space Development	Pearson Correlation	1	.813**	.393	.777**	.843**
	Sig. (2-tailed)		.000	.078	.000	.000
	N	21	21	21	21	21
Robust Process Design	Pearson Correlation	.813**	1	.359	.676**	.736**
	Sig. (2-tailed)	.000		.110	.001	.000
	N	21	21	21	21	21
Customer Choice Navigation	Pearson Correlation	.393	.359	1	.474*	.518*
	Sig. (2-tailed)	.078	.110		.030	.016
	N	21	21	21	21	21
Information Technology	Pearson Correlation	.777**	.676**	.474*	1	.752**
	Sig. (2-tailed)	.000	.001	.030		.000
	N	21	21	21	21	21
Operational Performance	Pearson Correlation	.843**	.736**	.518*	.752**	1
	Sig. (2-tailed)	.000	.000	.016	.000	
	N	21	21	21	21	21

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

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