BUSINESS PROCESS STANDARDIZATION AND OPERATIONAL PERFORMANCE OF LARGE MANUFACTURING FIRMS IN KENYA

BY

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DECLARATION

This research project is my original work and has not been presented for the award of a degree in this or any other university.

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

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DEDICATION

I dedicate this work to my beloved family members. Thank you.

ACKNOWLEDGEMENTS

First, I give glory to God for being good to me during the research period, especially with respect to resources and time. Secondly, I take appreciate Dr. Stephen Odock who spent his precious time in guiding me towards completion of this work. May God bless you abundantly. Thirdly, my appreciation goes to the management of the University for a chance to complete my studies.

Equally, I salute those who responded to the questionnaires, for participating in the process. Finally, appreciation goes to my family members for their commitment to bear with me during the huge task of accomplishing the write up. Allah bless you all

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ABSTRACT

Companies can only remain competitive and ensure survival in the current market environment if they adopt efficient mechanisms and operations. This would be achieved through standardizing business processes. The general objective was the determination of how business process standardization affects the extent to which large manufacturing in Kenya perform operationally. Specifically, it was meant to establish the degree of implementation of business process standardization and determine how business process standardization affects the degree of performance of large manufacturing firms in Kenya operationally. It employed descriptive cross-sectional approach. The target was all large manufacturing companies in Kenya. There were 511 of these firms as per the information provided in KAM directory (Kenya Association of Manufacturers (KAMs), 2021). The study used stratification to sample the needed informants randomly to avoid biasness making the outcome applicable. The exact sample size was 77. The study employed primary data obtained through a questionnaire. SPSS was used to provide both inferential and descriptive statistics. Descriptive statistics helped give information on the informants. Multiple regression helped to ascertain how the study constructs are linked. The findings indicate that large manufacturing firms in Kenya adopted process execution to a moderate extent. The correlational findings established that process execution and operational performance positively and significantly correlate, given $r = .709$, $p < 0.05$. Process documentation and collaboration and communication equally strongly correlate positively and significantly having $r = .789$, $p<0.05$ and $r=.806$, $p<0.05$ discretely. Collaboration and communication and operational performance have a weak direct and insignificant correlation of $r = .152$, $p>0.05$. The implication was that increased process execution, process documentation and data management lead to improved operational performance. Improved collaboration and communication equally do not significantly affect operational performance. The research also found a direct relationship connecting BPS and operational performance given by $R = 0.862$. The adjusted R^2 of 0.726 imply that 72.6% of changes in operational performance arise due to changes in BPS practices studied in this research. This implies that there are other factors causing 27.4% variations in operational performance that are not studied in the current model. The conclusion of the study was that BPS and operational performance positively and significantly relate. Further BPS practices affect the extent to which manufacturing firms in Kenya perform operationally. The study also reached a conclusion that large manufacturing firms have embraced BPS activities to a moderate extent. These included process execution, process documentation, data management and collaboration and communication. The study recommended that managers of large manufacturing firms should seek how to improve operational performance by incorporating standardized processes. The managers should also focus on factors that may negatively affect the process of standardization. The researcher also recommends that management should exploit other operational performance factors to help achieve sustainable operational superiority.

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ABBREVIATIONS AND ACRONYMS

BPS: Business Process Standardization

CC: Collaboration and Collaboration

DCT: Dynamic Capabilities Theory

DM: Data Management

KAMs: Kenya Association of Manufacturers

KITP: Kenya Industrial Transformation Programme

PD: Process Documentation

PE: Process Execution

RBV: Resource Based View

SD: Standard Deviation

TOC: Theory of Constraints

VIF: Variance Inflation Factor

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Companies can only remain competitive and ensure survival in the current market environment if they adopt efficient mechanisms and operations. There are however different methods of performing similar procedures due to differences in qualifications and experience making it difficult to be consistent in terms of operational activities. This leads to deviations in the products or services produced (Kurdve & Goey, 2017). This implies that firms should record and document standardized ways of accomplishing particular tasks to reduce the deviations in performance and enhance efficiency through predictability. Employees should then be asked to adhere to such standards for purposes of achieving the desired output. This explains the justification of standardization by companies today and its emphasis in achieving operational efficiency (Ungan, 2006). The focus is on attaining uniformity of the processes as well as predictability for purposes of customer satisfaction (Harmon, 2010).

This research was founded on the theory of dynamic capabilities, resource-based view and theory of constraints. Business process standardization means a dynamic ability of the company to develop resources and action plans that generate competitiveness of the company (Makadok, 2001). Resource based view assert that business process standardization is one process through which companies acquire superior optimization of the use of the available resources. Ray, Barney and Muhanna (2004) assert that procedures used in business are part of the systems that companies engage in for objectives accomplishment. Finally, the theory of constrains explains that when business

processes are standardized, limiting factors in the production process are reduced (Rudnicki, 2011).

Large manufacturing firms in Kenya have a major concern in managing inputs, particularly local inputs where they cannot always place reliance on centralization through warehousing operations due to long lead time, and thus are not guaranteed to get quality inputs at the right price for the duration needed (Gichuru, & Arani, 2015). The reality is that, in order to be sustainable, the large manufacturing firms in Kenya must deal with operational constraints including stoppages, poor materials management and high cost of production arising from non-standardization of operations. Business process standardization is therefore important in dealing with issues in manufacturing leading to smooth and predictable operations that improves production efficiency and timeliness (Peng, & Vlas, 2017). This is because business process standardization gives direction and predictable approach that improves efficiency in process management (Mor, Bhardwaj, Singh, & Sachdeva, 2018).

1.1.1 Business Process Standardization

According to Schäfermeyer, Grgecic, and Rosenkranz (2010), BPS is the process of consolidating procedures and activities in the business and the key operations of the firm. It's about creating a "best practice" for running a process and ensuring that the company abides by it. It is the process of documenting and visualizing the system showing employees the best way to do their tasks. When standardization is used in all tasks, it helps to reduce costs and improve co-ordination between the units and other stakeholders (Whitmore, 2008). The process equally reduces the turnaround time of a process,

expenses reduction and improvement of qualitative aspects of operations (Muenstermann, Eckhardt, & Weitzel, 2010). While standardizing business processes has clear advantages, there are adequate reasons for maintaining the differences between procedures and tasks in business. Variations occur to be able to handle different customer types and cultures differently and to leave different business areas with adequate independence to avoid micro-management (Tregear, 2010).

Some variations must however exist explaining the reasons why models are developed to standardize operations (La Rosa, Ter Hofstede, Wohed, Reijers, Mendling, & Van der Aalst, 2011). There are a number of ways of measuring business process standardization. Wurm, Schmiedel, Mendling and Fleig (2018) conceptualized business process standardization as a multidimensional construct on the basis of process performance. The current study will focus on process execution, process documentation, data management and collaboration and communication. This is because these activities would enable integration of all activities in the firm's operations.

1.1.2 Operational Performance

Azim, Ahmed, and Khan (2015) argue that operational performance measures how effective and reliable the company processes are, including the time taken to produce and the inventory levels maintained. Generally, the basis is that when companies are operationally efficient, it has an overall effect on performance with respect to marketing, manufacturing excellence, and customer care. The bottom line in operational excellence is the identification of inefficient processes as well as waste and making prompt decisions to improve corporate performance (Russell & Taylor, 2008). The study by Zhu, Sarkis

and Lai (2008a) posit that operational performance indicators include timely delivery of goods, waste reduction, quality of products and services, quick deliveries, minimization of wastes and maximum use of available capacity.

The current study used of the variables as defined by Zhu, Sarkis and Lai (2008a) and hence will focus on cost reduction, flexibility of operations, speed of service delivery and product and service quality. Reduced number of products returned by consumers indicate that goods and services are of high quality, reduced number of customer complaints overtime and reduced cases of products reworked on. Reduced cost of operations was on the basis of reduced inventory levels (Maani, Putterill & Sluti, 1994), improved capacity utilization and the realization of favorable variance against budget by the company. Flexibility of operations on the other hand will be measured on the basis of existence of a high number of product categories, capacity to respond to fluctuating market demand and the fact that new products can be introduced to cater for emerging consumer preferences by the company. Finally, speed of service delivery will be indicated by a shorter design time, favourable operational cycle time and set up time of machinery and equipment (Zhu, Sarkis, & Lai, 2008a). These indicators are justified because they are relevant with reference to the activities of manufacturing companies' operations.

1.1.3 Business Process Standardization and Operational Performance

BPS helps to achieve higher customer satisfaction taking into account changing customer preferences, while delivering performance benefits (Liker, & Morgan, 2006). Further, it helps in achieving uniform processes through the value chain and throughout the confines of the firm to enhance information management regarding business operations. This

improves how communication is managed and the partnership among the relevant participants in the manufacturing process (Schäfermeyer, Rosenkranz, & Holten, 2012). It should however be noted that excessive standardization may negatively affect how customers relate to the organization due to the formality that may not suit all customers. This requires firms to deal with how to maximize customer satisfaction with minimal informality and without compromise on the need for improved performance (Silvestro & Lustrato, 2015).

There are a number of operational values generated by business process standardization. Davenport (2005) established that BPS lowers process execution costs and improves how processes and departments collaborate. Further, Münstermann, von Stetten, Laumer, and Eckhardt (2010) posit that it reduces time involved in process execution, cost of operations and lead to improved quality as well (Münstermann, Eckhardt & Weitzel, 2010). There is also improved operational performance through enhanced regulation and the fact that sections within the organization and personnel collaborate in all processes. Standardizing business processes generally ensures that operational processes are effectively realigned and predictable especially with regard to routine operations.

Business process standardization helps to achieve this by ensuring that each activity is undertaken on the basis of clearly define guidelines on scope, quality, and procedures needed. Failure to standardize means a firm cannot visualize and plan on issues of quality and personnel as per customer specifications (Lander & Liker, 2007). Regarding operational performance, business process standardization ensures improved clarification of procedures, guaranteed performance, promotion of

production activities and perfecting customer care. Further, Münstermann and Weitzel (2008) assert that operational excellence arising from BPS include reduced time, reduced cost, improved quality, improved customer satisfaction and increased flexibility.

1.1.4 Large Manufacturing Firms in Kenya

The vision 2030 would be achieved through increased manufacturing activities, because it contributes to improved economic performance, job creation and poverty elimination (Kenya National Bureau of Statistics, 2017). In addition, it leads to improved development through foreign investments and export earnings (Cheruiyot, Jagongo, & Owino, 2012). The need to improve the manufacturing process increase gains for the country. Emphasis is therefore placed on the role of the sector in achieving industrialization and improving economic growth and development of Kenya. There are 511 of these firms as per the information provided by Kenya Association of Manufacturers (KAMs), 2021). The large manufacturing firms are spread across the country with a majority of them being located in Nairobi and Mombasa region. It is presented as Appendix II.

There are a number of business process standardization-related problems affecting large manufacturing firms today. Cascio and Montealegre (2016) found out that most companies do not run optimally and they employ obsolete technology in running their operations while 83 percent of the firms are semi-automated and 11 percent have full automation. Equally, 6 percent of the firms operates full non-automated operations. It can therefore be noted that most of the firms are at sub-optimal level in operations because of several challenges including cost of energy, financial constraints, manual operations, expensive technology and inadequate personnel as well as markets. Pierre, Thomas,

Lennart, Birgitta, and Lena (2013) argue that standardizing manufacturing processes motivates the entire organization to work more efficiently and provide manufacturing companies with higher quality cheaply.

1.2 Research Problem

The standardization of business processes intends to intuitively create similarity in operations despite different physical task locations (Harmon, 2010). This process is beneficial to the firms in that it helps to reduce operating expenses and improve co-ordination of activities between units and stakeholders (Davenport, 2005). According to Münstermann, Eckhardt, and Weitzel (2010), when business processes are standardized, there is significant cost reduction as well as improved quality and co-ordination of activities. However, despite the advantages arising from BPS, the need to vary processes and procedures should still be upheld. This would help to handle diverse customer needs and cultural differences and minimal compromise on the autonomy of different business units (Tregear, 2010). The reality is that some variability is unavoidable emphasizing the fact that a balance must be established between variation of processes and standardization (La Rosa, Dumas, Ter Hofstede, & Mendling, 2011).

There is increased migration of firms involved in manufacturing from separated planning processes towards standardization due to available operational constraints (Stadtler, 2005). The argument is that business process standardization is key and it means integration of tasks, departments and personnel in the production operation process which improves operational excellence. In Kenya, the focus is on achieving improved manufacturing-based revenues through revamped manufacturing sector (Kenya

Association of Manufacturers, KAM, 2020). This would drive up economic growth and help achieve industrialization objective arising from the fact this is one of the largest and strategic sectors.

Kim, Daniel, Tim, and Wolfgang (2008) established that business process standardization positively influences business process outsourcing. Contextual gap however exist since the study was done in Germany. The study also used business process outsourcing as the dependent variable. In another study, Villalba-Diez and Ordieres-Mer´e (2015) found out that operational performance in the manufacturing process is affected to a significant level by process standardization. The study was however based on a Japanese context and the focus was on general manufacturing operational performance. The standardization focused on the communication process. Ratheesh (2015) equally established that standardization of work is the basis upon which lean manufacturing systems are crafted focusing on Toyota Production System. Munyi and Ogollah (2017) determined the elements influencing the improvement of firm procedures at pharmaceutical manufacturers in Kenya. A conclusion was reached that management's involvement majorly impact improved business processes in Kenyan pharmaceutical manufacturers.

Aforementioned studies mean an existing conceptual, contextual and methodological gap regarding the practice of business process standardization. Conceptual gap arises on the basis that different studies focus on different variables. The current study focuses on BPS as the regressor and operational performance as the regressed variable. The focus by other studies included business process outsourcing as independent variable (Kim, Daniel, Tim, & Wolfgang, 2008); manufacturing performance as independent variable

(Villalba-Diez & Ordieres-Mer´e, 2015) and determinants of business process standardization (Munyi & Ogollah, 2017). Methodological gap exists on the basis that most of the studies are case studies, while the current study focuses on all large manufacturing firms.

The research sought to address the gap by answering the question, 'what is the effect of business process standardization on operational performance of large manufacturing firms in Kenya?'

1.3 Research Objectives

The general objective was to determine the effect of business process standardization on the operational performance of large manufacturing firms in Kenya. The study was meant to achieve the following specific objectives:

i. To establish the extent of implementation of business process standardization in large manufacturing firms in Kenya.
ii. To determine the effect of business process standardization on operational performance of large manufacturing firms in Kenya.

1.4 Value of the Study

It significantly contributes to theoretical, practical and policy development. Theoretically, it makes provision for operational significance of business process standardization. This would provide a good basis for academicians to develop more theories and models regarding standardization. The generalization of the findings would further give insights into the existing theories in the areas of operational excellence of firms. The study findings would also provide theoretical insights regarding the determinants of operational

performance. The findings of the research in this area would equally help to investigate how business processes standardized affects business performance. This would provide more information on operational performance excellence based on business process standardization.

In practice, it provides information to the managers of manufacturing companies on why they need to emphasize on approaches to standardization of work processes. It will also inform further studies and insights in the same area and related concepts. Additionally, management team would find the generalizations useful in working out lean and effectively coordinated business models. Business process standardization equally ensures that firms achieve operational and service quality and improved returns. The study outcome would also relevantly be used by academia community and those in practice since it puts BPS in its concept and contextual perspective.

Finally, with respect to policy, paper provides a basis for formulation of various guidelines and frameworks for BPS within the framework of healthy competitive policy provisions. BPS can be applied to parastatals and public corporations to provide insights into how these organizations can operate in an environment of budget constraints and the need for transparent financial operations. The research would therefore help the Government to identify complexities in operations of its institutions and implement effectively aligned processes within the budget constraint environment.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The part provides reviewed literature on BPS and operational performance. It starts by looking at the theories which anchors this study after which the concept of BPS is discussed in details. This was followed by a section on empirical review. The section ends by looking at a diagrammatic analysis of the variables under study.

2.2 Theoretical Foundations of the Study

It was founded upon Dynamic Capabilities Theory (DCT), Resource-Based View (RBV) and Theory of Constraint (TOC). The following subsections provide a detailed explanation of each theory and their relevance in the study. It is however anchored on DCT, since the process of standardization is based on an in-depth analysis of the internal capabilities of the firms.

2.2.1 Dynamic Capabilities Theory

It was put forward by Teece and Pisano (1994) who put up an argument that capabilities are a firm's capacity as well as abilities in deploying the firms' assets and the use of effective processes and procedures. Pearce, Sims Jr, Cox, Ball, Schnell, Smith, and Trevino (2003) established that the dynamic capability relates to the extent to which a company can grow and survive through proper usage of the resources. The argument is that companies should be in a position to combine the resources effectively and apply expertise as well as being innovative in the use of the available resources. Managers should also be good entrepreneurs to ensure that the available resources are put into good use.

Augier and Teece (2007) emphasizes on effective adaptation, integration, and reconfiguration of controls internally with the available personnel and core competences to match the dynamic nature of the environment as a basis of achieving operational excellence. Business process standardization helps firms to strategize on the best way to use resources by adopting a uniform procedure for similar tasks to compete effectively (Makadok, 2001). The basis is that firms must be predictable in using resources and match it with customer specifications for effective customer experience.

2.2.2 Resource Based View

It was formulated by Wernerfelt, (1984). The theory is of the view that firms can be competitive and sustain superior performance through identification and use of rare capabilities overtime. Companies that have rare capabilities including personnel and unique processes are deemed to be good competitors since they are in a position to do what the other organizations cannot do (Crook, Ketchen, Combs, & Todd, 2008). Business process standardization may give an organization superior capability due to predictability and process simplication giving the organizations competitive advantage. This advantage is therefore realized through uniqueness in operational procedures and process maximization (Sirmon, Hitt & Ireland, 2007).

According to Crook, Ketchen, Combs, and Todd (2008), organizations should effectively position themselves in the market by using their resources for competitive advantage. This improves the general performance of the company. Business process standardization is one process through which companies acquire superior optimization of the use of the available resources. The argument is that procedures adopted in a business are part of the

systems that enhance the competitive position of the firm and hence objectives achievement (Ray, Barney, & Muhanna, 2004).

2.2.3 Theory of Constraints

TOC was advanced by Goldratt in the 1970's. The theory identifies process constraints and procedural difficulties that may hinder the process of achieving organizational objectives (Goldratt, 1990). The argument is that any complexity in a process or system including multiple linking of processes is a limiting factor and must be handled effectively to achieve operational success and improved financial benefits. The theory therefore provides a basis to identify and remove limiting factors, giving solutions to organizations on improving operational performance through process improvement (Goldratt,1990).

According to the theory, process standardization explains interconnection of various parts of a system working together to produce optimum goods and services. This positively affect the quality of supply chains to achieve efficiency and effectiveness (Rudnicki, 2011). In its relevance, theory of constraints identifies obstacles in the system for purposes of improvement. Some of these obstacles would best be solved through standardization of processes through accurate focus on the tasks.

2.3 Indicators of Business Process Standardization

BPS directly and positively affects production cost because it enhances economies of scale and organizational expertise. The indicators of business process standardization focus on the variables that give evidence and drives the benefits derived from

standardization. (Koenig, Beimborn, & Weitzel, 2009). The indicators are as outlined below:

2.3.1 Process Execution

According to Girod and Bellin (2011), a good design of organizational structure creates hierarchy of departments and processes that relate vertically and horizontally to facilitate centralized decision making. Through standardization, there is distribution of leadership in such a way that decision making is not disjointed. Through effective organization structure, there is routine decision making and predictability which improves business process standardization.

Design of organization structures requires that there is high transaction facilitating business operations among the stakeholders in such a way that there is harmony in operations and a routine is established in some operations. The requirement is that the structure facilitates operational performance and by extension business process standardization. Transactions between departments and tasks within the organization and routine performances influences business process standardization and supply chain performance (Schäfermeyer, Grgecic, & Rosenkranz, 2010).

2.3.2 Process Documentation

Process standardization leads to consistent operations which makes organizations to survive and grow overtime. It should however be noted that employees have different ways of performing tasks that are similar. There is however the need to document the procedures, processes and ways of doing tasks to ensure consistency, irrespective of the

different input by the employees, based on their different levels of education, level of experience and expertise (Ungan, 2006).

Process documentation ensures that there is minimization of variations since they would adhere to the documented procedures leading to high quality products or services being available to customers (Romero, Dijkman, Grefen, Van Weele & De Jong, 2015). There are however certain difficulties arising from the process documentation, especially where there are very many complex operations.

2.3.3 Data Management

Data management ensures that processes are standardized since database can be used to centralize information needed to make performance decisions. This is achieved through data standardization. This involves converting different data sets into a common expectation for uniformity (Buchta, Eul, & Schulte, 2009). The reality is that emerging technologies can reshape business processes from its traditional version to a more explorative variation.

Data management have an influence on how processes are standardized through focus on creating value, engaging customers and management of how technology is applied in business processes (Ahmad, & Van Looy, 2020). Effective data management can be applied in resolving current issues in business to facilitate achievement of new performance levels (Fichman, Dos Santos, & Zheng, 2014). Emerging technologies equally helps to execute business process tasks.

2.3.4 Collaboration of Task Performance

Collaboration ensures that departments collaborate properly which improves work culture and process consultations. It is achieved through development of good working relationship between departments and personnel in different sections for effective collaborations. The advantage of collaboration and communication in process standardization is that it enhances collaboration that achieves customer quality services and generally improved supply chain performance (Miguel, & Xhafa, 2017). It further helps in improving trust and to build a positive work culture.

The reality is that each firm works based on their different cultures and operational uniqueness. This is because different firms have different stakeholder relationships and the markets they serve, implying different supply chains. Tregear (2010) posit that the differences in the firms would significantly affect operations if not effectively standardized.

2.4 Empirical Literature Review

The reviewed research focused on the variables under study both locally and globally. The study by Munyi and Ogollah (2017) looked at how people, strategy, leadership, and corporate culture impact how business processes are improved. The study was identified influencing factors in improving business processes at pharmaceutical manufacturers in Kenya. The conclusion was that effective corporate leadership, culture and staffing affect business performance. The study has contextual and conceptual gaps. It was focused on pharmaceutical companies in Kenya with the concepts of focus being people, strategy, leadership, and corporate culture as aspects of business process standardization.

Kim, Daniel, Tim, and Wolfgang (2008) conducted a research on the use of standardized processes and business process outsourcing success. The study adopted descriptive survey collecting data from 335 business process outsourcing ventures in 215 German banks. The study concluded that standardization of business processes positively influence success in outsourcing. The gap however exists since the study was done in Germany. The study also identifies a gap on conceptual analysis since it used business process outsourcing as the dependent variable.

In another study, Villalba-Diez and Ordieres-Mer´e (2015) established the existence of highly quantifiable correlation among manufacturing operational performance and small-size as well as manufacturing operational performance and process standardization connecting organizational network. It was based on a Japanese context and the focus was on general manufacturing operational performance. The standardization focused on the communication process and this presents both contextual and conceptual gaps.

A study by Ratheesh (2015) focused on standardization of work in a manufacturing industry. The study adopted a concept of time observation and a case study was used. It was established that standardized work is a foundational element of lean manufacturing methodologies. The study is contextually different as it focuses on Toyota Production System.

Koval, Nabareseh, and Chromjaková (2019) established that how customers perceive the organization affects service quality and the extent to which they are satisfied. The conclusion was that attempt to customize goods and services as well as to standardize

them must be compromised for effective competitive advantage. The study is however contextually different from the current study since it focused on the four foreign countries.

2.5 Summary of Literature Review and Knowledge Gaps

The reviewed concepts, context and methodology leaves gaps in knowledge that need to be addressed. For instance, the conceptualization of the variables of business process standardization and operational performance creates different variations while there exist as well some contradictions. The gaps that exist conceptually means the use of other concepts in related studies that were not dealt with in the current research. Contextually, some research based on the same variables focused on other countries and sectoral operations, as opposed to the focus of this research work. Methodologically, gaps existed where there were different designs used in research, including the method of sampling, how the data was analyzed and interpreted. The summary of these gaps are as given in Table 3.1:

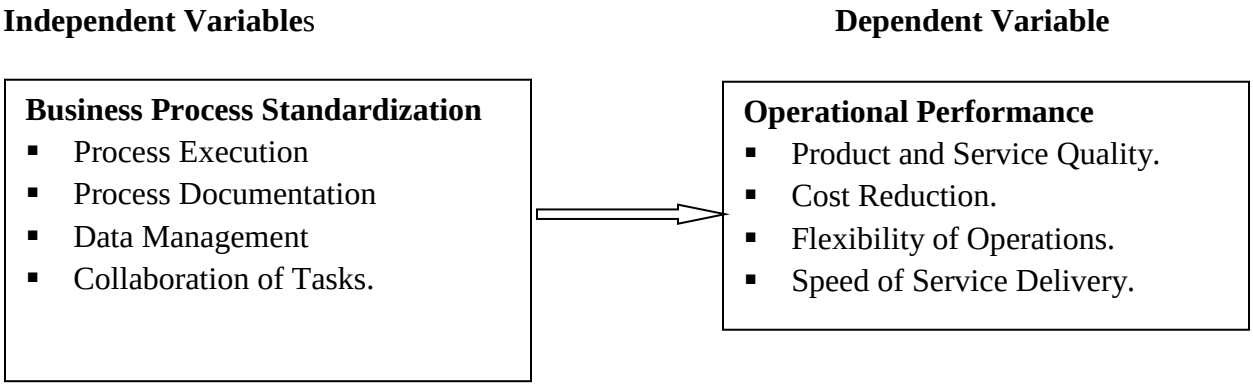
Table 3.1: Summary of the Knowledge Gaps

Study by	Study Focus	Methodology	Study Results	Knowledge Gap
Kim, Daniel, Tim & Wolfgang (2008)	Evenness of business processes and successful outsourcing	Used descriptive survey.	Evenness of business processes positively affect outsourcing of processes.	Contextually, the study was domiciled in Germany. The study used business process outsourcing as the dependent variable.
Villalba-Diez & Ordieres-Mer´e (2015)	Manufacturing Performance and Standardization of Interprocess Communication	Case Study. Japanese manufacturing organization.	Manufacturing operational performance have a significant effect on process standardization of small businesses.	The study was based on a Japanese context. The focus was on general manufacturing operational performance. The standardization focused on the communication process.
Ratheesh (2015)	Standardization of Work in a Manufacturing Industry	Time Observation Case Study Based on Toyota Production System	Standardization of processes affects lean practices.	The study focused on Toyota Production System.
Munyi and Ogollah (2017)	Factors affecting business process improvement	A descriptive survey research design.	The improvement of processes in business needs the commitment of managers.	Contextually, the study was domiciled in companies that manufacture pharmaceuticals in Kenya. Conceptually, the research concentrated on the factors affecting process improvement.

2.6 Conceptual Framework

It conceptualizes how business process standardization and operational performance relate. Business process standardization represents the regressor variable while operational performance is the regressed variable. The indications of performance operationally include cost reduction, flexibility of operations, speed of service delivery and product and service quality. The analysis is given in Figure 2.1.

Figure 2.1: Conceptual Framework



CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

It is a presentation of the design considered appropriate, the respondents, sample selection procedures. It also emphasizes on how the data was collected and analyzed to help in addressing the questions raised in the study, as well as to meet the research objectives.

3.2 Research Design

It employed descriptive cross-sectional research design. It describes characteristics of a phenomenon as it is occurring. Kihara (2016) posits that descriptive approach samples data to help analyze them in a statistical way and generalize the outcome with reference to a population. In this design, data will be gathered to facilitate verification of how the variables are hypothetically related and further generate results on the basis of the questions to be addressed (Mugenda & Mugenda, 2003). Cross sectional studies are justified on the basis that it assists in ascertaining the existence of link between the study variables at a specific point in time (Cooper & Schindler, 2006).

Generally, the design was considered appropriate due to its focus on how the variables under study are linked and the fact that data collection focused on several companies at a point in time. It enabled analysis, interpretation and reporting of research findings in their natural state for easy application of the study outcome (Sekaran, 2006).

3.3 Population of the Study

The target was all manufacturing companies that are categorized as large. There were 511 of these firms as per the information provided in KAM directory (Kenya Association of Manufacturers (KAMs), 2021). The large manufacturing firms are spread across the country with a majority of them being located in Nairobi and Mombasa region. It is presented as Appendix II.

3.4 Sample Size and Sampling Technique

The samples are obtained from the targeted population as given in the KAM listing manual (KAM, 2021). The study used stratification to sample the needed informants randomly. In this method, categories of the large manufacturing firms made up the stratum. Stratified random sampling helped to avoid biasness making the outcome applicable. Each stratum was made up of the different classification of the large manufacturing companies. Thereafter 15% of the population was chosen randomly as sample size. Mugenda and Mugenda (2003) posits that 10-50% of the population makes up an acceptable sample size. This is as given in Table 3.1:

Table 3.1: Sampling and Sample Size.

S/NO	Sub - Sector	Population	Sample Size (15%)
1	Building, Construction and Mining	16	2
2	Chemical and Allied	60	9
3	Energy, Electricals and Electronics	32	5
4	Food and Beverages	135	20
5	Leather and Footwear	5	1
6	Metal and Allied	56	8
7	Motor vehicle and Accessories	22	3
8	Paper and Board	50	8
9	Pharmaceuticals and Medical Equipment	21	3
10	Plastics and Rubber	58	9
11	Textiles and Apparels	37	6
12	Timber, Wood and Furniture	20	3
	TOTAL	**512**	**77**

Source: Research Data (2021)

3.5 Data Collection

Freshly collected data was obtained through a semi-structured questionnaire. It comprises of three sections. Section A has information about the firm; section B covers business process standardization practices while section C has data on performance operationally. Administration of questionnaires was through e-mail and drop and pick later approach. The university provided a reference letter to be used as evidence of a genuine academic exercise. The letter provides reasons for carrying out the study.

The researcher created awareness among the participants on the essence of the study and necessity of their participation. Data collection was from one informant, the operations manager or an equivalent of each company. This is because operations manager is presumed to have knowledge of the company's operations especially the concept of standardization of business processes. The research focused on a duration of five years dating the year January 2017 to December 2021.

3.6 Operationalization of Study Variables

It focused on BPS as regressor variable and operational performance as regressed variable. The parameters were executed as indicated in Table 3.2

Table 3.2: Operationalization of Study Variables

Variable	Sub-Variable	Indicators	Source
Independent Variable Business Process Standardization	Process Execution	▪ Product quality. ▪ Predetermined process. ▪ Flexible business operations.	Whitmore (2008)
	Process Documentation	▪ Full documentation of business process. ▪ Documented change. ▪ Existence of manuals.	Muenstermann, Eckhardt, & Weitzel (2010)
	Data Management	▪ Data quality ▪ Data processing. ▪ Data integrity.	Porlán, García & Vera (2018)
	Collaboration and Communication	▪ Reduced operation cost. ▪ Data consistency. ▪ Data integrity.	Maier (2018)
Dependent Variable	Operational Performance	▪ Product and Service Quality. ▪ Cost Reduction. ▪ Flexibility of Operations. ▪ Speed of Service Delivery.	Neely, Gregory, & Platts (2005).

Source: Research Data (2021)

3.6 Validity and Reliability

Validity is the capability of the tool used to estimate the supposed estimate (Cooper & Schindler, 2006). The questionnaires were developed by reviewing existing relevant literature to assess face and content validity. Discussion with the experts and the supervisor – academic expert. Evaluation of Kaiser Meyer-Olkin and p-values for Bartlett's Test was done. A pre-test of the questionnaires was done through piloting to

confirm the clarity of the research tool. This included 10 managers from supervisory level, middle and senior level management in the large manufacturing firms that are not included in the study. The emphasis is that they are deemed knowledgeable on the concept of business process standardization. Thereafter the questionnaire was adjusted based on the recommendations.

Reliability is a measure of how consistency can be achieved when used on a continuous basis (Mugenda & Mugenda, 2003). The employment of Cronbach's alpha coefficient was done. This study used values higher than 0.6 as reliable.

3.7 Data Analysis

Data completeness and accuracy was first confirmed for analysis purposes. To infer and describe statistics, SPSS was adopted. Descriptive statistics helped to give information on the respondents. Multiple regression helped to ascertain the link among the parameters studied. The variables for this study included business process standardization practices representing independent variables and operational performance which represent dependent variable.

3.8 Diagnostic Tests

Normality was ascertained by Shapiro-wilk values above 0.05. Multicollinearity on the other hand was assessed using VIF with value consideration being 10 and below. The testing of whether data is heteroscedastic employed the use of Koenker test. The desired values should be above 0.05. To test whether the data was autocorrelated, the employment of Durbin-Watson was done, relying on values of around 2. Additionally,

linearity of the association between the constructs was ascertained at P- values greater than 0.05.

3.9 Tests of Significance

The use of t-test and p-values was done confirming whether the sub-variables are key. F-test helped to show the extent to which regression model is suitable. R, R^2, and β, were also computed. Table 3.3 gives this summary:

Table 3.3: Analytical Model of Data

Objectives	**Analytical Model**	**Interpretation of Results**
To determine the effect of business process standardization on the extent to which large manufacturing firms in Kenya perform operationally.	Multiple Linear Regression Analysis. $\mathbf{OP = a + \beta_1 PE_1 + \beta_2 PD_2 + \beta_3 DM_3 + \beta_4 CC_4 + \varepsilon}$ **Where:** **OP** = Operational Performance **a** = Constant **β** = Coefficient $\mathbf{PE_1}$ = Process Execution $\mathbf{PD_2}$ = Process Documentation $\mathbf{DM_3}$ = Data Management $\mathbf{CC_4}$ = Collaboration and Communication **ε** = Error term.	P< 0.05 of **β** shows hypothesis is supported; Significant F-ratio (P< 0.05) implies model appropriateness; Significant t -statistics (P< 0.05) indicate the significance between the parameters.

Source: Researcher (2021)

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 Introduction

This component presents how data was analyzed, what was found out, interpretations and conclusion reached. It also contains the analysis of how reliable and valid the collected data was. Further, it includes the outcome of diagnostic tests undertaken. Descriptive statistics regarding demographics and extent of adoption of BPS practices. Finally, it shows the outcome of how standardization of business processes affected performance of large manufacturing firms from an operational perspective.

4.2 Response Rate

It targeted 77 informants and 70 responses were received representing 91% of the targeted population. Saunders, Lewis and Thornhill (2017) posit that 30-40% responses is applicable. The response rate was therefore sufficient to ascertain consistency of the study findings.

4.3 Demographic of the Companies

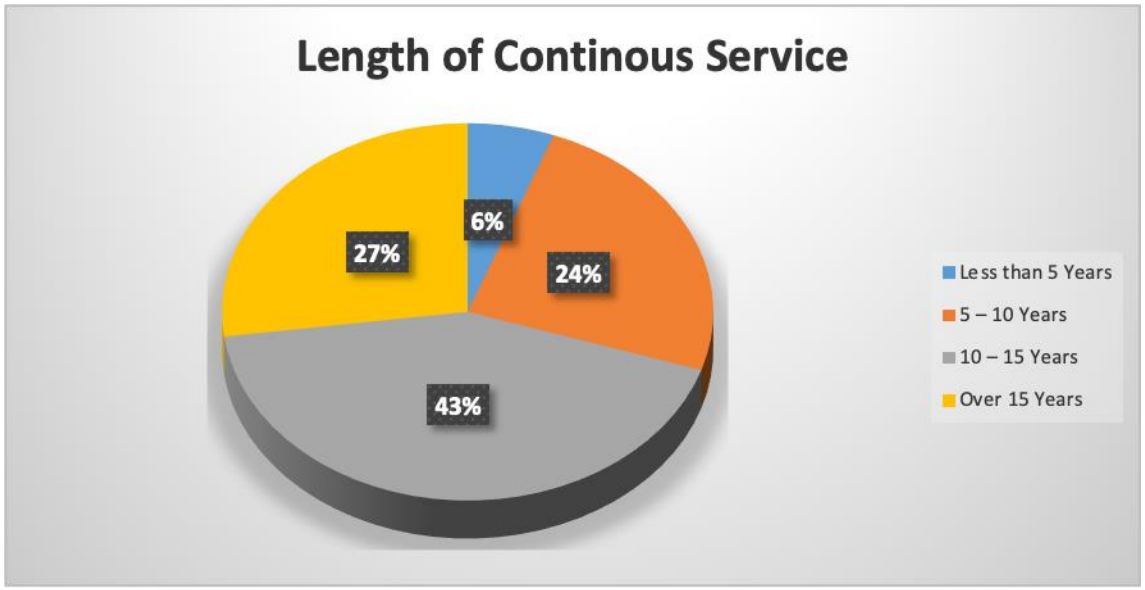
The focus of the research was length of continuous service, position held, educational level and how long the company has been in operation.

4.3.1 Length of Continuous Service

It was found out that 43% of the respondents had been in organizational service for 10-15 years, 27% for over 10 years and 24% have served for 5-10 years. The least number of the respondents represent 6% who had served for less than 5 years. This implied that over

90% of the informants had served the organization for 5 years and above. This implies that the responses were more reliable, since majority have served the organization in the relevant sub-unit for a reasonable period of time. This is analyzed as given in Figure 4.1.

Figure 4.1: Length of Continuous Service

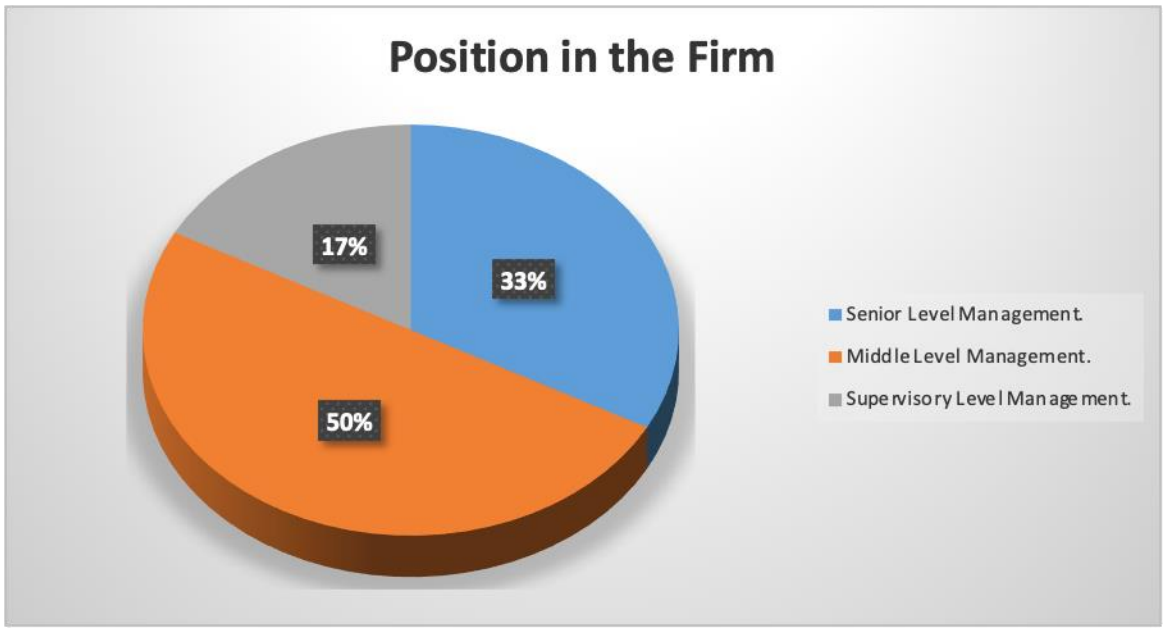


Source: Research Data (2022)

4.3.2 Position in the Firm

It focused on respondents in the positions of strategic section, middle-level management and supervisors. Figure 4.2 indicate that respondents in the middle level management were the majority representing 50%, followed by senior level management with 33% and the least representation was the supervisory level management at 17%. This implied that there was reliable representation enhancing credibility of the outcome.

Figure 4.2: Position in the Firm

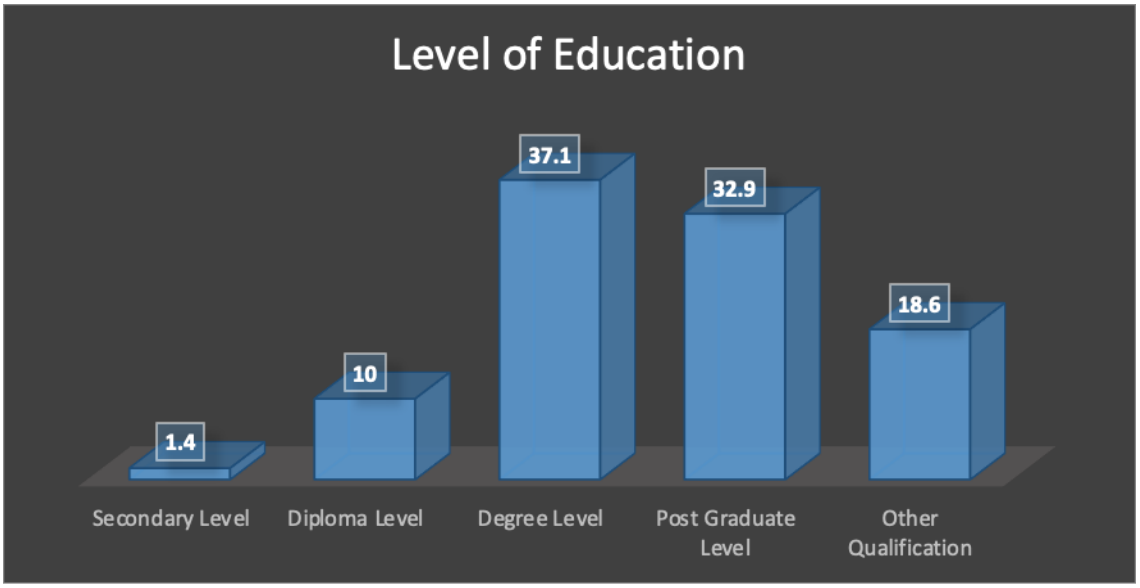


Source: Research Data (2022)

4.3.3 Level of Education

The consideration was secondary, diploma, degree, post graduate and other qualifications as relevant for the study. Figure 4.3 shows that most of the informants, amounting to 37.1% had degrees while 32.9% had post graduate degrees and 18.6% held other qualifications not enlisted. Only 10% and 1.4% had diploma and secondary education qualification respectively. The outcome implied that the qualifications of the informants were relevant for a credible response regarding the parameters studied.

Figure 4.3: Level of Education

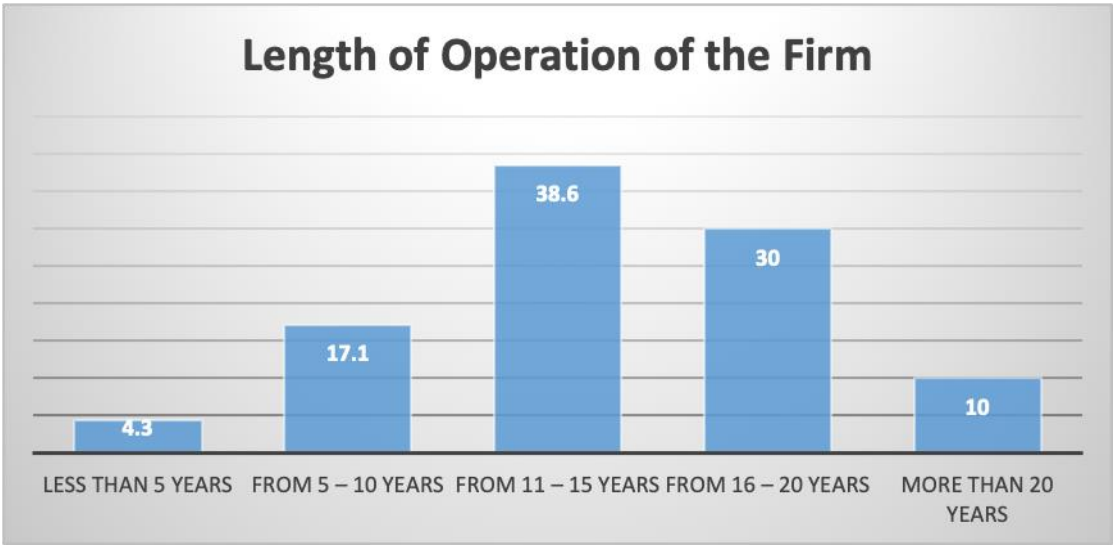


Source: Research Data (2022)

4.3.4 Length of Operation of the Firm

Here, the study considered less than 5 years, from 5-10 years, 11-15 years, 16-20 years and those who have served for over 20 years of operation as relevant. Figure 4.4 indicate that many of the firms making up to 38.6% had been in operation for between 11-15 years while 30% were in operation for 16-20 years while 17.1% were in operation for 5-10 years. The study also established that 10% of companies were in operation for 20 years and above while only 4.3% had been in operation for below 5 years. The implication is that 73% and above were in operation for 10 years and above. The time period enables an understanding that the companies must have implemented the relevant BPS that are subject of this study. The analysis is as shown in Figure 4.4:

Figure 4.4: Length of Operation of the Firm



Source: Research Data (2022)

4.4 Extent of Adoption of Business Process Standardization Practices

The respondents indicated the degree of agreement with the level at which the business process standardization practices have been adopted by the companies. The analysis was based on the four practices as given below:

4.4.1 Process Execution

Table 4.1 indicates that the firms implement process execution practices in a moderate way, averaging 3.88; SD= .915. The informants indicated that there is performance of process activities in a similar way and that similar procedures are followed in executing processes to a greatly given by an average of 4.43; SD=.791 and 4.21; SD=.866 independently. The business process of the firms was confirmed to have many exceptional issues in its implementation with a highly flexible structure possessing a mean of 3.76; SD=.970 and 3.13; SD=1.034 independently. This implies that the firms'

operational performance was based on a moderate adoption of process execution practices as shown in Table 4.1:

Table 4.1: Process Execution

Practices	N	Mean	Std. Deviation
The business process has many exceptional issues in its implementation.	70	3.76	.970
Similar procedures are followed in executing processes.	70	4.21	.866
There is performance of process activities in a similar way.	70	4.43	.791
The business structure is highly flexible.	70	3.13	1.034
Average		**3.88**	**0.915**

Source: Research Data (2022)

4.4.2 Process Documentation

Table 4.2 show that the large manufacturing firms implement process documentation moderately with an average mean of 3.94; SD=0.966. The best adopted practice was the creation of standard business process documents possessing an average of 3.99; SD=1.040, and then using of tailored integration process at an average of 3.94; SD=.976. The firms facilitated evaluation of documented processes by stakeholders, as well as full documentation of business processes and tasks possessing a mean of 3.93; SD=1.040 and 3.91; SD=.989 independently. This implies that there was the practice of process documentation, though at a moderate level, with the average standard deviation showing that significantly, no variation existed regarding responses by the informants on the variables under study.

Table 4.2: Process Documentation

Practices	N	Mean	Std. Deviation
There is full documentation of business processes and tasks.	70	3.91	.989
There is continuous evaluation of documented processes by stakeholders.	70	3.93	1.040
There is creation of standard business process documents.	70	3.99	.860
There is tailored integration process.	70	3.94	.976
Valid N (listwise)	70		
Average		**3.94**	**0.966**

Source: Research Data (2022)

4.4.3 Data Management

Table 4.3 show that data management practices were adopted to moderately having an average of 3.89; SD=.961. The firms ensure centralization of data through the use of repository and the understanding of the system by the process owners regarding data processing to a greatly with an average of 4.17; SD=.816 and 4.06; SD=.883 discretely. They equally maintain similar business processes and the fact that data for the business processes is very predictable moderately possessing a mean of 3.71; SD=1.118 and 3.60; SD=1.027 discretely.

Table 4.3: Data Management

Practices	N	Mean	Std. Deviation
Data for the business processes is very predictable.	70	3.60	1.027
There is centralization of data through the use of repository.	70	4.17	.816
The business maintains similar business processes.	70	3.71	1.118
There is understanding of the system by the process owners regarding data processing.	70	4.06	.883
Valid N (listwise)	70		
Average		**3.89**	**.961**

Source: Research Data (2022)

4.4.4 Collaboration and Communication

Table 4.4 stipulate that the firms adopted collaboration and communication moderately having an average of 3.67; SD=1.053. The most commonly adopted practice was agreement on issues of collaboration regarding business processes, followed by process owners having knowledge of the stakeholders they are collaborating with, having a mean of 3.84; SD=1.072 and 3.80; SD=.926 discretely. The firms equally ensure that discussions are held that helps to achieve harmony in experts' view during collaborations and that emphasis is made on structuring collaborations possessing an average of 3.74; SD=1.031 and 3.29; SD=1.181 discretely.

Table 4.4: Collaboration and Communication

Practices	N	Mean	Std. Deviation
There is agreement on issues of collaboration regarding business processes.	70	3.84	1.072
Process owners have knowledge of the stakeholders they are collaborating with.	70	3.80	.926
There is emphasis on structuring collaborations.	70	3.29	1.181
Discussions are held that helps to achieve harmony in experts' view during collaborations.	70	3.74	1.031
Valid N (listwise)	70		
Average		**3.67**	**1.053**

Source: Research Data (2022)

4.5 Operational Performance

The informants used a list of operational performance indicators and ranked them based on their execution by the organization. Their views were as analyzed below:

4.5.1 Product and Service Quality

Table 4.5 indicate that there was realization of improved product and service quality of goods and services moderately having an average of 3.96; SD=.935. This is achieved through reduced cases of products reworked on greatly having a mean of 4.03; SD=.868. It was also achieved to a moderate extent through reduced customer complaints overtime and reduced number of products returned by consumers, having a mean of 3.99; SD=.985 and 3.86; SD=.952 discretely.

Table 4.5: Product and Service Quality

	N	Mean	Std. Deviation
There has been reduced number of products returned by consumers.	70	3.86	.952
The number of customer complaints has reduced overtime.	70	3.99	.985
There are reduced cases of products reworked on.	70	4.03	.868
Valid N (listwise)	70		
Average		**3.96**	**.935**

Source: Research Data (2022)

4.5.2 Cost Reduction

Table 4.6 indicate that cost reduction was achieved greatly through BPS with an average of 4.15; SD=.864. This was realized because the firms realized favorable variance against their budgets during the period, there was improved capacity utilization and low levels of idle stock greatly having an average of 4.21; SD=.849, 4.13; SD=.883 and 4.11; SD=.860.

Table 4.6: Cost Reduction

Variables	N	Mean	Std. Deviation
Inventory levels have reduced.	70	4.11	.860
Capacity utilization has improved.	70	4.13	.883
The company realizes favorable variance against budget.	70	4.21	.849
Valid N (listwise)	70		
Average		**4.15**	**.864**

Source: Research Data (2022)

4.5.3 Flexibility of Operations

Table 4.7 stipulate that the firms achieved flexible operations greately having an average of 4.12; SD=0.862. This was realized because the firms have a high number of product categories, the firms have the capacity to respond to fluctuating market demand and the firms can introduce new products to cater for emerging consumer preferences to a greater extent given by 4.20; SD=.844, 4.10; SD=.903 and 4.07; SD=.840.

Table 4.7: Flexibility of Operations

Variables	N	Mean	Std. Deviation
The company has a high number of product categories.	70	4.20	.844
The company has the capacity to respond to fluctuating market demand.	70	4.10	.903
New products can be introduced to cater for emerging consumer preferences.	70	4.07	.840
Valid N (listwise)	70		
Average		**4.12**	**0.862**

Source: Research Data (2022)

4.5.4 Speed of Service Delivery

Table 4.8 indicate that speed of service delivery was achieved greatly possessing a mean of 4.00; SD=0.869. It is indicated by shorter design time and favorable set up time of machinery greatly having an average of 4.07; SD=0.857 and 4.00; SD=0.868 respectively. It is also indicated to a moderate extent by a favorable operational cycle time given by an average of 3.94; SD=0.883.

Table 4.8: Speed of Service Delivery

Variables	N	Mean	Std. Deviation
There is shorter design time.	70	4.07	.857
Operational cycle time is favorable.	70	3.94	.883
The set-up time of machinery and equipment is favorable.	70	4.00	.868
Valid N (listwise)	70		
Average		**4.00**	**0.869**

Source: Research Data (2022)

4.6 Business Process Standardization and Operational Performance

Table 4.9 summarizes the predictor and predicted variables. The predictor variables include process execution, process documentation, data management and collaboration and communication while the antecedents of dependent variable include product and service quality, cost reduction, flexibility of operations and speed of service delivery.

Table 4.9: Business Process Standardization and Operational Performance

Respondents	Process Execution	Process Documentation	Data Management	Collaboration and Communication	Operational Performance
1	3.5	3.5	3.75	3.5	3.85
2	4.25	4.2	4	4.75	4.25
3	4.5	4.5	4.5	4.5	4.42
4	4.25	4.25	4.5	4.25	4.5
5	4	3.9	3.85	4.25	3.85
6	3.75	3.5	3.5	4.25	3.25
7	3.75	3.7	3.85	3.5	3.75
8	3.75	3.65	3.75	3.25	3.25
9	4	4.25	4.5	4	4.25
10	4.5	4.5	4.5	3.75	4.5
11	4	4.25	4	3.5	3.85
12	4.5	4	3.75	3.75	3.65
13	3.25	3.75	3.5	4.5	3.25
14	4	4	4	3.75	4
15	3.25	3.25	3.75	3.25	3.5
16	4	3.9	4	4.5	3.75
17	4.5	4.5	4.35	4.25	4.25
18	4.25	4.2	4	3.25	4
19	4	4	4.25	3.75	4.25
20	4	4	3.85	4.25	3.75
21	3.75	3.5	3.75	3.5	3.42
22	3.25	3.2	3.75	3.5	3.8
23	3.75	3.85	4	3.5	4
24	4.75	4.5	4	2.75	4.17
25	4	4	3.85	3.75	3.75
26	4	3.75	4	4	3.85
27	3.5	3.5	3.75	3.75	3.5
28	3.5	3.25	3.75	3.5	3.65
29	4	4	3.85	3.5	4
30	4.5	4.5	4.25	4.25	4.45
31	3.5	3.65	3.75	3	3.75
32	3.25	3.5	3.25	3.5	3.45
33	4	4	4.25	3.25	4
34	4.25	4.25	4	2.75	3.95
35	3.5	3.65	3.75	4.25	3.7
36	3.5	3.5	4	3	3.75
37	3.75	3.85	3.75	2.75	3.92
38	3.5	3.5	4	3	3.92
39	3	3.5	3.75	3.25	3.75

Respondents	Process Execution	Process Documentation	Data Management	Collaboration and Communication	Operational Performance
40	4	4	3.85	4.25	4
41	4	4	3.85	3.5	3.75
42	4	3.85	4	4.25	4.17
43	4	4	4.25	3.75	3.92
44	3.75	3.65	3.25	2.5	3.65
45	4	4	3.95	3.5	4
46	4.5	4	4	2.75	4.33
47	4	4	3.75	2.5	3.92
48	2.75	3	3.75	4.25	3.33
49	4.25	4	4	4	4.25
50	4.5	4.75	4.25	2.75	4.65
51	4.25	4.5	4.25	3.75	4.25
52	4.5	4.75	4.25	4.25	4.65
53	2.5	3	3.25	4	3.25
54	3.75	3.75	3.5	4.25	3.75
55	3.5	3.25	4	4.25	3.75
56	4.2	4.25	4	3	4.17
57	4.25	4.5	4.35	5	4.83
58	4	4	3.85	4	4.33
59	4.25	4.25	4.25	3.25	4.25
60	4.25	4	4.25	4	4.25
61	3.75	3.5	3.5	3	3.52
62	3.5	4	4.25	3.75	4.33
63	4.5	4.5	4.25	3	4.08
64	4.5	4.5	4.25	3.75	4.2
65	3.5	3.75	3.85	3	3.65
66	4.25	4.25	4	3.75	3.92
67	3.5	3.5	3.5	3.75	3.65
68	3.75	3.75	4	4	3.78
69	4	4	4.25	3.25	4
70	4	4	4.25	4.25	4.58

Source: Research Data (2022)

4.6.1 Diagnostic Tests

The confirmation that there was no violation of key presuppositions of regression was done using diagnostic tests. This helped to defend the use of multiple regression in data

analysis. The tests used were normality, heteroscedasticity, autocorrelation and multicollinearity tests.

Normality was ascertained using Shapiro-wilk. Table 4.10 shows data having normal distribution with a Shapiro Wilk values over 0.05 for operational performance, process documentation and collaboration and communication. The data on process execution and data management was however not normally distributed since shapiro Wilk values are below 0.05.

Table 4.10: Test of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Operational Performance	.095	70	.188	.980	70	.334
Process Execution	.180	70	.000	.941	70	.003
Process Documentation	.137	70	.002	.966	70	.054
Data Management	.148	70	.001	.946	70	.004
Collaboration and Communication	.119	70	.016	.967	70	.060

a. Lilliefors Significance Correction

Source: Research Data (2022)

Koenker test was used for testing whether the data was heteroscedastic. Absence of heteroscedasticity was indicated by a p-Value > 0.05. The analysis was as explained in the output below:

```
Run MATRIX procedure:

 written by Ahmad Daryanto

Original Regression model:

Dependent variable
 Operational Performance
```

R-square .742

OLS outputs

	b	se	t	sig	95%LB	95%UB
constant	-.038	.321	-.119	.906	-.668	.591
ProcessE	-.002	.115	-.014	.989	-.228	.224
ProcessD	.396	.137	2.894	.005	.128	.665
DataMana	.601	.114	5.259	.000	.377	.825
Collabor	.017	.042	.400	.690	-.065	.098

OLS outputs with heteroscedasticity-robust standard errors:

	b	se	t	sig	95%LB	95%UB
constant	-.038	.361	-.106	.916	-.668	.591
ProcessE	-.002	.146	-.011	.991	-.228	.224
ProcessD	.396	.175	2.268	.027	.128	.665
DataMana	.601	.125	4.795	.000	.377	.825
Collabor	.017	.051	.326	.746	-.065	.098

* Note: standard error is HC3 variant

------- ANOVA TABLE --------

	SS	df	MS	F	Sig
Model	6.760	4.000	1.690	46.806	.000
Residual	2.347	65.000	.036	-999.000	-999.000

==========

Breusch-Pagan and Koenker test

==========

The tests use the residuals from the original OLS above with no adjustment to standard errors

OLS outputs

	b	se	t	sig	95%LB	95%UB
constant	.511	2.291	.223	.824	-3.979	5.000
ProcessE	.282	.822	.343	.733	-1.330	1.893
ProcessD	.304	.976	.312	.756	-1.608	2.217
DataMana	-.861	.814	-1.057	.294	-2.457	.735
Collabor	.435	.296	1.467	.147	-.146	1.015

R-square
.043

------- ANOVA TABLE --------

	SS	df	MS	F	Sig
Model	5.407	4.000	1.352	.737	.000
Residual	119.293	65.000	1.835	-999.000	-999.000

------- Breusch-Pagan and Koenker test statistics and sig-values ------
--

	LM	Sig
BP	2.703	.609
Koenker	3.035	.552

```
Null hypothesis: The data is not heteroskedastic.

if sig-value less than 0.05, reject the null hypothesis

Note: Breusch-Pagan test is a large sample test and assumes the
residuals to be normally distributed

------ END MATRIX -----
```

The conclusion of the test is as outlined below:

Step 1: Stating the hypotheses

H_0: The data is homoscedastic.

H_1: There is heteroscedasticity in the data.

Step 2: The level of significance, $\alpha = 0.05$

Step 3: Decision rule: The null hypothesis is rejected if the p-value is less than 0.05

Step 4: Test statistic: Koenker test statistic = 3.053 and p-value = .552

Step 5: Conclusion: At a level of significance of 0.05, no heteroscedasticity was found in the data because since the p-value is greater than 0.05 ($p>0.05$). This means there is justification in using the model.

The extent to which the data was auto correlated was done using Durbin-Watson test. The following procedure was used:

Step1: State the hypotheses

H_0: $\rho = 0$ (autocorrelation is absent)

H_1: $\rho > 0$ (autocorrelation is present)

Step 2: Significance level: Significance level, $\alpha = 0.05$

Step 3: Decision rule

Number of independent variables, k = 2; Number of observations, n = 70. From the Durbin-Watson tables, d_l =1.351 and d_u = 1.484

Step 4: Test statistic: Table 4.11 gives the Durbin-Watson test statistic computed, d = 1.566

Table 4.11: Autocorrelation Test

Model	Durbin Watson Test
Collaboration and communication, Process execution, Data management, Process documentation and operational performance.	1.566

Source: Research Data (2022)

Step 5: Conclusion

Compare Durbin-Watson test statistics d = 1.566 with values from the tables at 0.05 significance level. There was confirmation of no autocorrelation since d (1.566) was greater than d_u (1.484). The basis is the hypothesis stated as follows:

If $d < d_1$ – Autocorrelation is present.

If $d > d_u$ – Autocorrelation is absent.

If $d_1 < d < d_u$ – test is inconclusive.

The implication is that there is no autocorrelation.

Multicollinearity was assessed using VIF. O'Brien (2007) stated that values of VIF should be values between 1 and 10. Table 4.12 show that all the values of VIF were within the acceptable range while the values of tolerance for process execution, data management and collaboration and management are over 0.20. This indicates that the variables were not multi collinear. Only process documentation has tolerance value below 0.20, though the VIF within acceptable limits.

Table 4.12: Multicollinearity Test

	Collinearity Statistics	
Model	**Tolerance**	**VIF**
Process Execution	.200	5.007
Process Documentation	.171	5.848
Data Management	.464	2.156
Collaboration and Communication	.941	1.063

a. Dependent Variable: Operational Performance

Source: Research Data (2022)

Linearity test was employed to assess the extent to which the variables were linear. It was established that there was linearity between the variables given that the p>0.05. This is shown in Table 4.11:

Table 4.13: Linearity Test

Variables	**Deviation from Linearity**	**Significance Level**
Operational Performance and Process Execution	.882	.140
Operational Performance and Process Documentation	1.044	.425
Operational Performance and Data Management	0.40	0.291
Operational Performance and Collaboration and Communication	1.717	0.146

Source: Research Data (2022)

4.6.2 Correlational Analysis

The computation of Pearson bivariate correlation coefficient was done to establish the degree to which the parameters under study are correlated. The findings are as outlined in Table 4.14:

Table 4.14: Correlation Analysis

		Process Execution	Process Documentation	Data Management	Collaboration and Communication	Operational Performance
Process Execution	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	70				
Process Documentation	Pearson Correlation	.893**	1			
	Sig. (2-tailed)	.000				
	N	70	70			
Data Management	Pearson Correlation	.652**	.717**	1		
	Sig. (2-tailed)	.000	.000			
	N	70	70	70		
Collaboration and Communication	Pearson Correlation	.019	.070	.195	1	
	Sig. (2-tailed)	.875	.564	.106		
	N	70	70	70	70	
Operational Performance	Pearson Correlation	.709**	.789**	.806**	.152	1
	Sig. (2-tailed)	.000	.000	.000	.210	
	N	70	70	70	70	70

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

Source: Research Data (2022)

Table 4.14 shows that a strong positive and significant association exists linking process execution and operational performance indicated by r=.709, p< 0.05. Process documentation and collaboration and communication equally has significantly strong

positive correlation as shown by r=.789, p<0.05 and r=.806, p<0.05 discretely. Collaboration and communication and operational performance have a weak positive insignificant association indicated by r=.152, p>0.05. This implies that increased process execution, process documentation and data management lead to improved operational performance. Improved collaboration and communication on the other hand have no effect significantly on operational performance.

4.6.3 Model Summary

Table 4.15 indicates that R = 0.862 which implies that BPS and operational performance was positively correlated. The adjusted R^2 of 0.726 mean that 72.6% of changes in operational performance gives rise to changes in BPS practices studied in this research. This implies existence of other factors causing 27.4% variations in operational performance that are not studied in the current model.

Table 4.15: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.862[a]	.742	.726	.19002

a. Predictors: (Constant), Collaboration and Communication, Process Execution, Data Management, Process Documentation

b. Dependent Variable: Operational Performance

Source: Research Data (2022)

4.6.4 Analysis of Variance

Table 4.16 indicate that BPS and operational performance are significantly related at 0.000 (p<0.05). The implication is that process execution, process documentation, data management and collaboration and communication reliably predict how large-scale

manufacturing firms in Kenya perform operationally. The outcome in Table 4.16 also indicate that the F statistic is 46.806 and was significant at p = 0.000. This implies that the model reliably predicts the relationship between BPS and how large manufacturing firms in Kenya perform operationally.

Table 4.16: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.760	4	1.690	46.806	.000[b]
	Residual	2.347	65	.036		
	Total	9.107	69			

a. Dependent Variable: Operational Performance
b. Predictors: (Constant), Collaboration and Communication, Process Execution, Data Management, Process Documentation
Source: Research Data (2022)

4.6.5 Regression Co-efficients

Table 4.17 shows isolated relationship among the independent variables with operational performance and their coefficient betas. The finding in Table 4.17 indicate that process documentation and data management have positive coefficients indicating that when process documentation and data management improve positively, it significantly improves performance operationally as indicated by β=.441; p<0.05 and β =.486; p<0.05 discretely. Collaboration and communication have positive though insignificant result on performance operationally as shown by β=.026; p>0.05. Lastly, process execution has a negative though insignificant result on performance operationally given by β=-.002; p>0.05.

The multiple regression model can therefore be modelled as follows:

$OP = -0.038 + 0.486DM + 0.441PD + 0.042CC – 0.002PE + \varepsilon$

Where:

OP = Operational Performance

DM = Data Management

PD = Process Documentation

CC = Collaboration and Communication

PE = Process Execution

ε = Error term.

Table 4.17: Regression Co-efficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	**Beta**	**t**	**Sig.**
1	(Constant)	-.038	.321		-.119	.906
	Process Execution	-.002	.115	-.002	-.014	.989
	Process Documentation	.396	.137	.441	2.894	.005
	Data Management	.601	.114	.486	5.259	.000
	Collaboration and Communication	.017	.042	.026	.400	.690

a. Dependent Variable: Operational Performance

Source: Research Data (2022)

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section gives a synopsis of what was found out and then presents how the study was concluded and the recommendations. It equally analyzes the difficulties faced during the study.

5.2 Summary of Findings

The outcomes were based on research objectives. The general objective involved the determination of how business process standardization affects the extent to which large manufacturing firms perform operationally in Kenya. It was meant to achieve two specific objectives, namely to establish the degree of implementation of business process standardization and to determine the influence of business process standardization on the extent to which large manufacturing firms in Kenya perform operationally. A summary was also done of the demographic parameters to establish how they affect the extent to which BPS practices were adopted.

5.2.1 Extent of Adoption of Business Process Standardization Practices

The objective was to establish the degree of adoption of BPS practices. The study found out that large manufacturing firms in Kenya adopted process execution moderately having average of 3.88; SD= .915. The informants indicated that the firms performed process activities in a similar way and that similar procedures were followed in executing processes to a greatly having an average of 4.43; SD=.791 and 4.21; SD=.866 discretely. The business process of the firms was confirmed to have many exceptional issues in its

implementation with a highly flexible structure having a mean of 3.76; SD=.970 and 3.13; SD=1.034 discretely. Regarding process documentation, the findings indicate that large manufacturing firms implemented process documentation moderately having an average mean of 3.94; SD=0.966. The best adopted practice was the creation of standard business process documents having an average of 3.99; SD=1.040, then the use of tailored integration process at a mean of 3.94; SD=.976. The firms facilitated evaluation of documented processes by stakeholders, as well as full documentation of business processes and tasks having a mean of 3.93; SD=1.040 and 3.91; SD=.989 discretely.

It was also established that data management practices were adopted moderately having a mean of 3.89; SD=.961. The firms ensure centralization of data through the use of repository and the understanding of the system by the process owners regarding data processing greatly possessing a mean of 4.17; SD=.816 and 4.06; SD=.883 discretely. The firms equally maintain similar business processes and the fact that data for the business processes is very predictable moderately having an average of 3.71; SD=1.118 and 3.60; SD=1.027 discretely. Finally, collaboration and communication practices were moderately used having an average of 3.67; SD=1.053. The most commonly adopted practice was agreement on issues of collaboration regarding business processes, followed by process owners having knowledge of the stakeholders they are collaborating with, possessing an average of 3.84; SD=1.072 and 3.80; SD=.926 discretely. The firms also ensure that discussions are held that helps to achieve harmony in experts' view during collaborations and that emphasis is made on structuring collaborations possessing an average of 3.74; SD=1.031 and 3.29; SD=1.181 discretely.

The findings are consistent with that of Vásquez-Vargas, Flor-Moltalvo, Blanco-Fernández, Sandoval-Quintanilla, Jiménez-Macías and García-Alcaraz (2019), who concluded that organizations adopt business process standardization practices to minimize waste, such as delays on deliveries and over-processing. They further indicated that analysis of worker motions and anthropometric studies are effective techniques for redesigning workstations, helping to reduce inefficiencies.

5.2.2 Business Process Standardization and Operational Performance

The study determined how business process standardization affect the degree to which large manufacturing firms in Kenya perform operationally. The correlational findings established that process execution and operational performance positively and significantly correlate, given r =.709, $p< 0.05$. Process documentation and collaboration and communication equally strongly correlate positively and significantly having r =.893, $p<0.05$ and r=.652, $p<0.05$ discretely. Collaboration and communication and operational performance have a weak positive insignificant correlation having r =.019, $p>0.05$. The implication was that increased process execution, process documentation and data management lead to improved operational performance. Improved collaboration and communication equally do not significantly affect operational performance.

The research also found a positive relationship linking BPS and operational performance given by R = 0.862. The adjusted R^2 of 0.726 imply that 72.6% of changes in operational performance arise due to changes in BPS practices studied in this research. This implies that there are other factors causing 27.4% variations in operational performance that are not studied in the current model. The study also established that BPS and operational performance significantly relate at 0.000 ($p<0.05$). This implies that process execution,

process documentation, data management and collaboration and communication reliably predicted how large manufacturing in Kenya operationally perform. This is consistent with the works of Yurii, Nataliia, Olena, Yelyzaveta and Ganna (2021), who established that standardized processes improve customer service, competency of employees and increases financial results of enterprises.

The findings on regression co-efficient establish that process documentation and data management positively and significantly improve performance operationally given by β=.441; $p<0.05$ and β =.486; $p<0.05$ discretely. Collaboration and communication have positive though insignificant effect on performance operationally having β=.026; $p>0.05$. Lastly, process execution negatively though insignificantly affect performance operationally having β=-.002; $p>0.05$.

5.3 Conclusion of the Study

It was concluded that BPS and operational performance positively and significantly relate. Further BPS practices affect the extent to which manufacturing firms in Kenya perform operationally. It was also deduced that large manufacturing firms have embraced BPS activities to a moderate extent. These included process execution, process documentation, data management and collaboration and communication.

Consistency of the conclusion relate to the works of Kim, Daniel, Tim, and Wolfgang (2008) who asserted that standardization of business processes positively influence success in outsourcing. It was also consistent with the works of Villalba-Diez and Ordieres-Mer´e (2015) who established the existence of highly quantifiable correlation among manufacturing operational performance and process standardization. The

conclusion by Ratheesh (2015) that standardized work is a foundational element of lean manufacturing methodologies was equally consistent.

5.4 Recommendations of the Study

Managers of large manufacturing firms should seek how to improve operational performance by incorporating standardized processes. The managers should also focus on factors that may negatively affect the process of standardization. Practices like process execution, process documentation, data management and collaboration and communication should be streamlined for the firms to benefit from them through operational performance improvement.

The researcher also recommends that since the study has established that there are some factors that affect operational performance other than the variables studied, management of large manufacturing firms should exploit other operational performance factors to help achieve sustainable operational superiority. Further, management of the firms should implement mechanisms that will enhance effective incorporation of information communication technology as a key driver in business process standardization.

5.5 Limitations of the Study

There was inadequate collaboration from the informants as some were suspicious, coupled with covid-19 situation that made it difficult to physically administer the questionnaires. This was solved by introducing oneself using a letter from the institution to convince the informants on how the outcome of the data and research work will be used. Further, the researcher sent some questionnaires online and once filled were collected at the convenience of the respondent with minimal contact.

There was also the problem of focusing on a few correspondents per company for generalization purposes. Receiving response from a few persons per firm makes generalization limited. To deal with the issue, only strategic persons in operations were focused on including the technicians to acquire reliable data. Finally, the study was quantitatively approached focusing on how the parameters are related. Qualitatively, other insights would be made clearer especially behavioral BPS practices because of the nature of the variables. The researcher gave the respondents room to make other comments that would help capture some aspects of qualitative response.

5.6 Suggestions for Further Study

Future studies can be done to focus on other sectoral issues for an adequate generalization. Other studies would concentrate on companies that offer services, especially how service provision operations are standardized. Further, a suggestion is based on the fact that there are many factors that affect execution of BPS activities as well as limiting factors, causing operational deficiencies. Lastly, since the study focused on only four antecedents of BPS, future research can focus on other aspects for exhaustive consideration.

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APPENDICES

APPENDIX I: QUESTIONNAIRE

Dear Sir/ Madam,

I am requesting you to provide information regarding the following issues. The information provided through the use of this questionnaire is for academic purpose only and will be used confidentially.

SECTION A: BIO DATA

Instruction: Kindly tick in the spaces provided.

	Name of the Company		
	Variable	**Responding Group**	
1.	Length of Continuous Service	Less than 5 Years	
		5 – 10 Years	
		10 – 15 Years	
		Over 15 Years	
2.	Your position in the firm TICK as appropriate	Senior Level Management.	
		Middle Level Management.	
		Supervisory Level Management.	
		101 – 500 employees	
		501 – 1000 employees	
		More than 1000 employees	
3.	Please indicate the level of education.	Secondary Level	
		Diploma Level	
		Degree Level	
		Post Graduate Level	
		Other Qualification	
4.	Please indicate the length of operation of the firm.	Less than 5 Years	
		From 5 – 10 Years	
		From 11 – 15 Years	
		From 16 – 20 Years	
		More than 20 Years	

SECTION B: BUSINESS PROCESS STANDARDIZATION

TICK appropriately based on the scale to indicate the level of agreement with the following business process standardization practices:

5 = To a very large extent; 4 = Large extent; 3 = Moderate extent; 2 = Small extent and 1 = Very small extent.

	Statement					
A	**Process Execution**	**1**	**2**	**3**	**4**	**5**
	The business process has many exceptional issues in its implementation.					
	Similar procedures are followed in executing processes.					
	There is performance of process activities in a similar way.					
	The business structure is highly flexible.					
B	**Process Documentation**	**1**	**2**	**3**	**4**	**5**
	There is full documentation of business processes and tasks.					
	There is continuous evaluation of documented processes by stakeholders.					
	There is creation of standard business process documents.					
	There is tailored integration process.					
C	**Data Management**					
	Data for the business processes is very predictable.					
	There is centralization of data through the use of repository.					
	The business maintains similar business processes.					
	There is understanding of the system by the process owners regarding data processing.					
D	**Collaboration and Communication**					
	There is agreement on issues of collaboration regarding business processes.					
	Process owners have knowledge of the stakeholders they are collaborating with.					

	There is emphasis on structuring collaborations.					
	Discussions are held that helps to achieve harmony in experts' view during collaborations.					

SECTION C: OPERATIONAL PERFORMANCE

Please indicate the degree of realization of operational performance based on the following key:

1 = Not at all; 2 = Small extent; 3 = Moderate extent; 4 = Great extent; 5 = Very great extent

	Statement					
A.	**Product and Service Quality**	**1**	**2**	**3**	**4**	**5**
	There have been reduced number of products returned by consumers.					
	The number of customer complaints have reduced overtime.					
	There are reduced cases of products reworked on.					
B.	**Cost Reduction**	**1**	**2**	**3**	**4**	**5**
	Inventory levels have reduced.					
	Capacity utilization have improved.					
	The company realizes favorable variance against budget.					
C.	**Flexibility of Operations**	**1**	**2**	**3**	**4**	**5**
	The company has a high number of product categories.					
	The company has the capacity to respond to fluctuating market demand.					
e	New products can be introduced to cater for emerging consumer preferences.					
D.	**Speed of Service Delivery**	**1**	**2**	**3**	**4**	**5**
	There is shorter design time.					
	Operational cycle time is favorable.					
	The set-up time of machinery and equipment is favorable.					

APPENDIX II: LARGE SCALE MANUFACTURING FIRMS

Building, Construction and Mining sector (15)	
Athi River Mining	Mombasa Cement Ltd
Kenbro Industries	International Energy
Bamburi Cement	Technik Ltd
Kenya Builders & Concrete	Orbit Enterprises Ltd
Central Glass Industries	Karsan Murji & Co. Ltd
Malindi Salt Works	Saj Ceramics Ltd
East African Portland Cement	Kemu Salt Packers Production
Manson Hart Kenya	Homa Line Company

Chemical and Allied Sector (60)	
Anffi Kenya	Pyrethrum Board of Kenya
Match Masters	Pan Africa Chemicals
Basco Products	Strategic Industries
Metoxide Africa	Desbro Kenya
Bayer East Africa	Soilex prosolve
Milly Glass Works	Eastern Chemicals Industries
Belersdorf East Africa	Supa Brite
Murphy Chemicals	Elex Products
Blue King Products	Superfoam
Odex Chemicals	Eveready Batteries East Africa
BOC Kenya Ltd	Syngenta E.A.
Orbit Chemicals Industries	Galaxy Paints and Coating Co.
Buyline Industries	Synresins
Osho Chemicals Industries	Grand Paints
Carbacid	Tata Chemicals
Webuye Chemical and Solvents (E.A.)	Haco Tiger Brands (E.A.)
Polychem E.A.	Tri-Clover Industries (K).
Continental Products	Henkel Kenya
Procter & Gamble E. A.	Interconsumer Products
Cooper K-Brands	Twiga Chemical Industries
Nairobi Crown Gases	Johnson Diversey E.A.

PZ Cussons E.A.	Unilever E. and Southern Africa
Crown Paints (Kenya).	Kapi
Reckitt Benckiser (E.A.).	Vitafoam Products
Colgate Palmolive	Kel Chemicals
Revolution Stores	Maroo Polymer
Magadi Soda	Ken Nat Ink & Chemicals
Rumoth Group of Co.	Sara Lee
Sadolin Paints (E.A.)	Tropikal Brand

Energy, Electricals and Electronics (32)	
Amedo Centre Kenya	PCTL Automation
Meltex International	Power Technics
Assa Abloy E.A.	Holman Brothers (E.A.)
Module Engineering Systems	Manufacturers and Supplies (K).
Aucma Digital Technology Africa	Ibera Africa Power (E.A.)
Mustek E.A.	Reliable Electricals Engineers.
Avery E.A.	International Energy Technik
Nationwide Electrical Industries	Socabelec (E.A.).
Baumann Engineering	Karani Biofuel
Optimum Lubricants	Sollatex Electronics (Kenya).
Centurion Systems.	Kenwest Cables.
Digitech E.A.	Specialized Power Systems.
Pentagon Agencies	Kenya Petroleum Refineries
East Africa Cables.	Synergy – Pro
Libya Oil Kenya.	Kenya Power.
Marshall Fowler Engineers	Virtual City.

Food and Beverages (135)	
Africa Spirits.	Wrigley Co. (E.A.).
New Kenya Co-operative Creameries	Kuguru Food Complex
Bidco Oil Refineries	C. Dormans
Kenya Tea Growers Association	British American Tobacco
Agriner Agricultural Development	Europack Industries
Kenya Tea Packers.	Eastern Produce Kenya

Agro Chemical & Food.	Fresh Produce Exporters Association of Kenya
Kenya Wine Agencies.	Kenya Seed Company
Alliance One Tobacco Kenya	Deepa Industries
Keroche Industries.	Pristine International
Al-Mahra Industries.	Kambu Distillers
Kevian Kenya.	Trust Flour Mills
Alpha Fine Foods.	Kenchic
Kibos Sugar and Allied Industries	T.S.S. Green Millers
Alpine Coolers.	Kenlab Supplies
Kisii Bottlers.	Lari Diaries Alliance
Koba Waters.	Kenya Meat Commission
Arkay Industries.	Kenya Sweets.
Kwality Candies & Sweets.	Pembe Flour Mills.
Belfast Millers.	Farmers Choice.
London Distillers (K).	Premier Flour Mills.
The Breakfast Cereal Co. (K).	Frigoken.
Mafuko Industries.	Premier Food Industries.
Broadways Bakery.	Gil Oil Co.
Manji Food Industries.	Proctor & Allan (E.A.).
Brookside Dairy.	Glaciers Products
Mastermind Tobacco (K) L	Promasidor Kenya.
Bunda Cakes & Feeds.	Global Fresh.
Melvin Marsh International	Pwani Oil Products.
Buzeki Dairy.	Global Tea & Commodities (K).
Menegai Oil Refineries.	Rafiki Millers.
Czarnikow Sugar E.A.	Gold Crown Foods.
Milly Fruit Processors.	Razco.
Cadbury Kenya.	Gonas Best.
Mini Bakeries (Nbi).	Re-Suns Spices.
Candy Kenya.	Happy Cow.
Miritini Kenya.	Rift - Valley Bottlers.
Capwell Industries.	Highlands Canners.
Mombasa Maize Millers.	Sigma Supplies.

Centrofood Industries.	Highlands Minerals Water Co.
Mount Kenya Bottlers.	Spectre International.
Chai Trading Co.	Insta Products (EPZ).
Mumias Sugar Co.	Spice World
Chemelil Sugar Co.	Jambo Biscuits (K)
Mzuri Sweets.	Sunny processors
Chirag Kenya.	James Finlay Kenya
Nairobi Bottlers.	Trufoods
Valuepack Foods.	Kenblest
Kenafric Industries.	Unga Group
Coca-Cola East & Central.	Kabianga Dairy
NAS Airport Services.	UDV Kenya
Del Monte Kenya.	Kamili Packers
NesFoods Industries.	Coastal Bottlers
Diamond Industries.	Nairobi Flour Mills
Nestle Foods Kenya.	Valley Confectionery
E.A. Breweries.	Jetlak Foods
Nicola Farms.	W.E. Tilley.
E.A. Sea Food.	Kensalt Ltd
Njoro Canning Factory.	Wanainchi Marine Products (K).
Eldoret Grains.	Kenya Breweries
Palmhouse Diairies.	West Kenya Sugar Co.
Equator Bottlers.	Pearl Industries.
Patco Industries.	Excel Chemicals.
Erdermann Co. (K).	United Millers.
Usafi Services.	Kapa Oil Refineries.
Karirana Estate.	Kenya Nut Co.
Aquamist.	
Leather and Footwear (5)	
Alpharama.	Bata Shoe Co. (Kenya).
C & P Shoe Industries.	Leather Industries of Kenya.
Sandstorm Africa.	

Metal and Allied Sector (56)	
Africa Marine & General Engineering Co.	East Africa Foundry Works (K).
Orbit Engineering.	Steel Makers.
Allied East Africa.	Elite Tools
Rolmil Kenya.	Steel Wool (Africa).
Alloy Steel Casting.	Farm Engineering Industries.
Sheffield Steel Systems.	Tarmal Wire Products.
Apex Steel.	Friendship Container Manufacturers.
Soni Technical Services.	Tononoka Steel.
ASL Limited - Steel Division	General Aluminum Fabricators.
Specialized Engineering Co. (E.A.).	Viking Industries.
ASP Co.	Greif East Africa.
Standard Rolling Mills.	Warren Enterprises.
Athi River Steel Plant	Heavy Engineering.
Hobra Manufacturing.	Welding Alloys.
Booth Extrusions.	Metal Crowns.
Insteel.	Wire Products.
Brollo Kenya.	Nail & Steel Products.
Kaluworks.	Narcol Aluminium Rolling Mills
City Engineering Works (K).	Nampak Kenya.
Kens Metal Industries	Ndume.
Cook 'N' Lite.	Napro Industries.
Kenya General Industries.	Southern Engineering
Corrugated Sheets.	Devki Steel Mills.
Khetshi Dharamshi & Co.	Mabati Rolling Mills.
Crystal Industries.	Doshi Enterprises.
Kitchen King.	Mecol.
Davis & Shirtliff.	East Africa Spectre.
Laminate Tube Industries	Steel Structures.

Motor Vehicle and Accessories (22)	
Associated Battery Manufacturers EA.	Banbros Ltd Associated Vehicle Assemble
Labh Singh Harnam Singh.	Bhachu Industries.

Auto Ancillaries.	Pipe Manufacturers.
Theevan Enterprises.	Kenya Grange Vehicle Industries.
Autofine Filters and Seals.	Sohansons.
Megh Cushion Industries.	Kenya Vehicle Manufactures.
Auto Springs Manufacturers.	Chui Auto Spring Industries.
Mann Manufacturing Co.	General Motors E.A.
Unifilters Kenya.	Toyota Kenya.
Mutsimoto Co.	Impala Glass Industries.
Varsani Brakenlinings.	

Paper and Board (50)	
Allpack Industries.	Elite Offset.
Kenafric Diaries Manufacturers.	Printwell Industries.
Andika Industries.	Ellams Products.
Kenya Litho.	Punchlines.
Bags and Balers Manufacturers (k).	English Press Limited
Kenya Stationers.	Ramco Printing Works.
Brand Printers.	Flora Printers.
Kim - Fay E.A.	Regal Press Kenya.
Carton Manufacturers.	General Printers.
Kul Graphics.	Tetra Pak.
Cartubox Industries (E.A.).	Graphics and Allied.
L.A.B. International Kenya.	The Rodwell Press.
Cempack Solutions.	Guaca Stationers.
Label Converters	Uneeco Paper Products.
Chandaria Industries.	Icons Printers.
Modern Lithographic (K).	Autolitho.
Colour Labels.	Interlables Africa.
Nation Media Group.	Bag and Envelope Converters
Colour Packaging.	Paper House of Kenya.
National Printing Press.	Jomo Kenyatta Foundation
Colour Print.	Kartasi Industries.
Packaging Manufacturers.	Associated Paper & Stationery

D.L. Patel Press.	Phonexi Matches.
Paperbags.	E.A. Packaging Industries.
Dodhia Packaging.	Printpak Multi Packaging.

Pharmaceutical and Medical Equipment (21)	
African Cotton Industries.	Dawa.
Manhar Brothers (k).	Pharm Access Africa.
Alpha Medical Manufacturers	Elys Chemical Industries.
Medivet Products.	Pharmaceutical Manufacturing Co.
Beta Healthcare.	Glaxo Smithkline Kenya.
Novelty Manufacturing.	Revital Healthcare (EPZ).
Cosmos.	KAM industries
Osschemie (k).	Universal Co.
KAM Pharmacy	Bulk Medicals
Laboratory & Allied.	Regal Pharmaceuticals.
Biodeal Laboratories.	
Plastics and Rubber (58)	
ACME Containers.	Spring box Kenya.
Packaging Masters.	Kenpoly Manufacturers
Afro Plastics (k).	Sumaria Industries
Plastic Electricons	Kentainers.
Betatrad (K).	Super Manufacturers
Plastic & Rubber Industries	Kenya Suitcase Manufacturers.
Bobmil Industries.	Techpak Industries.
Prolly Propelin Bags.	L.G. Harris & Co.
Cables and Plastics.	Treadsetters Tyres.
Polyblend.	Laneeb Plastic Kenya.
Complast Industries.	Umoja Rubber Products.
Raffia Bags (K).	Metro Plastics Kenya.
Dune Packaging.	Uni – Plastics.
Rubber Products.	Polythene Bags.
Elgitread (Kenya).	Vyatu.
Safepak.	Nairobi Plastics.

Elgon Kenya.	Wonderpac Industries.
Silpack Industries.	Doshi Ironmongers
Eslon Plastics of Kenya.	Zaverchand Punja.
Sanpac Africa.	Packaging Industries.
Five Star Industries.	Pollyflex Industries
General Plastics.	Polythene Industries
Signode Packaging Systems.	Prosel.
Hi-Plast.	Premier Industries
Sameer Africa.	Haco Tiger Brands
Jamlam Industries.	Pyramid Packaging
Solvochem E.A.	King Plastics Industries
Kamba Manufacturing.	Kingsway Tyres
Shiv Enterprises (E.A).	Ombi Rubber Rollers.

Textiles and Apparels (37)	
Alltex EPZ.	Sunflag Textile & Knitwear Mills.
Ngecha Industries.	Kenya Shirts Manufacturing Co.
Alpha Knits.	Tarpo Industries.
Rivatex (E.A.).	Kenya Trading (EPZ).
Apex Apparels (EPZ).	Teita Estate Ltd Nairobi Kikoy Co.
Rupa Mills.	Thika Cloth Mills.
Ashton Apparel EPZ.	Le Stud.
Senior Best Garments Kenya (EPZ).	Unified Aryan (EPZ).
Bedi Investments.	Leena Apparels.
Shin - Ace Garments Kenya (EPZ).	Vajas Manufacturers.
Fantex (K).	Lifeworks Shukrani.
Spin Knit.	Wildlife Works (EPZ).
Kamyn Industries.	Mega Spin.
Spinners & Spinners.	World of Kikoys
Knit Garment (EPZ).	Midco Textiles (EA).
Simba Apparels EPZ.	Straightline Enterprises
Squaredeal Uniform Centre.	Ken - Knit (Kenya).
Karivondo Filaments.	Summit Fibres.

Mombasa Apparel (EPZ).	
Timber, Wood and Furniture (20)	
Comply Industries.	Newline.
Rosewood Furniture Manufacturers	Timsales.
Economic Housing Group.	PG Bison.
Shah Timber Mart.	Taws.
Fine Wood Works.	Rai Plywoods (Kenya).
Shamco Industries.	Twiga Stationers
Kenya Wood.	Furniture International.
Statpack Industries	Timber Treatment International.
Woodtex Kenya.	Uneeco Paper Products
Tetra Pack.	Woodmakers Kenya

Source: Kenya Association of Manufacturers Directory (2021)