EFFECT OF BUSINESS PROCESS RE-ENGINEERING STRATEGIES ON PRODUCTION PERFORMANCE OF FOOD MANUFACTURING FIRMS IN NAKURU COUNTY, KENYA

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A Project Submitted to the Institute of Postgraduate Studies of Kabarak University in Partial Fulfillment of the Requirements for the Award of Master of Business Administration (Strategic Management) Degree

KABARAK UNIVERSITY

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DECLARATION

l. I do hereby declare that:

i. This project is my own work and to the best of my knowledge it has not been presented for the award of a degree in any university or college.

ii. The work has not incorporated material from other works or a paraphrase of such material without due and appropriate acknowledgement.

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Signed:______________________________ Date:________________________

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GMB/NE/0143/01/22

RECOMMENDATION

To the Institute of Postgraduate Studies:

The research project entitled "**Effect of Business Process Re-Engineering Strategies on Production Performance of Food Manufacturing Firms in Nakuru County, Kenya"** and written by **Janet Mueni Mutua** is presented to the Institute of Postgraduate Studies of Kabarak University. We have reviewed the research project and recommend it be accepted in partial fulfilment of the requirement for the award of the degree of Master of Business Administration (Strategic Management).

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DEDICATION

I dedicate this research project as an accolade to my family and especially my beloved husband, acknowledging his unwavering support throughout my study.

ABSTRACT

Business process re-engineering facilitates manufacturing companies in adapting to evolving market demands, thereby enhancing their competitiveness and operational efficiency. As a result, it plays a pivotal role in elevating production performance. Nevertheless, food manufacturing firms in Kenya are currently contending with ineffective processes that have caused a rise in production costs and a decrease in output. Considering this challenge, the researcher assessed the effect of business process re-engineering on the production performance of food manufacturing firms. The study's specific objectives encompassed determining the influence of business needs analysis, strategic cost analysis, integrated production technology, and process optimization on the production performance of food manufacturing firms in Nakuru County, Kenya. The study was anchored on the Survival-based Theory, Theory of Constraints, Social-technical Systems Theory, and Absorptive Capacity Theory. The current study employed a correlational research design encompassing both qualitative and quantitative approaches. The study's target population was the 13 registered food manufacturing firms in Nakuru County, Kenya. The unit of analysis was the 13 food manufacturing firms and the unit of observation was the 66 managers. This number was small and manageable thus, sampling was not necessary. Instead, census design was employed where all the 66 managers were involved in the study. Data was collected by questionnaires, and subsequent analysis employed both descriptive and inferential statistical methods. In data analysis, Statistical Packages for Social Sciences (SPSS) version 24 was utilized. According to the descriptive findings, the manufacturing firms' production performance was affected by the business process re-engineering. The correlation analysis findings indicated correlation coefficients ($r=0.831$; $p=0.000$), ($r=0.406$; $p=0.005$), ($r=0.702$; $p=0.000$), and ($r=0.528$; $p=0.002$) for business needs analysis, strategic cost analysis, integrated production technology, and process optimization respectively. All variables had a significant and positive relationship with production performance. As such, business process re-engineering affected the manufacturing firms' production performance. The regression analysis findings revealed R-squared value of 0.849, indicating that 84.9% of the variability in production performance was explained by business process re-engineering. Hence, it can be concluded that business process re-engineering has a significant effect on the production performance of food manufacturing firms. The study recommends that food manufacturing firms should integrate business process re-engineering into their overarching operational strategy by leveraging cutting-edge technologies and aligning production processes with evolving customer needs. This study offers new insights by specifically connecting to the food manufacturing firms' production performance. It addresses business needs analysis, strategic cost analysis, integrated production technology, and process optimization, which have been previously underexplored in the concept of BPR and context of food manufacturing firms.

Keywords: *Business Process Re-engineering, Process Optimization, Business Needs Analysis, Strategic Cost Analysis, Integrated Production Technology, Production Performance, Food Manufacturing Firms*

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ABBREVIATIONS AND ACRONYMS

BPR	Business Process Re-engineering
BNA	Business Needs Analysis
SCA	Strategic Cost Analysis
IBM	International Business Machines Corporation
UK	United Kingdom
ICT	Information Communication Technology
IT	Information Technology
NACOSTI	National Commission for Science, Technology and Innovation
SPSS	Statistical Packages for Social Sciences
GDP	Gross Domestic Product
IoT	Internet of Things
KNBS	Kenya National Bureau of Statistics
KAM	Kenya Association of Manufacturers
SEM	Structural Equation Modelling
IPT	Integrated Production Technology

CONCEPTUAL AND OPERATIONAL DEFINITION OF TERMS

Business Needs Analysis: Business needs analysis refers to the process of examining the business processes and systems, identifying the inefficiencies, and determining the causes of those inefficiencies and areas for improvement (Elapatha & Jehan, 2020). In this study, the business needs analysis entails a systematic analysis of the present operational state within manufacturing firms. The aim is to pinpoint particular requirements crucial for enhancing processes. It prioritizes comprehending the essential elements needed to synchronize operations with the strategic goals of manufacturing entities.

Business Process Re-engineering: Business process re-engineering is a thorough overhaul of a company's processes to attain enhanced efficiency and cost-effectiveness (Al-Shammari, 2023). In this study, the business process re-engineering focuses on the redesign of manufacturing workflows, technologies, resources, and organizational structures to enhance efficiency and reduce costs.

Integrated Production Technology: Integrated Production Technology is the integration of advanced technologies and automation into production processes to increase efficiency and quality of products (Tripathi & Gupta, 2021). For the current research, integrated production technology encompasses the strategic amalgamation of technological systems and tools to streamline the Manufacturing processes. This will involve the seamless integration of software, machinery, and automated systems to improve efficiency and flexibility in production.

Process Optimization: Refers to making changes to existing business processes so as to reduce costs, improve efficiency, and increase performance. Optimizations create streamlined processes that meet the needs of the customers and organization at large (Polim & Lestari, 2023). In this study, process optimization involves refining the existing processes to achieve maximum efficiency and reduced waste among manufacturing firms. This incorporates the streamlining of workflows to eliminate bottlenecks and enhance efficient manufacturing.

Production Performance: Production performance refers to the evaluation of how effectively and efficiently a company undertakes its production activities and processes (Ganbold, Matsui, & Rotaru, 2021). The efficiency and effectiveness of manufacturing operations will be determined in terms of cost-effectiveness, timeliness, and the quality of products produced.

Strategic Cost Analysis: Strategic cost analysis is the detailed analysis of the process and activity costs within an organization that is aimed at identifying areas of inefficiency, waste, and opportunities for cost savings (Massaro & Galiano, 2020). In this study, strategic cost analysis encompasses a thorough evaluation and comprehension of the expenses linked to diverse activities and processes. It aims at pinpointing cost drivers, scrutinizing expenditures, and tactically enhance resource allocation to minimize overall costs incurred by manufacturing firms.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Business process reengineering encompasses a comprehensive and methodical strategy that centers on organizational transformation (Ivanišević, Horvat, & Matić, 2023). This strategy integrates interconnected activities with the aim of achieving specific results related to the optimization and restructuring of the organization's core processes. As indicated by Shahul-Hameed, Salamzadeh, Abdul Rahim, and Salamzadeh (2022), within the framework of Business Process Reengineering (BPR), a thorough analysis of business processes highlights inefficiencies and wasteful practices, prompting companies to develop fresh frameworks for aligning goals and objectives effectively. Shirinkina, and Romansky (2020) opined that the emphasis on customer centricity is attained from the fundamental shift, cross-functional, and collaborative approaches that align the customer needs to the firm's activities and processes. Additionally, stakeholder involvement ensures that the process improvements conform to the strategic goals and stakeholder needs.

Manufacturing firms strive to change their work designs to ensure that desirable results are accomplished (Hashem, 2020). Redesigning the workflows can optimize costs of production and provision of associated services thereby giving the firm a position of superiority in the market. Despite the requirement for the significant commitment of resources and time, BPR contributes to greater customer satisfaction, cost reduction, and improved productivity (Garcia-Garcia, Coulthard, Jagtap, Afy-Shararah, Patsavellas, & Salonitis, 2021). The focus on getting the quantum gains about the outputs, quality of services, and responsiveness toward customers is critical for the long-term sustainability of manufacturing firms. Further, elimination of the time-consuming activities and fastening of workflow through high-tech systems lead to operational efficiency. Therefore, business process reengineering stands as a valuable instrument for addressing market requirements and enhancing a company's overall performance.

Effective analysis of the manufacturing process requires a rational breakdown of such processes through logically linked activities that transform resources into outputs in an efficient manner (Fragapane, Ivanov, Peron, Sgarbossa, & Strandhagen, 2022). This helps set up targets for process improvement that ultimately ends up improving the overall performance of the manufacturing activities. Through this analysis, manufacturing firms can also achieve transformational benefits in terms of optimum allocation and utilization as well as process efficiency (Al-Shammari, 2023). The main components of business process reengineering comprise business needs analysis, strategic cost analysis, integrated production technology and process optimization.

As per Tayyab, Jemai, Lim, and Sarkar (2020), Business Needs Analysis (BNA) assesses the business requirements, thereby establishing a fundamental understanding of the organization's operational framework. Within the food manufacturing context, BNA incorporates comprehensive examination of specific production steps, meticulously exploring each process's intricacies to uncover inefficiencies and bottlenecks that could impede productivity and profitability. Serving as a systematic and meticulously structured approach, BNA facilitates the identification and elimination of processes lacking in customer value (Ungermann, Kuhnle, Stricker, & Lanza, 2019). This fosters a leaner and more adaptable manufacturing environment geared towards improved performance. Additionally, it aims for heightened customer satisfaction. Thus, BNA plays a pivotal role in enhancing organizational efficiency and competitiveness.

Strategic cost analysis offers an impartial, evidence-driven assessment of production processes, investigating the intricate relationship between product costs and the value proposition for customers, thereby providing essential insights for strategic decision-making (Nick, Kovács, Kő, & Kádár, 2021). This comprehensive approach equips manufacturing firms not only with strategic alternatives but also with a deeper comprehension of how to optimize the utilization of strategic resources. It also aids in reducing operational costs effectively (Nick et al., 2021). Consequently, this strengthens their competitive standing in the market. Additionally, it ensures sustainable growth in the long run. Thus, strategic cost analysis plays a crucial role in enhancing organizational efficiency and competitiveness.

Within the framework of business process re-engineering (BPR), integrated production technology embodies deployment of advanced systems and tools designed to streamline and improve manufacturing processes (Tayyab, Jemai, Lim, & Sarkar, 2020). It emphasizes the combination of various production technologies to develop more efficient, adaptable, and responsive manufacturing systems. By adopting integrated production technology, businesses can optimize their operations to produce higher-quality products, minimize waste, and boost overall efficiency (Hashem, 2020). This approach allows for real-time monitoring and control of production activities, enabling companies to swiftly respond to shifts in market demand and production needs. In the context of BPR, integrated production technology is essential for re-engineering business processes, driving substantial enhancements in performance, innovation, and competitive edge.

Process optimization increases operational efficiency through control loops and quality monitoring, leading to better output (Abd-Rahman, Mohamad & Abdul Rahman, 2021). It eliminates unnecessary processes, Engaging in process optimization allows companies to achieve streamlined operations and enhance product quality. This, in turn, contributes to increased profitability. It also empowers them to secure and uphold a competitive edge. Therefore, process optimization plays a crucial role in enhancing organizational performance and market competitiveness.

Globally, the adoption of business process re-engineering has resulted in improved efficiency, cost reduction, and increased competitiveness among manufacturing firms (Harlan, Gow, Kornstädt, Alderson, & Lustig, 2023). It has been focused on the customer needs and delivery of products, where new and innovative services are developed to meet the changing customer and market needs. Business process re-engineering has been widely applied by manufacturing firms in the United States of America to streamline production processes and increase the competitiveness worldwide (Truong, Lê, Paja, & Giorgini, 2021). For example, Ford Motor Company, International Business Machines Corporation (IBM), and Xerox Holdings Corporation have been re-engineering their manufacturing processes since the 1990.

Ford applies this approach to transform the manufacturing processes through continuous use of new technology and operational standardization which are vital in reducing costs and improving the quality of products (Polim& Lestari, 2023). IBM has continuously adopted BPR to optimize customer service operations and eliminate redundant activities. This contributes to increased customer satisfaction. Xerox reduces operational costs due to the effective optimization of document processing operations. Food manufacturing firms in the United States such as Kraft Foods, Nestle, and PepsiCo have implemented business process re-engineering (Massaro & Galiano, 2020). PepsiCo streamlined its supply chain by minimizing Stock Keeping Units (SKUs) which resulted in operational efficiency and cost savings. Consequently, the performance of manufacturing companies in the United States has been notably influenced by the practice of business process re-engineering. This impact is realized through the optimization and streamlining of production processes, along with cost reduction efforts, ultimately enhancing their competitive stance within an ever-evolving global market.

Within the United Kingdom context, Garcia-Garcia, Coulthard, Jagtap, Afy-Shararah, Patsavellas, and Salonitis (2021) emphasized that the enhancement of quality control practices is significantly supported by the business process re-engineering. This, in turn, leads to a reduction in product defects and a fostering of quality standards within the domain of food manufacturing. They further noted that Premier Foods applies technology to automate its processes, especially in production planning and inventory management. The company has also implemented the principles of lean manufacturing leading to significant improvement in production and operational efficiency. They used Six Sigma methodologies to eliminate waste from the production processes and this approach contributes to cost savings (Colwill, Despoudi, & Bhamra, 2016). McCain Foods employs advanced planning and scheduling systems to increase manufacturing efficiency. Effective implementation of BPR among UK food manufacturers has contributed to increasing the flexibility hence allowing them to quickly respond to changes in the market demand and customer needs.

Jenatabadi, Radzi, AbdManap, & Abdullah (2023) observed that the food manufacturing sector significantly drives economic growth in Malaysia. However, the country is not able to meet the demand for food products and as such they are net importers. Food manufacturing firms encounter challenges including competition from global food manufacturers, food quality, sustainability, and cost constraints. To cope with the challenges, they have recently adopted organizational innovation encompassing incremental changes to existing products. Within Malaysia, food manufacturing companies bolster their technological prowess by dedicating efforts to the creation and application of organizational innovation strategies.

In the African region, manufacturing enterprises adopts business process re-engineering to achieve sustainable growth and ensure competitiveness in the long run (Olajide & Okunbanjo, 2020). While this approach has been embraced by most manufacturing firms in Africa, its execution has been lacking in effectively addressing evolving business conditions and shifting customer demands. As noted by Awolusi and Atiku (2019), these firms might not have embraced the most current technology and innovation necessary for executing the essential organizational transformations.

Despite the inherent challenges, the adoption of Business Process Re-engineering has seen an increase among manufacturing companies in Nigeria in recent times (Olajide & Okunbanjo, 2020). Manufacturing firms in the country such as Dangote Group, Unilever, and Procter & Gamble are undertaking radical business process redesigning to reduce inefficiencies and stabilize production processes. Process automation and the use of computerized systems have been vital in cutting operational costs among firms (Ofoegbu, 2022). Implementation of BPR by manufacturing companies in Nigeria has improved their performance but they still must overcome the challenges of inadequate funding and technology infrastructure.

Manufacturing companies in South Africa have recognized the importance of BPR and continue to use it to achieve their business objectives. Tiger Brands has used BPR to streamline its supply chain and optimize production processes. Automation of its administrative tasks has resulted in significant cost savings. Moreover, supply chain integration, and data analytics by Pioneer Foods have made the company a leader in the food manufacturing sub-sector. Therefore, the effective application of BPR is attributable to significant improvements in the operations and competitiveness in the

South African market and Africa at large. Mukwakungu, Mabasa, Mamela, and Mabuza (2018) noted that business process renovation, computerized processes, and network of business processes influence the performance of manufacturing firms. This entails enhancing business operations through the redesigning of key business processes. They involve streamlining essential processes within a cohesive flow, maintaining the progression of work and integration. The automation of business processes involves the incorporation of machinery into business operations, leveraging information and communication technology to enhance process efficiency (Nkomo & Marnewick, 2021). The interconnected business process involves leveraging information and communication technology to coordinate business operations and their interlinked tasks, enabled by ICT networks and the Internet of Things (IoT). These methodologies are applied within manufacturing firms to align with the demands of the dynamic environment, guiding companies in adapting techniques and approaches to ensure the fulfillment of customer needs.

1.1.1 Food Manufacturing Firms in Kenya

In Kenya, the manufacturing sector is a major contributor to the Country's GDP (Ongeri, Magutu, & Litondo, 2020). The sector is also a significant source of export earnings through a range of exportable goods such as textiles and processed foods. Nevertheless, manufacturing firms in Kenya have encountered recent obstacles such as limited value addition and elevated production expenses. As per a report by the Kenya National Bureau of Statistics (KNBS, 2020), the manufacturing sector witnessed a decline in its growth rate from 4.3% to 3.2% between 2018 and 2019. Moreover, its contribution to the GDP decreased from 9.3% in 2016 to 7.2% in 2021 (KNBS, 2022), indicating a deterioration in the performance of Kenya's manufacturing sector.

The food manufacturing sub-sector is responsible for producing a wide range of food products that are consumed in Kenya (Ogada, 2017). According to the Kenya Association of Manufacturers (KAM), the food sector is the largest manufacturing sub-sector in Kenya, contributing about 25% of total manufacturing value-added. Despite this contribution, the industry has encountered challenges such as high production costs and technology which affect the performance of individual firms. Many food manufacturers in Kenya still struggle with aligning their business processes to accommodate the utilization of new technology. Food manufacturing firms such as Bidco Africa, Kenchic, and East African Breweries Limited (EABL) among others have embraced business process re-engineering (Kithinji, Rotich, & Kihara, 2021).

They have employed new technologies and optimized their supply chains to reduce costs improve efficiency and enhance customer satisfaction. However, some food companies have performed poorly and collapsed in recent times due to the inability to adapt to the changing market conditions (Kithinji et al., 2021). Recently, companies such as Mumias Sugar Company, Cadbury Kenya, Alpha Grain Millers, and Kiambu Juice Company have experienced collapse, potentially as a result of their failure to adapt to evolving market demands. This could also be linked to inefficient operations, leading to unsustainable losses. The inability to adapt to changes in the market and technological advancements makes firms less competitive and ultimately jeopardizes their survival and sustainability. Inefficient processes cause low product quality, displeased customers, market share loss, revenue decline, and poor performance (Njuguna & Wanjohi, 2021).

Food manufacturing firms in Nakuru County, form a robust sector that significantly contributes to the region's economy and agricultural production (Adhiambo & Machoka, 2023). Among the notable food manufacturing entities, Nakuru hosts prominent companies such as Menengai Oil Refineries, specializing in the production of various edible oils. Another key player, Njoro Canning Factory, focuses on the canning and preservation of a variety of food products, including fruits and vegetables. Additionally, there are flour milling companies such as Premier Flour Mills, producing a wide array of flour products that serve both local and regional markets (Onyiego & Osoro, 2022). These food manufacturing firms in Nakuru County play a pivotal role in processing raw agricultural produce into value-added food products, generating employment opportunities, boosting the agricultural sector, and catering to the nutritional needs of the local and wider population.

Production performance encompasses the efficiency and cost-effectiveness of manufacturing operations, which is crucial in meeting consumer demands and ensuring the sustainability (Liu, Li, Tang, Wang, & Yao, 2021).This is determined by quality, cost and time. Quality incorporates the consistency, safety, and nutritional value, aligning with standards, regulations, and consumer expectations to maintain satisfaction and loyalty. According to Shanak and Abu-Alhaija (2023) time efficiency relates to manufacturing speed, timely delivery, and reduced lead times, ensuring swift market access, lowered inventory expenses, and meeting consumer needs. Moreover, cost signifies production expenses, crucial for profitability, yet not at the expense of quality. Balancing the aforesaid metrics determines a manufacturing firm's success in the long-run. An effective manufacturing firm optimizes operations for high-quality products while ensuring time and cost efficiency(Liu et al., 2021).Achieving these demands streamlined processes, technology integration, rigorous quality controls, and continuous improvement. In this competitive industry, firms ought to consistently refine processes, reduce waste, minimize production time, and optimize costs while upholding quality standards to meet consumer expectations and survive in the market.

1.2 Statement of the Problem

Manufacturing firms in Kenya are experiencing challenges in production performance. As indicated in a report from the Association of Manufacturers (KAM, 2021), manufacturing companies are currently contending with challenges related to insufficient value addition and elevated production costs, which have significantly impacted their production performance. As per report by Kenya National Bureau of Statistics (KNBS, 2020), the manufacturing sector experienced a reduction in its growth rate, dropping from 4.3% in 2018 to 3.2% in 2019. Additionally, KNBS (2022) reported that the sector's contribution to the GDP has been declining; decreasing from 9.3% in 2016 to 7.2% in 2021.In particular, the contribution to GDP was 7.9%, 7.6%, and 7.2% in 2019, 2020, and 2021 respectively. Additionally, food manufacturing firms including Cadbury Kenya, Alpha Grain Millers, Kiambu Juice Company have recently encountered inefficient operations and unsustainable losses and collapsed as a result (KAM, 2021).

Food manufacturing firms face challenges in achieving their desired production performance, potentially stemming from inefficiencies and suboptimal operations. The current scenario might be associated with the limited implementation of business process re-engineering. Furthermore, prior research works have not comprehensively addressed the business process re-engineering within the manufacturing firms. In the work of Njuguna and Wanjohi (2021), the effect of business process reengineering on agro-processing firms' performance in Nairobi City County was examined. The results underscored the importance of effective knowledge management and organizational restructuring in influencing the performance of these agro-processing firms. Similarly, Ongeri, Magutu, and Litondo (2020) evaluated the relationship between the business process re-engineering strategy and the food manufacturing companies' performance. The findings revealed that BPR prototypes, management of re-engineered processes, clear BPR definition, and vision influenced performance. Olajide and Okunbanjo (2020) examined the effects of business process reengineering on organizational performance in the food and beverage industry in Nigeria. The findings established that organizational resources, innovative thinking, and functional processes affects organizational performance. These studies provide valuable insights into the impact of BPR on firm performance. However, they insufficiently address the aspects of strategic cost, integration of production technology, and optimization of processes, which are critical components in maximizing operational efficiencies.

To fill the gaps, the current study assessed the effect of business process re-engineering strategies on the production performance of food manufacturing firms. The findings established that business needs analysis, strategic cost analysis, integrated production technology, and process optimization within the domain of business process re-engineering significantly enhance production performance in food manufacturing firms. These results underscore the importance of aligning strategic initiatives with operational efficiencies to achieve improved production performance in terms of cost and output quality.

1.3 Objectives of the Study

The study was guided by both the general and the specific objectives.

1.3.1 General Objective of the Study

To assess the effect of business process re-engineering strategies on the production performance of food manufacturing firms in Nakuru County, Kenya.

1.3.2 Specific Objectives of the study

Specific objectives of the study were as follows:

i. To determine the effect of business need analysis on production performance of food manufacturing firms in Nakuru County.
ii. To assess the effect of strategic cost analysis on production performance of food manufacturing firms in Nakuru County.
iii. To establish the effect of integrated production technology on production performance of food manufacturing firms in Nakuru County.
iv. To ascertain the effect of process optimization on production performance of food manufacturing firms in Nakuru County.

1.4 Research Hypotheses

Research Hypotheses of the study were as follows:

$H0_1$: Business needs analysis has no statistically significant effect on production performance of food manufacturing firms in Nakuru County.

$H0_2$: Strategic cost analysis has no statistically significant effect on production performance of food manufacturing firms in Nakuru County.

$H0_3$: Integrated production technology has no statistically significant effect on production performance of food manufacturing firms in Nakuru County.

$H0_4$: Process optimization has no statistically significant effect on production performance of food manufacturing firms in Nakuru County.

1.5 Justification for the Study

The current research will enable food manufacturing companies in evaluating their production challenges and crafting strategies to effectively address them. The goal is to facilitate a seamless transition to revamped processes aimed at enhancing efficiency. The study has established a framework for recognizing and integrating best practices and technological innovations aimed at boosting production performance within food manufacturing firms.

1.6 Significance of the Study

The study is to contribute to the field of strategic management, particularly on aspects of business process re-engineering such as analyzing business needs, strategic cost analysis, and optimizing processes within food manufacturing businesses. This study will be valuable for the manufacturing sector, especially in food manufacturing, by offering insights into effective business process re-engineering practices that boost production performance. Policymakers in Kenya's manufacturing sector can utilize these findings to develop supportive regulations and incentives, while other authors and researchers in strategic management can build on this work to investigate additional innovations and strategies. Ultimately, the research provides crucial knowledge to enhance operational efficiency and competitiveness within the industry.

1.7 Scope of the Study

The current research involved the managers from 13 food manufacturing firms that operate within Nakuru County. The unit of observation was 66 managers. The study centered around the various elements of business process re-engineering, which encompass business needs analysis, strategic cost analysis, integrated production technology, and process optimization. The response variable was the production performance, assessed through dimensions such as cost, quality, and time. The research took place during the period from June, 2023 to May, 2024.

1.8 Limitations and Delimitations of the Study

The study encountered limitations, particularly in terms of reluctance among respondents to fill the questionnaire. Gathering data from managers of food manufacturing companies necessitated a thorough elucidation of the study's significance. To facilitate this, authorization letters from NACOSTI and the University Administration were provided to the respective managers, accompanied by a detailed explanation of the anticipated benefits. The research concentrated exclusively on the food sub-sector within the broader manufacturing domain. By adopting this approach, it was possible to conduct a focused evaluation of the ramifications of business process reengineering and its effect on production performance within this sector. The study encompassed a range of food manufacturing companies with diverse complexities and requirements, factors that could potentially shape the results of business process re-engineering efforts. Lastly, the research focused solely on evaluating metrics related to production performance, including quality, cost, and time.

1.9 Assumptions of the Study

First, it was assumed that a thorough and systematic business need analysis leads to the identification of critical production requirements, which in turn positively influences the production performance of food manufacturing firms.

Secondly, it was assumed that strategic cost analysis, when effectively implemented, allows firms to allocate resources more efficiently and control costs better, thereby enhancing the production performance of food manufacturing firms.

Thirdly, it was assumed that the adoption and integration of advanced production technologies streamline manufacturing processes, reduce production errors, and improve overall efficiency, leading to enhanced production performance of food manufacturing firms.

Finally, it was assumed that continuous process optimization practices, including the use of lean manufacturing techniques and continuous improvement strategies, result in higher productivity and improved production performance of food manufacturing firms.

CHAPTER TWO

LITERATURE REVIEW

2.1Theoretical Framework

This section reviews the theories that are related to business process re-engineering and production performance. They comprise the survival-based theory, theory of constraints, social-technical systems theory and absorptive capacity theory.

2.1.1 Survival- Based Theory

The survival-based theory was propounded by Miesing and Preble (1985). The survival-based theory suggests that businesses concentrate on ensuring their continued existence in the market by adapting strategies to navigate challenges and environmental changes. According to Liu, Qu, Wang, Abbas, and Mubeen (2022) survival-based theory highlights the importance of strategies that prioritize the long-term sustenance of the business over aggressive growth or expansion, especially in uncertain or turbulent conditions. Flexibility and agility are paramount for organizations to effectively respond to these external factors (Hermundsdottir & Aspelund, 2022). In order to endure and thrive, companies must actively seek a competitive advantage. This might be attained through avenues such as cost leadership, differentiation, innovation, or niche specialization. Establishing a distinct position in the market is instrumental in sustaining long-term success and relevance (Islam & Fatema, 2023).

Firms that align with survival-focused strategies prioritize risk management (Liu et al., 2022). They conscientiously assess potential risks and devise strategies to either mitigate or navigate them. These risks could span financial vulnerabilities, operational hurdles, or uncertainties linked with new ventures. While acknowledging the importance of short-term gains, the strategic emphasis on survival theory highlights the significance of long-term planning and sustainability. Companies must strike a balance between immediate profitability and enduring viability for sustained growth (Hermundsdottir & Aspelund, 2022). The theory suggests that businesses should employ adaptive strategies that enable them to promptly react to evolving conditions. These include practices like scenario planning, dynamic resource allocation, and ongoing monitoring of the business environment. Embracing innovation and change stands as a fundamental principle within survival-based theory. They are required to continually innovate to stay pertinent, refine operational processes, and introduce novel products or services. Anticipating and proactively adapting to market shifts are vital aspects for organizational survival and success.

The survival-based theory appropriately highlights adaptability and risk management as crucial elements for a company's long-term existence; however, its exclusive emphasis on survival could promote a cautious approach, potentially restraining innovation and daring strategic initiatives (Polim& Lestari, 2023). Additionally, in the current dynamic business environment where innovation and disruption are fundamental, a theory primarily centered on survival may not effectively stimulate the audacious, transformative measures necessary for continual success in fiercely competitive markets.

The survival-based theory is the main theory explaining all the parameters of business process re-engineering and production performance. Concerning business needs analysis, this theory prioritizes the identification of fundamental requisites necessary for the company's sustainability and advancement, fostering a deeper comprehension of the crucial components needed for the business to prosper and persist. In strategic cost analysis, the theory advocates for a thorough assessment of expenses, striving to strike a balance between reducing costs and upholding quality standards to ensure the company's long-term endurance (Hermundsdottir & Aspelund, 2022). Integrated production technology resonates with this theory by advocating for the adoption of technologies and systems that enhance efficiency and adaptability, essential for the company's resilience in a competitive business environment. Moreover, in the realm of process optimization, the survival-based theory advocates for the continual enhancement of processes. This guarantees adaptability, efficiency, and quality, aligning with the fundamental principles of enduring success and survival of manufacturing firms.

However, survival-based theory focuses excessively on adaptation, potentially underestimating the significance of strategic foresight and innovation in achieving business success. It assumes a deterministic view of competition, which may overlook the influence of randomness and external factors such as regulatory changes. Additionally, the theory can be overly simplistic, failing to account for the complex interplay between internal organizational dynamics and market forces. Furthermore, it may not adequately explain the success of businesses that thrive without major adaptation, relying instead on robust foundational strategies.

2.1.2 Theory of Constraints

The theory of constraints was developed by Goldratt (1990). The theory of constraints functions as a methodology aimed at pinpointing the primary limiting factor obstructing the achievement of a goal. It systematically works to enhance this constraint until it ceases to impede progress. In manufacturing, this constraint is often referred to as a bottleneck. According to Tarte, Suryawanshi, and Batule (2023) the theory of constraints adopts a scientific method towards improvement, proposing that complex systems, including manufacturing processes, comprise interconnected activities, with one acting as the limiting factor for the entire system. One notable aspect of the Theory of Constraints is its inherent prioritization of improvement activities.

The primary focus is always on the current constraint. In environments necessitating urgent improvement, TOC provides a highly targeted methodology for swift enhancements (Orue, Lizarralde, Amorrotu, &Apaolaza, 2021). At its core, the theory suggests that every process has a singular constraint and that overall process throughput can only increase when this constraint is addressed. A significant corollary is that investing time in optimizing non-constraints does not yield substantial benefits; only improvements to the constraint advance the goal. Therefore, TOC aims to maintain precise and sustained attention on improving the current constraint until it no longer hampers throughput (Modi, Lowalekar, & Bhatta, 2019). At that juncture, focus shifts to addressing the next constraint. The potency of TOC lies in its ability to generate a strong focus on a single goal and eliminate the primary impediment to achieving more of that goal.

Theory of constraints identifies and prioritizes limitations that often relate to inefficiencies and elements driving costs within operational processes (Tarte et al., 2023). Its focus on these constraints serves to support the objectives of strategic cost analysis by identifying pivotal areas where costs are concentrated and where improvements could generate substantial cost-saving benefits. Within the scope of business process re-engineering, TOC's emphasis on pinpointing and improving constraints strongly resonates with the strategic aim of reducing costs and enhancing efficiency (Orue et al., 2021). Given that strategic cost analysis involves the comprehensive assessment of expenditures and resource usage across diverse operations, TOC proves instrumental in directing attention towards the most influential factors affecting costs, thereby contributing to the overhaul of business processes to maximize efficiency and minimize expenses.

Theory of constraints presents a structured approach for recognizing and resolving bottlenecks in processes, highlighting the significance of prioritizing constraints for enhancements. Nevertheless, its main drawback stems from its limited scope, as it may oversimplify operational systems by excessively fixating on a singular constraint. This singular focus could potentially neglect interconnections and systemic issues that are critical to impacting overall efficiency.

2.1.3 Socio-Technical Systems Theory

Emery and Trist formulated the socio-technical systems theory in 1960. This theory revolves around the harmonious fusion of organizational processes and technological utilization to create a cohesive and efficient system. According to Münch, Marx, Benz, Hartmann, & Matzner (2022), technological advancements significantly impact organizations, particularly manufacturing firms, necessitating a well-structured change model that bolsters the compatibility of their structures. Socio-technical systems theory posits that an organization is an amalgamation of interconnected sub-systems. An adept organization is composed of a workforce possessing skills aligned with established protocols, making use of technology, operating within a physical framework, and collaboratively working towards accomplishing their goals (Zhang, Nutakor, Minlah, & Li, 2023).

Socio-technical systems theory underscores that a company's performance hinges on the seamless integration of its social and technical elements (Ceschin & Gaziulusoy, 2019). As such, organization ought to focus on all its operational and change aspects to achieve sustainable production performance. However, Münch *et al* (2022) asserted that the failure to integrate and analyze technology and other aspects including knowledge management, operational structure, and structural redesigning and the interdependencies that exist among them is a major deterrent to better operational efficiency. To comprehend organizational processes and enhance performance, it's imperative to involve all essential stakeholders, encompassing individuals operating across various facets of the organizational framework (Qureshi, Rasiah, Al-Ghazali, Haider, &Jambari, 2019). Consequently, widespread participation becomes an essential condition for cultivating a holistic grasp of the organization's dynamics and facilitating transformative changes aimed at enhancing performance.

Social-technical systems theory describes the interaction between social and technical factors in the design and implementation of work systems. The theory can be applied in integrating the technology and production work processes which are the central element of integrated production technology. It describes the interactions between technology and work processes which food manufacturing firms adopt to design production systems that are well-integrated, effective, and efficient. While socio-technical systems theory offers valuable insights into the interaction between social and technical systems, it can be overly complex and challenging to implement due to the need to balance numerous interdependent factors. It may overly stress the importance of harmony between social and technical aspects, potentially hindering innovation and risk-taking. The theory often necessitates significant organizational change and investment, posing difficulties for businesses with limited resources. Additionally, it may fail to sufficiently address power dynamics within organizations, oversimplifying the complexities of human behavior in the context of organizational reengineering.

2.1.4 Absorptive Capacity Theory

Absorptive Capacity Theory was developed by Cohen and Levinthal (1990). The theory describes the ability of an organization to assimilate and use knowledge from the environment in which it operates. The core principle of absorptive capacity theory lies in the notion that a company's capability to innovate, enhance processes, elevate products, and refine services is contingent upon its capacity to acquire, integrate, and apply fresh knowledge (Howell, 2020). Knowledge is acquired by identifying and accessing external sources of information, and assimilation involves interpreting and comprehending this knowledge within the context of the organization's operations (Abou-Foul, Ruiz-Alba, & López-Tenorio, 2023). Application pertains to using the newly obtained knowledge to devise novel products and processes.

Within the framework of absorptive capacity theory, the acquisition and effective utilization of novel knowledge hinge on the foundation of prior knowledge and the ability to recognize and respond to emerging information (Howell, 2020). Hence, enterprises with a robust foundation of prior knowledge are better positioned to absorb new information as they possess a deeper understanding of how it aligns with the organization's systems and operations. Furthermore, companies that can swiftly adapt to changes in the environment are equipped to identify and integrate novel knowledge (Madsen & Buhalis, 2022). Absorptive capacity encompasses both potential and realized capacities. Potential absorptive capacity signifies the ability to acquire and integrate, while realized absorptive capacity embodies the ability to apply knowledge to generate fresh products (Valentim, Lisboa, & Franco, 2016). Consequently, organizations rely on both these absorptive capacities to foster innovation and enhance performance.

Absorptive capacity theory relates to the process optimization variable of the study as it focuses on the acquisition, assimilation, and application of new knowledge from the environment. This knowledge can be applied to optimize production processes to reduce waste and improve efficiency. Through optimization of processes, a manufacturing firm can use the absorptive capacity theory to ensure effective application of new knowledge to drive production performance improvements. Knowledge transfer is associated with complexities and absorptive capacity theory does not provide sufficient frameworks for overcoming these complexities. Innovation requires a clear combination, absorption of external and creation of internal knowledge creation though this is scantly addressed in the absorptive capacity theory. The theory may also place excessive emphasis on prior related knowledge, potentially neglecting the benefits of new, unrelated knowledge. Furthermore, it can be difficult to measure and implement absorptive capacity, which leads to challenges in practical application and inconsistent results across different contexts.

2.2 Empirical Literature Review

The intention of the study is to explore how various components of business process re-engineering influence production performance, supported by a review of related empirical literature. They include the business needs analysis, strategic cost analysis, integrated production technology and process optimization.

2.2.1 Business Needs Analysis and Production Performance

Business needs analysis establishes the groundwork for formulating strategies that bolster the efficiency of business processes (Al-Anqoudi, Al-Hamdani, Al-Badawi, & Hedjam, 2021). The prioritization of business needs takes place according to their significance in alignment with the strategy and objectives of the company. This approach focuses resources on the overarching vital areas and ensures that efforts are directed towards achieving the firm’s most significant objectives. Moreover, business needs analysis can develop solutions to address the identified business needs and involve developing new processes, implementing new technologies, and changing existing procedures (Elapatha & Jehan, 2020).

The business needs analysis aligns firm strategy with its business processes and operations (Sungau, 2019). This supports the redesigning of business processes to improve efficiency, effectiveness, and competitiveness. Strategic alignment also incorporates adoption of new technologies that enable food manufacturing firms to achieve strategic objectives. Quality-based positioning determines how firms should position themselves in the market based on product quality (Elapatha & Jehan, 2020). The identification of key product attributes makes the organization stand out from the competitors and appeal more to the customers.

Firms analyze and redesign business processes to identify areas for quality improvement including the areas for defects' reduction, customer service improvement and product features' enhancement (Sungau, 2019). Continuous improvement is a vital component of business needs analysis that assist firms in assessing and meeting evolving needs of the customers and stakeholders (Al-Anqoudi et al., 2021). Therefore, it is essential for manufacturing firms to evaluate the effectiveness of the processes that are re-engineered and identify opportunities for further improvement in operational efficiency.

Febrianti and Herbert (2022) conducted a study on the Business analysis and product innovation to improve manufacturing SMEs business performance in Indonesia. This research employed a quantitative methodology with an explanatory approach to ascertain the extent of influence exerted by the independent variable on the dependent variable. The participants in this study comprised 200 small and medium-sized enterprises (SMEs) situated in Bandung city, particularly along Jalan Cikutra. The findings of this study revealed a significant impact of the business analysis and innovation on the performance.

Ndubuisi-Okolo, Anekwe, Akaegbobi, and Onuzulike-Chukwuemeka (2023) examined the effect of strategic orientation on performance of food and beverage firms in Enugu

State, Nigeria. The study employed a survey research design utilizing a structured questionnaire tailored to achieve the specific objectives of the research. The total population consisted of 200 employees drawn from registered food and beverage firms in Enugu State. Employing a Census Sampling Method ensured the inclusion of all participants. Collected data were obtained through a structured questionnaire. Descriptive analysis was utilized to examine the generated data, and the formulated hypothesis underwent testing via Simple Regression Analysis. The outcome indicated a noteworthy positive effect of market orientation on the market share of food and beverage firms in Enugu State. Overall, strategic orientation explained 81.7% of the food and beverage firms' performance.

Njuguna and Wanjohi (2021) examined the influence of business process re-engineering on performance of agro-processing firms in Nairobi City County. The research employed a descriptive research design. The target population was 177 agro-processing firms. A sample of 65 firms was selected through a simple random sampling method. Both primary and secondary data were utilized in the study. Analytical techniques encompassed descriptive statistics, Pearson's coefficient of correlation, and regression analysis. The study's findings demonstrated that the performance of agro-processing firms is influenced by organizational restructuring, knowledge management, information technology capabilities, and process monitoring. The inferential results revealed that business process re-engineering accounts for 77% of the observed variation in the firms' performance. In conclusion, the study indicated that business process re-engineering holds the potential to enhance efficiency and effectiveness by eliminating unnecessary business functions, thereby contributing to overall performance improvement.

2.2.2 Strategic Cost Analysis and Production Performance

Strategic cost analysis (SCA) increases the understanding of the costs associated with manufacturing operations and how they affect the overall firm strategy (Massaro & Galiano, 2020). It leads the managers in making sound decisions on resource allocation and management of cost. Through effective strategic cost analysis, businesses can identify areas for production cost control without compromising the quality of products. They can also develop cost strategies that are effective, efficient, and sustainable in the long-term. According to Polim and Lestari (2023) SCA identifies high-cost activities which are streamlined to minimize costs. Business process re-engineering redesigns processes and optimize them for cost-effectiveness, efficiency, and customer satisfaction. Chang, Chen, and Lu (2019) asserted that value chain analysis as a component of strategic cost analysis which traces activities that create value for customers and achieve a competitive advantage. Strategic cost analysis provides techniques to optimize the costs associated with activities identified through value chain analysis. Analysis of cost drivers help in identification of opportunities for cost reduction and optimization (Arisseto-Bragotto, Feltes, & Block, 2017).

Mwangi (2021) researched on the influence of procurement cost optimization on performance of manufacturing firms in Kenya. The study employed both primary and secondary data sources. Questionnaire was used in the collection of data. Descriptive and inferential statistical methods were employed in data analysis. The results indicated that the optimization of procurement costs is a significant predictor of the performance of manufacturing firms. A positive correlation was observed between the optimization of procurement costs and the performance of these manufacturing firms. This study was restricted to the sole exploration of procurement cost optimization. There are other types of costs that affect the overall efficiency of the manufacturing firms including production and service costs which were not discussed in the study. The current study looks into strategic cost analysis where the broader aspect of costs in food manufacturing firms is adequately discussed. Moreover, the researcher discusses the strategic cost analysis as a key element of business process re-engineering and establishes its effect on operational efficiency.

2.2.3 Integrated Production Technology and Production Performance

Integrated Production Technology (IPT) entails the use of advanced technology in manufacturing processes to reduce costs and increase productivity (Lokhande, Venkateswaran, Ramachandran, Chinnasami, & Vennila, 2021). The integration of technological systems creates a production process that is seamless and efficient. Moreover, IPT establishes holistic approach to improve production processes and leverages technology and automation to achieve the desired levels of efficiency (Tripathi & Gupta, 2021). This is attained through the automation that results in time savings and manufacturing costs. Therefore, the entire supply chain and logistics processes of the manufacturing firms can be automated to streamline inventory management and delivery of products to the customers (Madsen & Buhalis, 2022).

Production scheduling vitally includes well-designed planning and coordination of production tasks to attain timely delivery of products (Tripathi & Gupta, 2021). Production scheduling thus plays a critical role in meeting the organization's strategic objectives as it can be aligned with the organization's strategic goals by putting into account the production capacity, market demand, and resource allocation (Lokhande et al., 2021). This helps the manufacturing firms to meet demands of the customer and improve production performance. IPT increases production flexibility through automation of repetitive tasks and quality control. This gives the opportunity for reallocating resources to other important tasks. This allows adjustments in production processes to meet changing customer demands that is essential in a rapidly changing environment (Choudhary & Riaz, 2023).

Yaseen, Kasim, Falih, Sabah, & Hammood (2020) examined the relationship of lean production and business performance in the Malaysian food industry. Data was gathered from 187 executive managers within Malaysian food industry companies, facilitated through a self-administered questionnaire. These gathered data underwent analysis employing descriptive statistics and multiple. The findings unveiled that lean production practices directly contribute positively to business performance.

Telukdarie, Munsamy, Katsumbe, Maphisa, and Philbin (2023) assessed industry technological advancement in the food and beverage manufacturing industry in South Africa. The study employed quantitative research design. Based on the food traceability system and automation for repetitive tasks affected the food and beverage manufacturing firms. Kalko, Erena, and Debele (2023) assessed technology management practices and innovation among medium-and large-scale manufacturing firms in Ethiopia. Through the utilization of a simple random sampling method, this study selected 200 firms to collect responses from participants. The analysis of data was conducted using the structural equation modeling and a cross-sectional design, employing the LISREL 8.80 SIMPLIS program software tool. The study's outcomes indicate that both technology transfer and technology acquisition significantly and positively impact process innovation, product innovation, and method innovation. Furthermore, the findings highlight that technology process notably influences both process and method innovation, while technology absorption significantly affects product innovation.

Ikon, Onwuchekwa, and Nwoye (2018) conducted a study on business process reengineering and competitive advantage among selected brewing firms in Anambra State, Nigeria. Findings indicated a significant positive relationship between business process re-engineering and competitive advantage. Management commitment and innovative strength affected the competitive advantage of selected brewing firms. The study was limited to only two variables; management commitment and innovative strength under which the concept of business process re-engineering was scantly explained. The present study applies four elements of business process re-engineering including business needs analysis, strategic cost analysis, integrated production technology and process optimization. This offers a broader examination of business process re-engineering and its effect on performance.

Awolusi and Atiku (2019) conducted a study on the relationship between business process re-engineering and Nigerian oil and gas industry’s profitability. The research utilized both exploratory and confirmatory factor analysis, along with the application of Structural Equation Modeling (SEM). The research findings showed that there is a positive effect of organizational structure and IT Infrastructures on profitability. However, management competence and support had an insignificant effect on profitability. Despite business process re-engineering being the predictor variable, the study focused more on organizational structure, management support and management competence.

A study by Gitau, Nzuki, and Musau (2022) examined the effect of IT capability on manufacturing firms’ performance within Nairobi City County. The research involved a sample of 222 manufacturing firms, selected using the stratified random sampling method. Data collection was carried out using a semi-structured questionnaire. The collected data was analyzed using descriptive and inferential statistical techniques. The study's findings indicated a positive relationship between IT capability and manufacturing firms’ performance. Consequently, the study concluded that implementing measures to enhance IT capability can significantly enhance and sustain the manufacturing firms’ performance. The scope of the study was limited to assessing IT capability, which could account for the fact that only 49.2% of the variation in performance was explicable. The current study focuses on adoption and utilization of integrated production technology by food manufacturing firms. Apart from IT capability, the study analyzes the streamlined production systems, production scheduling, time savings and flexibility. The aforesaid components aim to achieve a desirable level of efficiency by minimizing waste and maximizing the use of resources in the production process.

2.2.4 Process Optimization and Production Performance

Process optimization is an important element of business process re-engineering that focuses on reducing costs, eliminating wastes and improving the quality of products (Hashem, 2020). It aligns business processes with the strategic objectives of the firm to achieve competitive advantage and better performance. According to Al-Shammari (2023) process optimization involves identification of bottlenecks, inefficiencies, and areas of waste that are impacting the production performance of the organization. Based on the process analysis, the production processes by food firms are redesigned through simplification, elimination of non-value-added activities, and automation of specific tasks as per the requirements (Shirinkina, & Romansky, 2020).

Process monitoring is an important aspect of process optimization in business process re-engineering (Garcia-Garcia et al., 2021). It enables manufacturing firms to ensure that the restructured process meets the intended purpose by delivering the desired outcomes in terms of efficiency. Hashem (2020) suggested that it is paramount for the firms to track and analyze the performance of new production and service provision services to ensure that they are meeting the overall production performance objectives. However, poor process monitoring lead to inefficiencies that cause bottlenecks and significant errors which contribute to decreased productivity, higher costs, and lower customer satisfaction (Fragapane et al., 2022). Process automation plays an important role in business process re-engineering among the food manufacturing firms by ensuring efficiency and effectiveness.

Automation reduces the time and effort required to complete tasks contributing to increased efficiency, faster turnaround times, and lower costs (Abd-Rahman et al., 2021). This promotes quality and higher customer satisfaction. The capability of manufacturing firms to adapt favorably to evolving customer requirements significantly influences their operational effectiveness. Tayyab, Jemai, Lim, and Sarkar (2020) contend that process automation is vital in achieving the above objective since it modifies and adapts the process to changing business requirements and customer needs. Moreover, the process control loops monitor the critical parameters of the production process to maintain the desired level of cost and efficiency. According to Polim and Lestari (2023) the sustainability of food manufacturing firms is determined by the ability to maintain appropriate variances in material usage and the associated costs. Process control loops are crucial in maintaining right variances. It minimizes process variability through adjusting the process variable to maintain consistency in material usage and cost control. This reduces waste and rework thereby increasing process efficiency.

Palanisamy, Chelliah, and Muthuveloo (2021) undertook a study on optimization of organizational performance among Malaysian manufacturing SMEs. An examination of 157 responses obtained from a cross-sectional survey conducted among Malaysian manufacturing SMEs was conducted, analyzed using SPSS software version 24 and Partial Least Squares-Structural Equation Modeling (PLS-SEM). The results highlight that while talent retention and talent displacement significantly impact organizational performance, no influence was observed concerning talent harnessing and talent acquisition on organizational performance. Nonetheless, the study fails to adequately address process optimization within the broader context of business process strategies, which could provide a more comprehensive understanding of organizational performance. By not exploring how optimization practices could enhance talent management processes, the research misses an opportunity to connect critical factors that drive performance in Malaysian manufacturing SMEs.

Adeodu, Kanakana-Katumba, and Rendani (2021) researched on implementation of lean six sigma for production process optimization in a paper production company in Nigeria. The application of lean six sigma tools revealed that the current production performance was below standard and generating excessive manufacturing waste, including low process cycle efficiency (23.4%), low talk time (4.11 sec), extended lead time (43200 sec), high non-conformance to six sigma values, elevated downtime (32.64%), and excessive labor flow (33). However, after implementing the lean six sigma tools for a specific period, substantial improvements were observed across all the considered parameters within the production line. However, the study overlooks the critical aspects of process monitoring and process automation within the context of process optimization, which are essential for sustaining improvements in production performance. This limit the long-term effectiveness of lean six sigma implementations and overlook opportunities for further enhancing efficiency and reducing waste.

Kering, Kilika, and Njuguna (2020) conducted a study on operational processes and performance of small and medium-sized manufacturing firms in Kenya. The study's findings indicated that strategy processes and competitive priorities significantly affected firm performance, as evidenced by the regression coefficients ($\beta = 0.5542$, $p < 0.05$) and ($\beta = 0.4201$, $p < 0.05$) associated with them. This implies a strong connection between these factors and manufacturing firms' performance. The study's overall outcomes indicated that about 37% of the performance changes in the firm could be attributed to operational processes. The operational processes encompassed strategy processes, competitive priorities, and manufacturing strategy, though the explanation of process optimization was lacking. Additionally, the study highlighted that the relationship between manufacturing strategy and performance was not statistically significant, indicating that the intrinsic processes did not impact performance. The present study addressed these gaps by delving into process optimization, thoroughly discussing aspects like process redesigning, process monitoring, process automation, and the implementation of process control loops.

Murima (2017) assessed the role of business process re-engineering as a tool for gaining competitive advantage among cement manufacturing firms in Kenya. The results indicated that technology, employee competencies, organizational strategy, organizational structure, and culture collectively shape competitive advantage. However, the study was confined to descriptive analysis, and the link between business process re-engineering and competitive advantage wasn't established. Furthermore, the study variables weren't clear indicators of business process re-engineering. The current study employed both descriptive and inferential analysis, particularly regression analysis, to elucidate the relationship between business process re-engineering and food manufacturing firms' production performance.

2.2.5 Production Performance

Production performance of manufacturing firms is indicated by cost, quality and time (Gupta, Kumar, & Wasan, 2021). Cost parameter determines the production system's efficiency on the basis of cost control and cost-effectiveness. Firms analyze the material, labor and overhead costs and strive to minimize them to promote efficiency. Strategic cost analysis as well as process optimization identify opportunities for cost reduction and cost optimization (Björkdahl, 2020). Quality performance determines the ability of the products to conform to the required specifications and standards. Time expresses the speed at which the process of production operates where a shorter cycle time demonstrates higher efficiency and faster production, and better performance. Production performance also expresses the ability of the production process to respond to changes in demand, product variations, and other market requirements (Ganbold, Matsui, & Rotaru, 2021).

Performance in manufacturing firms is marked by the integration of efficient processes, strategic resource allocation, the production of outputs of superior quality, and the consistent achievement or surpassing of predetermined targets (Björkdahl, 2020). A thorough assessment of performance in these firms includes the examination of key indicators like productivity, efficiency, and cost-effectiveness. The critical roles of monitoring and improving performance are integral in guaranteeing the competitiveness, profitability, and sustainability of production firms amid the dynamic business landscape. Therefore, ongoing initiatives to enhance processes, optimize resource utilization, and uphold high-quality standards significantly contribute to the overall success and resilience of production firms in today's evolving markets (Gupta et al., 2021).

In Jordan, Khashman (2019) researched the effect of BPR on organizational performance. According to the findings, BPR, strategic alignment and ICT affected the performance of manufacturing firms. Shahul-Hameed et al (2022) examined the impact of BPR on organizational performance of manufacturing firms during the coronavirus pandemic. Based on the findings, top management commitment, organizational readiness for change, information technology capabilities and people management affected performance. Nevertheless, the study overlooked the crucial role of technology integration in production processes, which is essential for realizing the full benefits of business process re-engineering (BPR). By not addressing how advanced technologies can enhance operational efficiency and adaptability, the studies miss a vital dimension that could significantly influence organizational performance

In Nigeria, Ikon et al (2018) conducted a study on BPR and competitive advantage among selected brewing firms. A significant positive relationship between BPR and competitive advantage was established. Similarly, Awolusi and Atiku (2019) conducted a study on the relationship between BPR and Nigerian oil and gas industry's profitability. The findings showed that there is a positive effect on organizational structure and IT Infrastructures on profitability. The research lacks an in-depth analysis of how business process re-engineering (BPR) leads to competitive advantage and profitability, creating a gap in understanding these processes. Additionally, not considering external factors like market trends and regulations limits the relevance of the findings across Nigeria's manufacturing and oil sectors.

Kithinji, Rotich, and Kihara (2021) assessed the association between implementation of a re-engineering strategy on manufacturing firms' performance. The study focused on a target population of 708 large manufacturing firms, all of which were registered with the Kenya Association of Manufacturers. A subset of 249 firms was selected for the study using a simple random sampling approach. Data collection was executed through the utilization of a questionnaire. The findings of the study showed that the adoption of a re-engineering strategy influence on the manufacturing firms' performance significantly. Moreover, the study highlighted that the connection between the re-engineering strategy and firm performance was influenced by the prevailing organizational culture within these manufacturing firms. The study's scope was confined to exploring the outcomes associated with the adoption of the re-engineering strategy, which encompassed enhancements in output quality, cost reduction, and service delivery improvements. However, the current study focused on the core components of business process re-engineering, which encompassed strategic cost analysis and the optimization of processes.

Muema and Gladys (2019) conducted a study on the effects of business process re-engineering on the real estate projects' performance in Nairobi City County. The analysis and presentation of data were carried out using a descriptive statistics approach. The results indicated that strategies, technology, and processes influenced performance. The inferential findings indicated a significant association between business process re-engineering and projects' performance. Bako and Banmeke (2019) investigated the influence of business process re-engineering on the microfinance banks' organizational performance. The study employed a simple random sampling technique, and data was collected through questionnaires. Multinomial regression analysis was used for data analysis. The results revealed a positive impact of business process re-engineering on organizational performance.

Mohat, Munyoki, and Cheluget, (2020) assessed the relationship between business process re-engineering practices and performance of the telecommunication sector in Kenya. The research employed a cross-sectional research design and focused on 35 telecommunications companies in Kenya. Data collection was conducted through structured questionnaires, and the subsequent data analysis involved the utilization of both descriptive and inferential statistical methods. The study results indicated that within the telecommunications sector, various Business Process Re-engineering (BPR) strategies were employed. These strategies encompassed the adoption of teleconferencing technologies, the implementation of computerized performance measurement and reporting systems, the establishment of shared information technology infrastructure, and the integration of a computerized procurement system. The outcomes of the study showed that the implementation of BPR strategies resulted in increased efficiency in customer service provision, an enhancement in product quality, and a reduction in non-value-adding processes. As a cumulative effect, these improvements contributed to achieving the desired level of performance. While the study by Mohat, Munyoki, and Cheluget (2020) highlights various business process re-engineering (BPR) strategies employed in Kenya's telecommunications sector, it lacks a detailed exploration of the specific impacts of each strategy on overall performance. Additionally, the reliance on structured questionnaires may limit the depth of insights gained, as qualitative factors influencing BPR implementation and its outcomes are not adequately captured.

Ongeri, Magutu, and Litondo (2020) evaluated the relationship between the business process re-engineering strategy and the food manufacturing companies' performance. The study utilized a cross-sectional survey design, and structured questionnaires were employed to gather data from participants. The findings unveiled that 63.9% of the variations in overall firm performance were accounted for by factors such as resources mobilization, sponsorship and commitment, analytical processes selection, BPR prototypes, management of re-engineered processes, clear BPR definition, and vision.

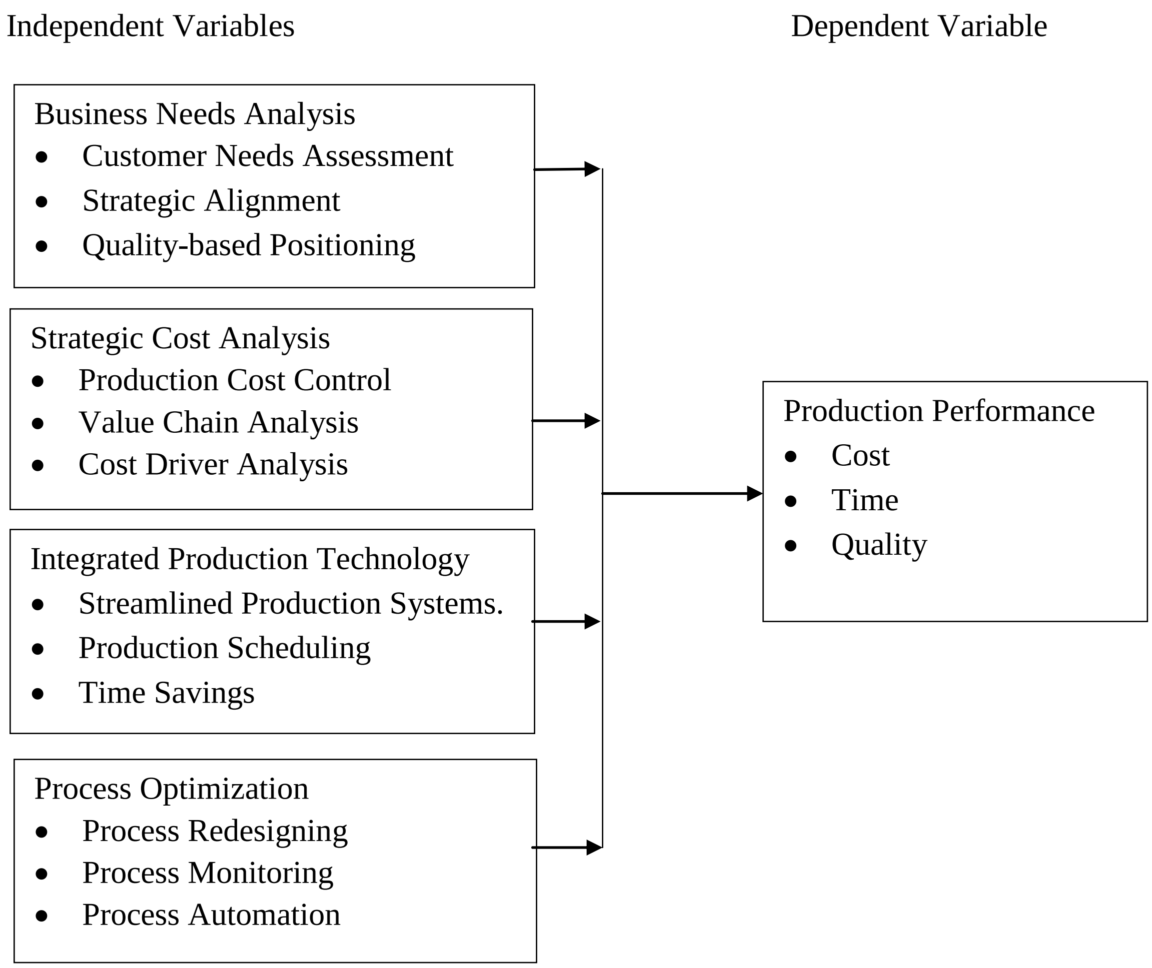
This highlights the significant relationship between the BPR strategy and performance. The study overlooked other aspects of BPR, such as business needs analysis, strategic cost considerations, and process optimization, along with their effects on production performance.

2.3 Conceptual Framework

Conceptual framework illustrates research variables and their relationship (Hazen, Russo, Confente, & Pellathy, 2021).Figure 1 shows the association between business process reengineering; strategic need analysis, strategic cost analysis, integrated production technology and process optimization (Independent Variables) and food manufacturing firms' production performance (Dependent Variable).

Figure 1

Conceptual Framework



Source: Author (2024)

2.4 Research Gaps

Table 1

Research Gaps

Author(s) & Year	Topic	Variables	Findings	Research Gaps
Njuguna and Wanjohi (2021).	Effect of business process re-engineering on performance of agro-processing firms in Nairobi City County.	i. Organizational Restructuring. ii. Knowledge Management. iii. Information Technology Capabilities. iv. Process Monitoring.	The research results revealed that the combined factors of organizational restructuring, knowledge management, information technology capabilities, and process monitoring collectively impact the performance of agro-processing firms. The business process re-engineering accounted for 77% of the variations in agro-processing firms' performance.	The current study centers into the optimization of production systems and scheduling to achieve enhanced efficiency.
Mwangi (2021).	Influence of Procurement Cost Optimization on Performance of Manufacturing Firms in Kenya.	i. Strategic Sourcing. ii. Consolidation of Suppliers. iii. Improvement of Contract Management.	The results revealed a significant and positive correlation between the optimization of procurement costs and the performance of manufacturing companies in Kenya.	The study was limited to procurement cost optimization. The current study looks into strategic cost analysis, which covers all cost aspects of manufacturing firms.
Kering, Kilika, and Njuguna, (2020).	Influence of Operational Processes on the Performance of SME Manufacturing Firms in Kenya.	i. Human Capital Management Structures ii. Human Resource Management	The findings indicate that human resource processes accounted for 23% of the variations observed in firm performance.	The study was limited to HR process, which explains only 23% of performance. The present study focuses on process optimization on a wider scope.

		Configurations iii. Human Resource Embeddedness		
Awolusi and Atiku (2019).	Business Process Re-Engineering and Profitability in the Nigerian Oil and Gas Industry: The Mediating Influence of Operational Performance.	i. Organizational Structure. ii. IT Infrastructures. iii. Management Competence and Support.	The results showed that organizational structure and IT infrastructures significantly affected profitability and operational performance. However, the relationship between management competence and support and profitability was insignificant.	The variables including organizational structure, management support and competence are not direct components of business process re-engineering. The current study focuses on business needs analysis and production cost control.
Kithinji, Rotich, and Kihara (2021).	Re-engineering strategy and performance of large manufacturing firms in Kenya.	i. Quality Improvement. ii. Operational Costs Reduction. iii. Service Delivery Enhancement. iv. Organizational Culture.	The results indicated a significant and positive effect of the re-engineering strategy on the performance of large manufacturing firms in Kenya. Additionally, the findings showed a significant moderating effect of organizational culture on the relationship between the re-engineering strategy and the performance of large manufacturing firms.	The variables were the outcomes of re-engineering strategy rather than the elements of BPR. The current research uses integrated production technology and process automation.
Mohat, Munyoki, and Cheluget (2020).	Business process re-engineering practices and performance of telecommunication sector in Kenya.	i. Teleconferencing Technologies. ii. Measurement and Reporting System. iii. Information Technology	The research revealed that the most telecommunications companies have employed diverse BPR strategies, including the utilization of teleconferencing technologies, computerized performance	The study did not elaborate on the specific limitations faced by telecommunications companies during the implementation of BPR. In discussing BPR, the inherent limitations will be

		Infrastructure iv. Computerized Procurement System	measurement and reporting systems, shared information technology infrastructure, and computerized procurement systems. The results showed that implementation of BPR, contributed improved efficiency in customer service, enhanced product and workforce quality.	elaborated in connection to the production performance.
Muema and Gladys (2019).	Effects of business process re-engineering on the performance of real estate projects in Nairobi City County, Kenya.	i. Strategies. ii. Processes. iii. Technology. iv. Personnel.	The research findings indicated that strategies, personnel, technology, processes affect project performance.	The components of business process re-engineering included strategies, personnel, technology, and processes. The response variable was project performance. In contrast the components of business process re-engineering include process optimization and strategic cost analysis. The response variable is production performance.
Bako and Banmeke (2019).	The impact of business process re-engineering on organizational performance of commercial banks and micro-finance banks.	i. Innovative Thinking. ii. Process Function. iii. Radical Change. iv. Information Technology.	The research findings showed that business process re-engineering impacted the organization performance.	The operations of banks are different from those of manufacturing firms. Instead of bank performance, the current study focuses on production performance that is indicated by quality and time.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Research Design

Research design is a structured framework that harmoniously integrates various research components to effectively tackle the research issue at hand (Ragab & Arisha, 2018). The current study employed a correlational research design encompassing both qualitative and quantitative approaches. The use of a correlational research design aids in elucidating the causal connections between variables within their natural context (Snyder, 2019). This research design aligned well with the study's objectives, as it sought to describe and establish the correlations between key variables such as business needs analysis, strategic cost analysis, integrated production technology, process optimization, and the food manufacturing firms' production performance. It therefore identified whether the predictor variables and response variable were related and to what extent. The correlational research design also assisted in predicting outcome. The researcher also sought to predict variation in production performance that was accounted for by change in the business process re-engineering.

3.2 Location of the Study

The study took place in Nakuru County, which was selected due to its status as one of the country's highly industrialized regions. As confirmed by the Kenya Association of Manufacturers, Appendix V illustrates a list of 13 registered food manufacturing firms within Nakuru County.

3.3 Population of the Study

Population refers to the individuals, entities, or items that share common characteristics of interest to the researcher (Chang, Van-Witteloostuijn, & Eden, 2020). The target population comprises individuals meeting specific criteria that align with the study's focal point. In this research, the target population comprised the registered manufacturing firms actively operating within Nakuru County. The study encompassed a comprehensive survey of all 13 manufacturing firms, specifically those engaged in food production; these firms constitute the primary unit of analysis. The 66 managers of these manufacturing firms formed the unit of observation. The managers were engaged due to their roles as strategic decision-makers, making them well-suited to possess the requisite information regarding business process re-engineering.

3.4 Sampling Procedure and Sample Size

Sample size refers to the number of people or entities that are included into a sample (Chang et al., 2020). The sample size depends on level of population variability. Smaller samples are preferred in highly homogenous population while large sample is required where the population is diverse. However, sampling was not done for the present study since the total target population was 66 as shown in Table 3.1, which was relatively small and manageable and thus census design was employed. Census design is a complete enumeration where data is obtained from every element of the population (Ragab & Arisha, 2018).It provided detailed information on all elements in the population.

Table 2

List of Food Manufacturing Firms in Nakuru County

Food Manufacturing Firms	Location	Number of Managers			Total
		Top Level	Middle Level	Lower Level	
1. Bahati Dairies	Bahati, Nakuru County	1	1	2	4
2. Bidco Elianto	Industrial Area, Nakuru County	1	2	3	6
3. Bunda Cakes & Feeds Ltd	Moses Mudavadi Road, Nakuru Municipality.	1	1	1	3
4. Delamere Dairy	Naivasha, Nakuru County.	1	1	2	4
5. East African Maltings Ltd	Molo	1	2	2	5
6. Guildford Dairy Institute	Egerton, Njoro	1	2	2	5
7. Happy Cow Ltd	Naka Estate, Along Oginga , Nakuru County	1	1	2	4
8. Keringet	Molo, Nakuru County	1	2	2	5
9. Kenlands Factory	Nakuru Municipality	1	1	1	3
10. Menengai Oil Refineries Ltd	Industrial Area, Nakuru County	2	3	3	8
11. Njoro Canning Factory (Kenya) Ltd	Njoro, Nakuru County	2	2	3	7
12. Unga Holdings Limited	Industrial Area, Nakuru County	1	2	2	5
13. Valley Confectionery Ltd	Langa Langa, Nakuru County	1	2	2	5
Total		16	22	28	66

Source: Kenya Association of Manufacturers Directory (2022)

3.5 Instrumentation

Instrumentation encompasses the tools employed in collection of data for research. It also includes development of suitable instruments and testing them for reliability and validity (Snyder, 2019).Questionnaires with structured and unstructured questions were used in data collection. The questionnaires fitted the present study since it was based on views of managers concerning business process re-engineering. Further, the questions provided efficient means of obtaining adequate information for the study.

3.5.1 Pilot Study

Pilot study is a preliminary study conducted before the main study to determine the reliability and validity of the data collection instrument (Ragab & Arisha, 2018). Pilot study was undertaken from 7 food manufacturing firms operating in Kiambu County, where 7 managers were involved in particular. 7 managers are approximately 10% of the total population (66) thus adequate for the preliminary study as contended by Hazzi and Maldaon (2015). Piloting was conducted in Kiambu County because it shares similar characteristics with Nakuru County, particularly in industrialization and food manufacturing.

3.5.2 Validity of the Study

Validity pertains to the instrument's capacity to effectively assess the intended measurement (Ragab & Arisha, 2018). To establish content and construct validity of the questionnaire, the researcher sought expert opinions from supervisors. The research supervisors meticulously examined the questionnaire to ensure that it adequately captured all pertinent aspects of the study's objectives, covering various dimensions such as business needs analysis, strategic cost analysis, integrated production technology, process optimization and production performance. Through iterative discussions and revisions, the redundancies in the questionnaire were addressed, thereby enhancing its clarity and relevance to the research context. Finally, the content validity of the questionnaire was established, affirming its suitability for data collection in the main study.

3.5.3 Reliability of the Study

Reliability determines the consistency of the data collection instrument (Kraus, Ribeiro-Soriano, & Schüssler, 2018). An instrument meets reliability requirements if it gives consistent results after being tested repeatedly under similar conditions. Reliability was determined through use of Cronbach alpha. The alpha values range from 0-1 and the threshold is α=0.7. If any variable fails to meet the threshold, the statements/questions are modified and adjusted to produce reliable results. Reliability test results are presented in Table 3.

Table 3

Reliability Test Results

Variables	Items Tested	Cronbach Alpha Value
Business Needs Analysis	5	0.781
Strategic Cost Analysis	5	0.822
Integrated Production Technology	5	0.766
Process Optimization	5	0.867
Production Performance	6	0.741

Based on the findings presented in Table 3, the business needs analysis had a Cronbach's alpha (α) of 0.781, surpassing the threshold of 0.7. This indicates strong consistency in statements concerning customer needs assessment, strategic alignment, and quality-based positioning. Similarly, the strategic cost analysis achieved a Cronbach's alpha of α=0.822, meeting the 0.7 threshold, affirming the reliability of statements related to production cost control, value chain analysis, and cost driver analysis. The reliability assessment for integrated production technology yielded a Cronbach's alpha of α=0.766, exceeding 0.7 and indicating consistency in statements regarding streamlined production systems, production scheduling, and time savings. The Cronbach's alpha value for process optimization was α=0.867, meeting the 0.7 threshold, which signifies the reliability of statements about process redesigning, process monitoring, and process automation. Additionally, for production performance, the Cronbach's alpha value was α=0.741, indicating consistency in statements concerning production performance indicators like cost, time, and quality. Overall, all variables demonstrated alpha values meeting the 0.7 threshold, confirming the questionnaire's reliability for data collection in the main study.

3.6 Data Collection Procedures

Data collection procedure is the process of obtaining data for research (Hazzi & Maldaon, 2015). Before commencement of data collection, the researcher obtained authorization letters from Kabarak University and National Commission for Science, Technology and Innovation (NACOSTI). The aforementioned letters, along with the introduction letter, were availed to the food manufacturing firms as part of the data collection process. The actual data collection employed the drop and pick technique, consisting of a two-step process. In the first step, the researcher physically distributed the questionnaires to the managers. After a three-week period, the researcher returned to collect the completed questionnaires. This approach provided respondents with flexibility in completing the questionnaires at their convenience, thereby reducing potential biases in the collected data.

3.7 Data Analysis and Presentation

Data analysis involves a systematic examination and interpretation of data with the aim of deriving insights and drawing conclusions pertinent to addressing the research problem (Ragab & Arisha, 2018). In this study, the researcher employed both descriptive and inferential methods of data analysis. Descriptive analysis is employed to provide summaries or descriptions of sample or dataset characteristics, encompassing statistics such as means, standard deviations, and percentages. Inferential statistics, on the other hand, encompass the array of statistical techniques used to draw conclusions regarding relationships between variables. For the context of this study, correlation and regression analysis were utilized as part of the inferential analysis. Statistical Packages for Social Sciences (SPSS) version 24 aided the data analysis. The regression model was as follows:

$$Y= \beta_0 + \beta_1X_1 + \beta_2X_2+ \beta_3X_3 + \beta_4X_4+\varepsilon$$

Where:

β_0 - Constant/autonomous variable.

β_1, β_2, β_3, β_4 - Beta coefficients of variables

X_1- Business Needs Analysis

X_2- Strategic Cost Analysis

X_3 - Integrated Production Technology

X_4 - Process Optimization

ε - Error of Margin

Diagnostic tests were conducted prior to regression analysis. They included normality test, linearity test, multicollinearity and homoscedasticity tests. The normality test examines whether the research data adheres to a normal distribution (Whang, 2019). This test holds crucial significance as numerous statistical procedures, such as correlation, regression, t-tests, and Analysis of Variance (ANOVA), hinge upon the assumption of normality, ensuring that subsequent analyses are grounded in sound statistical principles. In this study, where such statistical analyses played a fundamental role, the normality test was indispensable for the accurate and credible interpretation of the data. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests are utilized to evaluate the normality of a dataset. The Kolmogorov-Smirnov test, a non-parametric test, compares the sample's cumulative distribution function (CDF) to that of a theoretical normal distribution's CDF. Conversely, the Shapiro-Wilk test, more sensitive to deviations from normality in the center of the distribution and suitable for smaller sample sizes, calculates a test statistic based on observed data deviations from an anticipated normal distribution. Both tests operate under the null hypothesis of normality, with a low p-value indicating a significant deviation from a normal distribution, signaling non-normality. Regarding distributed data, significance lies beyond a 0.05 significance level.

The linearity diagnostic test, advocated by Chan and Tobias (2021), evaluates the validity and strength of multivariate techniques like correlation and regression. It examines whether the relationship between the outcome variable and the predictors adheres to a linear pattern, crucial for drawing meaningful and interpretable conclusions from the data. When the assumption of linearity is met and a linear relationship exists between independent and dependent variables, the significance value surpasses the 0.05 significance level. Multicollinearity, an essential diagnostic test within regression analysis explores interrelationships between independent variables in a model (Washington, Karlaftis, Mannering, & Anastasopoulos, 2020). This phenomenon, characterized by high correlations between independent variables, can significantly impact the reliability and interpretability of regression results. To address this, the Variance Inflation Factor (VIF) was employed to detect and mitigate multicollinearity, aiming to enhance the robustness of regression models. Homoscedasticity testing evaluates the consistency of residual variance across different variables (Barkhordar, Maleki, Khodadadi, Wraith, &Negahdari, 2022). Maintaining uniform variance across observed and predicted data is essential to ensure the reliability and validity of research findings, where non-uniform variance could compromise the study's accuracy and interpretability. For homoscedastic data, the significance value is above a 0.05 significance level.

3.8 Ethical Considerations

Ethical considerations are the principles that guide the conduct of a researcher (Bell, Bryman, & Harley, 2022). In the present study, the researcher was guided by the principles of respondent's confidentiality, voluntary participation, anonymity, and informed consent. The researcher upheld the confidentiality of research data collected from the participants. There was commitment to preserving shared information within a context of trust, with the understanding that it would remain confidential unless explicitly permitted otherwise. Additionally, a comprehensive process was introduced to ensure that all participants are informed about the study's subject matter and its exclusive academic intent, enabling them to decide whether to engage or partake in the research (Greener, 2022).The researcher further respected and protected the respondents by not revealing their identity and personal information. This anonymity protected participants' privacy.

The researcher expected minimal risks comprising the potential breaches of confidentiality and psychological discomfort. The researcher mitigated these risks by guaranteeing anonymity and confidentiality assurances to participants. The researcher implemented rigorous data validation checks to verify the accuracy of collected data. Additionally, standardized data collection procedures were employed to ensure both completeness and integrity throughout the data collection process. Data was handled and stored securely using encrypted systems with restricted access, and it will be retained for a period of one year. Only the researcher and the supervisors will have access to the collected data. The Principal Investigator (PI) plans to dispose of the data permanent deletion and the physical questionnaires will be discarded through shredding.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.1 Response Rate

The target population was 66 managers thus 66 questionnaires were prepared and distributed. Among these, 47 were completed and returned, yielding a response rate of 71.2%, considered adequate for the study.

4.2 Descriptive Statistics

The main objective of the study was to establish the effect of business process re-engineering on production performance of food manufacturing firms.

4.2.1 Descriptive for Business Needs Analysis

The first objective was to examine the effect of business need analysis on production performance of food manufacturing firms in Nakuru County. The descriptive research findings are presented in Table 4.

Table 4

Effect of Business Needs Analysis on Production Performance

	SA 5	A 4	N 3	D 2	SD 1	Mean	Std. Dev
	Percentage (%)						
Business needs analysis prioritizes process improvement initiatives.	31.9	46.8	17	4.3	0	4.06	0.818
Business needs analysis is essential for long-term viability of our firm.	38.3	48.9	4.3	6.4	2.1	4.15	0.932
Business needs analysis aligns business process re-engineering with overall business strategy.	31.9	46.8	12.8	6.4	2.1	4.00	0.956
Our products are positioned based on quality needs of the customers.	11.3	8.5	40.4	19.1	10.6	3.11	1.255
Business needs analysis has helped us to streamline operations and improve efficiency.	25.5	42.6	23.4	8.5	0	3.85	0.908
Average						3.83	

Key: 5 = Strongly Agree (SA), 4= Agree (A), 3 = Neutral (N), 2 = Disagree (D), 1 = Strongly Disagree (SD)

The descriptive findings in Table 4.1 show that 31.9% of the respondents strongly agreed while 46.8% also agreed, thus 78.7% at least agreed (Mean=4.06; Std. Dev.=0.818) that business needs analysis prioritizes process improvement initiatives. This underscores the importance of prioritizing process improvement initiatives, guided by business needs analysis, to elevate production performance in food manufacturing firms. Such efforts hold potential for enhancing efficiency, reducing costs, and ultimately enhancing the overall outcomes of the firms' production processes. 38.3% of the respondents strongly agreed (Mean=4.15; Std. Dev.=0.932) that business needs analysis is essential for the long-term viability of the food manufacturing firm. The finding emphasizes that integrating business needs analysis, a fundamental aspect of business process re-engineering is imperative for ensuring the long-term viability of food manufacturing firms. By incorporating this approach into their strategies, firms can adapt more effectively to market demands, optimize operations, and sustain competitiveness over time. Additionally, 31.9% of the respondents strongly agreed (Mean=4.00; Std. Dev.=0.956) that business needs analysis is aligned with overall business strategy. This implies that when business needs analysis is in harmony with the overarching business strategy, production performance improves.

Through this alignment, firms can streamline operations, enhance efficiency, and effectively achieve their strategic goals. However, 11.3% of the respondents strongly agreed but 40.4% had differing views (Mean=3.11; Std. Dev.=1.255) that their products are positioned based on the quality needs of the customers. Moreover, 68.1% of the respondents agreed that business needs analysis has helped us to streamline operations and improve efficiency. This finding means that business needs analysis helps food manufacturing firms identify and prioritize areas for improvement, allowing them to streamline operations by focusing resources where they are most needed. By understanding the specific requirements and goals of the business, firms can tailor their processes more effectively, leading to increased efficiency and optimized performance. The results are consistent with Njuguna and Wanjohi's (2021) research, which examined the effect of business process re-engineering on the performance of agro-processing firms in Nairobi City County.

The findings established that organizational restructuring within business process re-engineering influences agro-processing firms' performance. In this study, the focus on business process re-engineering, particularly business needs analysis affected food manufacturing firms’ production performance. Additionally, the findings of this study align with Febrianti and Herbert's (2022) research on the effect of business analysis on manufacturing SMEs' business performance in Indonesia. They indicated that business analysis affects the manufacturing SMEs' performance.

4.2.2 Descriptive for Strategic Cost Analysis

The second objective was to assess the effect of strategic cost analysis on production performance of food manufacturing firms in Nakuru County. Table 5 illustrates the descriptive research findings.

Table 5

Effect of Strategic Cost Analysis on Production Performance

	SA 5	A 4	N 3	D 2	SD 1	Mean	Std. Dev
	Percentage (%)						
Strategic cost analysis has improved resource prioritization in our firm.	38.3	17.0	34	4.3	6.4	3.77	1.202
Business process re-engineering enable organizations to reduce cost without compromising quality.	55.3	19.1	21.3	4.3	0	4.26	0.943
Value chain analysis has promoted customer value proposition in our firm.	19.1	31.9	40.4	8.5	0	3.62	0.898
Cost driver analysis has significantly contributed to cost reduction in our firm.	44.7	25.5	23.4	6.4	0	4.09	0.974
Redesigning enhances identification of new cost-saving opportunities.	36.2	40.4	21.3	2.1	0	4.11	0.814
Average						3.97	

Key: 5 = Strongly Agree (SA), 4= Agree (A), 3 = Neutral (N), 2 = Disagree (D), 1 = Strongly Disagree (SD)

As per the findings, 38.3% of the respondents agreed that strategic cost analysis has improved resource prioritization in manufacturing firms. Therefore, strategic cost analysis, as part of business process re-engineering, enhances resource prioritization within food manufacturing firms. It provides insights into cost structures and identifies areas where resources can be allocated more effectively. This enables these firms to optimize their production processes, leading to enhanced performance in terms of efficiency, quality, and overall profitability. Additionally, 55.3% of the respondents strongly agreed (Mean=4.26; Std. Dev.=0.943) that business process re-engineering enables organizations to reduce costs without compromising quality. This implies that BPR empowers food manufacturing firms to streamline operations, identifying and eliminating inefficiencies and redundancies that inflate costs. By optimizing workflows and resource allocation, firms can trim expenses while maintaining or even enhancing product quality, ensuring competitiveness in the market.

Furthermore, 31.9% of the respondents agreed that value chain analysis has promoted customer value propositions in food manufacturing firms. Value chain analysis bolsters customer value proposition in food manufacturing firms by identifying key areas where value can be added throughout the production process, and tailoring products and services to meet customer needs more effectively. By understanding and streamlining each stage of the value chain, firms enhance product quality and increase customer satisfaction. 44.7% of the respondents agreed (Mean=4.09; Std. Dev.=0.974) that cost driver analysis has significantly contributed to cost reduction in their respective manufacturing firms. Moreover, 76.6% of the respondents agreed (Mean=4.11; Std. Dev.=0.814) that redesigning enhances the identification of new cost-saving opportunities.

This is accomplished through systematic analysis and restructuring of current processes to eradicate inefficiencies and redundancies, enabling organizations to unveil concealed areas of waste or inefficiency, thus fostering more efficient cost-saving strategies. The findings relate to those of Mwangi's (2021) research on the impact of optimizing procurement costs on the performance of manufacturing firms in Kenya. Procurement costs, encompassing raw materials, components, and services, are integral to production expenses. The study's results demonstrated that the optimization of procurement costs influences the manufacturing firms' performance.

4.2.3 Descriptive for Integrated Production Technology

The third objective was to establish the effect of integrated production technology on production performance of food manufacturing firms in Nakuru County. Table 6 illustrates the descriptive research findings.

Table 6

Effect of Integrated Production Technology on Production Performance

	SA 5	A 4	N 3	D 2	SD 1	Mean	Std. Dev
	Percentage (%)						
Integrated production technology improves the efficiency and sustainability of production processes.	36.2	38.3	19.1	4.3	2.1	4.02	0.967
Our production processes are flexible and adapts to changing customer requirements.	25.5	17	23.4	17	17	3.17	1.434
Our firm maintains well streamlined production systems	21.3	17	27.7	19.1	14.9	3.11	1.355
Integrated production technology provide real-time monitoring of production optimizes and workflows.	46.8	29.8	14.9	6.4	2.1	4.13	1.035
Integrated production technology contributes to time savings and efficiency.	27.7	48.9	19.1	4.3	0	4.00	0.808
Average						3.69	

Key: 5 = Strongly Agree (SA), 4= Agree (A), 3 = Neutral (N), 2 = Disagree (D), 1 = Strongly Disagree (SD)

According to the findings, 74.5% of the respondents agreed (Mean=4.02; Std. Dev.=0.967) that integrated production technology improves the efficiency and sustainability of production processes. Integrated production technology improves production efficiency through streamlined workflows and optimized resource use, resulting in less waste and higher output. Additionally, it fosters sustainability by facilitating the adoption of eco-friendly practices, like energy conservation and waste reduction, across production processes.

However, 23.4% of the respondents had differing opinions (Mean=3.17; Std. Dev.=1.434) that their production processes are flexible and adapt to changing customer requirements. Similarly, 27.7% of the respondents were indifferent that food manufacturing firms maintain well-streamlined production systems. Additionally, 46.8% of the respondents strongly agreed (Mean=4.13; Std. Dev.=1.035) that integrated production technology provides real-time monitoring of production optimizes and workflows. Integrated production technology provides the ability to monitor production in real time, optimizing workflows for enhanced efficiency and performance.

Moreover, the respondents agreed (Mean=4.00; Std. Dev.=0.808) that integrated production technology contributes to time savings and efficiency. Integrated production technology enhances operational efficiency by automating processes and synchronizing workflows, leading to decreased downtime and improved productivity. This seamless integration fosters coordinated efforts across different production stages, reducing delays and maximizing resource utilization, thereby saving time and boosting overall productivity. The findings of this study are consistent with Gitau, Nzuki, and Musau's (2022) research, which investigated the influence of IT capability on the performance of manufacturing firms in Nairobi City County. Their findings demonstrated that IT capability affected the performance of manufacturing firms.

4.2.4 Descriptive for Process Optimization

The fourth objective was to establish the effect of process optimization on production performance of food manufacturing firms in Nakuru County. Table 7illustrates the descriptive research findings.

Table 7

Effect of Process Optimization on Production Performance

	SA 5	A 4	N 3	D 2	SD 1	Mean	Std. Dev
	Percentage (%)						
Process optimization maximizes productivity and minimizes the manufacturing costs.	46.8	25.5	23.4	4.3	0	4.15	0.932
Process redesigning leads to standardized manufacturing processes that reduce risks.	38.3	38.3	8.5	14.9	0	4.00	1.043
Our firm emphasize delivering value to customers through agile workflows.	27.7	12.8	23.4	14.9	21.3	3.11	1.507
Our firm has adopted Process automation which has increased productivity.	27.7	19.1	21.3	27.7	4.3	3.38	1.278
Process monitoring streamlines operations thereby enhancing product quality.	44.7	40.4	8.5	6.4	0	4.23	0.865
Average						3.77	

Key: 5 = Strongly Agree (SA), 4= Agree (A), 3 = Neutral (N), 2 = Disagree (D), 1 = Strongly Disagree (SD)

As per the findings, 46.8% of the respondents strongly agreed (Mean=4.15; Std. Dev.=0.932) that process optimization maximizes productivity and minimizes manufacturing costs. Process optimization boosts productivity by identifying and removing inefficiencies, streamlining workflows, and improving resource usage, resulting in higher output using fewer resources. This, in turn, reduces manufacturing costs by cutting waste, enhancing efficiency, and optimizing resource utilization, ultimately enhancing the overall cost-effectiveness of food manufacturing operations.38.3% of the respondents agreed (Mean=4.00; Std. Dev.=1.043) that process redesigning leads to standardized manufacturing processes that reduce risks. Process redesigning promotes standardized manufacturing processes, minimizing risks through the establishment of consistent procedures and protocols throughout operations.

This standardization improves predictability, quality control, and compliance, thereby lowering the probability of errors or deviations that may result in risks or inefficiencies. However, the respondents were indifferent (Mean=3.11; Std. Dev.=1.507) that manufacturing firms emphasize delivering value to customers through agile workflows. Additionally, 21.3% of the respondents were different and 27.7% disagreed (Mean=3.38; Std. Dev.=1.278) that their respective food manufacturing firms have adopted Process automation which has increased productivity. This means some firms have adopted process automation and others have not.

This may also suggest that others have adopted process automation and it has a small and moderate effect on production performance. Additionally, 44.7% of the respondents strongly agreed (Mean=4.23; Std. Dev.=0.865) that process monitoring streamlines operations thereby enhancing product quality. This means that process monitoring optimizes operations by consistently monitoring and analyzing production processes, promptly identifying potential issues in real time, enabling swift adjustments, and ultimately improving product quality through enhanced consistency and accuracy. This proactive methodology ensures timely mitigation of deviations from quality standards, minimizing defects, and optimizing production results. The results are consistent with the research by Kering, Kilika, and Njuguna (2020) on the operational processes and performance of small and medium-sized manufacturing firms in

Kenya. The findings showed that strategic processes and competitive priorities had a notable impact on firm performance.

4.2.5 Production Performance

The researcher also sought the views of the respondents pertaining to the performance of food manufacturing firms and the findings are presented in Table 8.

Table 8

Production Performance

	SA 5	A 4	N 3	D 2	SD 1	Mean	Std. Dev
	Percentage (%)						
Our operational efficiency has improved over the past five years.	55.3	25.5	8.5	6.4	4.3	4.21	1.122
We have incorporated business process re-engineering in our operational strategy.	14.9	36.2	17	25.5	6.4	3.28	1.192
Business process re-engineering improves process productivity.	44.7	40.4	12.8	2.1	0	4.28	0.772
Our profit levels have been on upward trend for the past five years.	38.3	36.2	8.5	12.8	4.3	3.91	1.176
The quality of our services meets the customer needs and expectations.	44.7	27.7	19.1	6.4	2.1	4.06	1.051
Business process re-engineering affect production performance.	55.3	31.9	8.5	4.3	0	4.38	0.822
Average						4.02	

Key: 5 = Strongly Agree (SA), 4= Agree (A), 3 = Neutral (N), 2 = Disagree (D), 1 = Strongly Disagree (SD)

The descriptive findings showed that 55.3% of the respondents strongly agreed (Mean=4.21; Std. Dev.=1.122) that their respective food manufacturing firms' operational efficiency has improved over the past five years. This implies that food manufacturing firms' ability can utilize resources and streamline processes to meet production goals. However, 17% of the respondents had differing views and 25.5% disagreed (Mean=3.28; Std. Dev.=1.192) that the food manufacturing firms have incorporated business process re-engineering in their operational strategy. It demonstrates partial incorporation of business process re-engineering in food manufacturing firms' operational strategy.

This may hinder production performance by failing to fully optimize processes, potentially leading to inefficiencies and suboptimal outcomes. Additionally, 85.1% of the respondents agreed (Mean=4.28; Std. Dev.=0.772) that business process re-engineering improves process productivity. Business process re-engineering boosts process productivity through the identification and elimination of inefficiencies, streamlining of workflows, and optimization of resource allocation, leading to heightened output and efficiency. 38.3% of the respondents agreed that food manufacturing firms' profit levels have been on an upward trend for the past five years. 44.7% of the respondents agreed (Mean=4.06; Std. Dev.=1.051) that the quality of their food manufacturing firms' services meets the customer's needs and expectations.

Moreover, 87.2% of the respondents agreed (Mean=4.38; Std. Dev.=0.822) that business process re-engineering affects production performance. The study's findings revealed that, business process re-engineering, incorporating elements such as business needs analysis, strategic cost analysis, integrated production technology, and process optimization, affects the production performance of food manufacturing firms. By systematically analyzing business needs and costs, integrating advanced production technology, and optimizing processes, these firms can enhance their production efficiency and effectiveness. This comprehensive approach to re-engineering processes results in improved productivity, reduced costs, and enhanced overall performance in food production operations. The findings of this study correspond with the research conducted by Kithinji, Rotich, and Kihara (2021) on the association between the implementation of a re-engineering strategy and manufacturing firms' performance. The findings demonstrated that adopting a re-engineering strategy affected performance. Additionally, the study aligns with the work of Ongeri, Magutu, and Litondo (2020) regarding the relationship between the business process re-engineering strategy and the performance of food manufacturing companies. Results showed that the performance of these firms was affected by business process re-engineering.

4.3 Diagnostic Test Results

The diagnostic tests included the normality, linearity, multicollinearity, and homoscedasticity tests.

4.3.1 Normality Test Results

Normality test was conducted to establish whether the data was normally distributed. The results are presented in Table 9.

Table 9

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Production Performance	.113	47	.172	.959	47	.102

a. Lilliefors Significance Correction

The findings revealed that significance value was 0.102 which was greater than 0.05. This means that the data was normally distributed. This led to more reliable and accurate estimates of coefficients and predictions. Additionally, normally distributed data allowed for better interpretation of statistical tests and confidence intervals, facilitating more robust conclusions about the relationships between variables.

4.3.2 Linearity Test Results

Linearity tests were conducted to determine the linear relationships between the predators and the response variable. Findings are shown in Tables 10, 11, 12, and 13.

Table 10

Linearity between Business Needs Analysis and Production Performance

			Sum of Squares	df	Mean Square	F	Sig.
Production Performance * Business Needs Analysis	Between Groups	(Combined)	5.036	8	.629	13.466	.000
		Linearity	4.705	1	4.705	100.660	.000
		Deviation from Linearity	.330	7	.047	1.009	.440
	Within Groups		1.776	38	.047		
	Total		6.812	46			

The findings indicated that the significance value was 0.440. This was greater than 5% significance level thus a linear relationship existed between the business needs analysis and production performance. This made it easier to interpret the effect of predictors on the response. Moreover, a linear relationship simplified the estimation of regression coefficients, enhancing model interpretability.

Table 11

Linearity between Strategic Cost Analysis and Production Performance

			Sum of Squares	df	Mean Square	F	Sig.
Production Performance * Strategic Cost Analysis	Between Groups	(Combined)	3.203	11	.291	2.824	.010
		Linearity	1.123	1	1.123	10.890	.002
		Deviation from Linearity	2.080	10	.208	2.017	.061
	Within Groups		3.609	35	.103		
	Total		6.812	46			

According to the results, with a p-value of 0.061 exceeding the significance threshold of 0.05, it was indicated that a linear relationship exists between strategic cost analysis and production performance. This was crucial as it enabled the regression model to effectively capture the association between these variables. This facilitated accurate estimation of regression parameters and improving the reliability of the model's predictions.

Table 12

Linearity between Integrated Production Technology and Production Performance

			Sum of Squares	df	Mean Square	F	Sig.
Production Performance * Integrated Production Technology	Between Groups	(Combined)	3.893	14	.278	3.048	.004
		Linearity	3.360	1	3.360	36.830	.000
		Deviation from Linearity	.533	13	.041	.450	.937
	Within Groups		2.919	32	.091		
	Total		6.812	46			

The results outlined a significance value of 0.937, surpassing the 5% significance level, indicating the presence of a linear relationship between integrated production technology and production performance. This facilitated the interpretation of the effect of the independent variable on the dependent variable. Furthermore, a linear relationship streamlined the estimation of regression coefficients, thereby improving the interpretability of the model.

Table 13

Linearity between Process Optimization and Production Performance

			Sum of Squares	df	Mean Square	F	Sig.
Production Performance * Process Optimization	Between Groups	(Combined)	3.378	15	.225	2.033	.047
		Linearity	1.897	1	1.897	17.127	.000
		Deviation from Linearity	1.481	14	.106	.955	.517
	Within Groups		3.434	31	.111		
	Total		6.812	46			

Based on the findings, since the p-value of 0.517 exceeds the significance threshold of 0.05, it suggests the presence of a linear relationship between process optimization and production performance. This finding is pivotal as it allowed the regression model to adequately capture the connection between process optimization and production performance. This enhanced the accuracy of regression parameter estimation and improved the reliability of the model's predictions.

4.3.3 Multicollinearity Test Results

Multicollinearity was undertaken to establish correlations between the independent variables. Findings are presented in Table 14.

Table 14

Multicollinearity Test Results

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Business Needs Analysis	.625	1.599
	Strategic Cost Analysis	.912	1.097
	Integrated Production Technology	.685	1.459
	Process Optimization	.821	1.217

a. Dependent Variable: Production Performance

The findings described that the VIF values were 1.599, 1.097, 1.459 and 1.217 for business needs analysis, strategic cost analysis, integrated production technology, and process optimization respectively. All the values were within the range of 1-10 VIF values which meant that there was no multicollinearity.

4.3.4 Homoscedasticity Test Results

Homoscedasticity test was conducted to establish the homogeneity of residuals. Findings are presented in Table 15.

Table 15

Homoscedasticity Test Results

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.294	.139		2.114	.040
	Business Needs Analysis	-.056	.041	-.242	-1.372	.177
	Strategic Cost Analysis	.037	.022	.246	1.680	.100
	Integrated Production Technology	.002	.019	.016	.093	.926
	Process Optimization	-.030	.017	-.273	-1.772	.084

a. Dependent Variable: Production Performance

The findings indicated that the significance values were 0.177, 0.100, 0.926 and 0.084 for business needs analysis, strategic cost analysis, integrated production technology, and process optimization respectively. All the values are more than the 5% significance level. The result implies that there was no heteroscedasticity problem with the data set. As such, the residuals were constant across the variables. This was crucial as it upheld the statistical assumption essential for regression analysis that data was homoscedastic. The regression coefficients were unbiased and consistent, while standard errors were dependable, which facilitated valid hypothesis testing.

4.4 Correlation Analysis

The correlation analysis examined the intensity and direction of associations between the study variables, quantifying how variations in one variable corresponded with changes in another, thereby providing insights into possible connections. The results are presented in Table 16.

Table 16

Correlations Matrix

		Production Performance	Business Needs Analysis	Strategic Cost Analysis	Integrated Production Technology	Process Optimization
Production Performance	Pearson Correlation	1				
	Sig. (2-tailed)					
	N	47				
Business Needs Analysis	Pearson Correlation	.831**	1			
	Sig. (2-tailed)	.000				
	N	47	47			
Strategic Cost Analysis	Pearson Correlation	.406**	.217	1		
	Sig. (2-tailed)	.005	.143			
	N	47	47	47		
Integrated Production Technology	Pearson Correlation	.702**	.555**	.193	1	
	Sig. (2-tailed)	.000	.000	.194		
	N	47	47	47	47	
Process Optimization	Pearson Correlation	.528**	.382**	.257	.250	1
	Sig. (2-tailed)	.002	.008	.082	.090	
	N	47	47	47	47	47

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

The findings indicated a strong and positive correlation (r=0.831**; p=0.000) between business needs analysis and production performance. The positive correlation implies that enhancement in business needs analysis led to enhanced production performance. As such, business needs analysis components comprising customer needs assessment, strategic alignment, and quality-based positioning affect the production performance. The findings align with the study conducted by Njuguna and Wanjohi (2021), focusing on the effect of business process re-engineering on the performance of agro-processing firms in Nairobi City County. Their research revealed a significant correlation between organizational restructuring as part of business process re-engineering and the performance of agro-processing firms.

The results also showed a positive and moderate correlation (r=0.406**; p=0.005) between the strategic cost analysis and production performance. This shows that components comprising production cost control, value chain analysis, and cost driver analysis affect production performance. The implications are that enhancement of strategic cost analysis contributes to improved production performance among food manufacturing firms. The findings are in agreement with Mwangi's (2021) research into the effects of optimizing procurement costs on the performance of manufacturing firms. A significant correlation was established between the optimization of procurement costs and the performance of manufacturing firms.

Furthermore, the results indicated a strong and positive correlation (r=0.702**; p=0.000) between integrated production technology and production performance in food manufacturing firms. This means that the components of a streamlined production system, production planning and time savings have influenced production performance. Therefore, improvements in integrated production technology are associated with increased production efficiency among food manufacturing firms. The results concur with the study by Gitau, Nzuki, and Musau (2022), who examined the impact of IT capability on the performance of manufacturing firms in Nairobi City County. Their findings indicated a significant correlation between IT capability and the performance of manufacturing firms.

Moreover, the results revealed a moderate and positive relationship (r=0.528**; p=0.002) between process optimization and production performance within food manufacturing firms. It demonstrates that elements encompassing process redesigning, process monitoring, and process automation affected production performance. Consequently, improvements in process optimization can be linked to enhancements in production performance in terms of quality and cost aspects. The results are consistent with the research by Kering, Kilika, and Njuguna (2020) on the operational processes and performance of small and medium-sized manufacturing firms in Kenya. The findings established a significant relationship between strategic processes and the firm performance. The overall correlation analysis findings indicated a relationship between business process re-engineering and production performance, which implies that the food manufacturing firms' production performance is affected by business process re-engineering. The study's findings align with the findings of Ongeri, Magutu, and Litondo (2020), who established a significant association between the business process re-engineering strategy and the performance of food manufacturing companies. In particular, the findings established that elements such as analytical processes selection, BPR prototypes, and management of re-engineered processes affected performance.

4.5 Regression Analysis

Linear regression assumes a linear relationship between the dependent variable and independent variables, normality and constant variance of residuals (homoscedasticity), and no perfect multicollinearity among predictors, ensuring unique contribution of each variable. Diagnostic test results indicated normal distribution of data, a linear relationship between each predictor and the response variable, absence of multicollinearity, and homoscedasticity in the data. Both Simple linear regression and multiple regression analysis were carried out.

4.5.1 Business Needs Analysis and Production Performance

Regression analysis was conducted to predict the production performance from the changes in business needs analysis within the realm of business process re-engineering. Findings are presented in Tables 17, 18 and 19.

Table 17

Model Summary for Business Needs Analysis and Production Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.831[a]	.691	.684	.21637

a. Predictors: (Constant), Business Needs Analysis

As per the results, a correlation coefficient of R = 0.831 indicated a strong relationship between business needs analysis and production performance. Furthermore, with a coefficient of determination of $R^2 = 0.691$, it was found that business needs analysis explained 69.1% of the variability in production performance. Thus, business needs analysis significantly affected production performance through aspects such as customer needs assessment, strategic alignment, and quality-focused positioning within the framework of business process re-engineering.

Table 18

ANOVA for Business Needs Analysis and Production Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.705	1	4.705	100.512	.000[b]
	Residual	2.107	45	.047		
	Total	6.812	46			

a. Dependent Variable: Production Performance

b. Predictors: (Constant), Business Needs Analysis

Based on the Analysis of Variance (ANOVA) results, the significant F value (F = 100.512, p = 0.000) indicated strong model fitness in establishing the relationship between business needs analysis and production performance. Overall, the findings underscored that production performance is notably influenced by business needs analysis.

Table 19

Regression Coefficients[a] for Business Needs Analysis and Production Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.892	.314		2.845	.007
	Business Needs Analysis	.816	.081	.831	10.026	.000

a. Dependent Variable: Production Performance

In the regression analysis model $Y = \beta_0 + \beta_1 X_1 + \varepsilon$, the interpretation was $Y = 0.892 + 0.816X_1 + \varepsilon$. The beta coefficient $\beta_1 = 0.816$ suggests that one-unit change in business needs analysis results in a 0.816-unit change in production performance for food manufacturing firms. The significant t-value ($t = 10.026$; $p = 0.000$) at a 95% confidence level indicates a significant relationship between business needs analysis and production performance, demonstrating that business needs analysis significantly affects the production performance of food manufacturing firms.

4.5.2 Strategic Cost Analysis and Production Performance

Regression analysis was performed to predict the production performance based on variations in strategic cost analysis. The results are detailed in Tables 20, 21, and 22.

Table 20

Model Summary for Strategic Cost Analysis and Production Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.406[a]	.165	.146	.35556

a. Predictors: (Constant), Strategic Cost Analysis

Based on the findings, a correlation coefficient of R=0.406 demonstrated an association between strategic cost analysis and production performance. Additionally, the coefficient of determination (R^2=0.165) revealed that strategic cost analysis accounted for 16.5% of the variation in production performance. Therefore, strategic cost analysis was found to have a significant effect on production performance.

Table 21

ANOVA[a] for Strategic Cost Analysis and Production Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.123	1	1.123	8.882	.005[b]
	Residual	5.689	45	.126		
	Total	6.812	46			

a. Dependent Variable: Production Performance

b. Predictors: (Constant), Strategic Cost Analysis

According to the results of the Analysis of Variance (ANOVA), the significant F value (F = 8.882, p = 0.005) indicated that the model effectively establishes the relationship between strategic cost analysis and production performance. Overall, these findings highlight the significant effect of strategic cost analysis on production performance.

Table 22

Regression Coefficientsa for Strategic Cost Analysis and Production Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.002	.346		8.673	.000
	Strategic Cost Analysis	.257	.086	.406	2.980	.005

a. Dependent Variable: Production Performance

The regression model $Y = \beta_0 + \beta_2 X_2 + \varepsilon$ was interpreted as $Y = 3.002 + 0.257X_2 + \varepsilon$. Here, the beta coefficient β_1=0.257 indicates that one-unit change in strategic cost analysis contributes to a 0.257-unit change in production performance among food manufacturing firms. The significant t-value ($t = 2.980$; $p = 0.005$) at a 95% confidence level highlights a significant relationship between strategic cost analysis and production performance, underscoring its significant effect on food manufacturing firms' production performance.

4.5.3 Integrated Production Technology and Production Performance

Regression analysis was conducted to predict production performance based on changes in integrated production technology. The detailed results can be found in Tables 23, 24, and 25.

Table 23

Model Summary for Integrated Production Technology and Production Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.702[a]	.493	.482	.27698

a. Predictors: (Constant), Integrated Production Technology

The model summary reveals high correlation coefficient (R) of 0.702 and a coefficient of determination (R^2) of 0.493, indicating that 49.3% of the variation in production performance was attributable to the integrated production technology. The findings highlight the substantial effect of integrated production technology on enhancing production performance within food manufacturing firms.

Table 24

ANOVA[a] for Integrated Production Technology and Production Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.360	1	3.360	43.794	.000[b]
	Residual	3.452	45	.077		
	Total	6.812	46			

a. Dependent Variable: Production Performance

b. Predictors: (Constant), Integrated Production Technology

The Analysis of Variance (ANOVA) results showed a significant F-value of 43.794 (p=0.000), confirming the overall model's fitness. This highlights the critical role of integrated production technology in affecting and enhancing production performance in food manufacturing firms.

Table 25

Regression Coefficients[a] for Integrated Production Technology and Production Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.773	.193		14.367	.000
	Integrated Production Technology	.339	.051	.702	6.618	.000

a. Dependent Variable: Production Performance

The regression model used was $Y = \beta_0 + \beta_3X_3 + \varepsilon$, with the coefficients interpreted as $Y = 2.773 + 0.339X_3 + \varepsilon$. This indicates that one-unit change in integrated production technology leads to a 0.339-unit change in production performance. The t-value (t=6.618, p=0.000) was significant at 95% confidence level. The results shows that production performance in food manufacturing firms is significantly affected by integrated production technology.

4.5.4 Process Optimization and Production Performance

A regression analysis was undertaken to predict production performance based on variations in process optimization. The findings are presented in Tables 26, 27, and 28.

Table 26

Model Summary for Process Optimization and Production Performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.528[a]	.279	.262	.33048

a. Predictors: (Constant), Process Optimization

The model summary shows a high correlation coefficient (R) of 0.528 and a coefficient of determination (R^2) of 0.279, indicating that process optimization accounts for 27.9% of the variation in production performance. These findings underscore the significant effect of process optimization on improving production performance in food manufacturing firms.

Table 27

ANOVA[a] for Process Optimization and Production Performance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.897	1	1.897	17.372	.000[b]
	Residual	4.915	45	.109		
	Total	6.812	46			

a. Dependent Variable: Production Performance

b. Predictors: (Constant), Process Optimization

The Analysis of Variance (ANOVA) results revealed a significant F-value of 17.372 (p=0.000), validating the overall model's fitness. This emphasizes the essential role of process optimization in impacting and improving production performance in food manufacturing firms.

Table 28

Regression Coefficients[a] for Process Optimization and Production Performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.098	.227		13.671	.000
	Process Optimization	.245	.059	.528	4.168	.000

a. Dependent Variable: Production Performance

The regression model applied was $Y=\beta_0 + \beta_4X_4 + \varepsilon$, with the coefficients interpreted as $Y= 3.098 + 0.245X_4 + \varepsilon$. This signifies that one-unit change in process optimization results in a 0.245-unit change in production performance. The t-value of 4.168 was significant (p=0.000) at the 95% confidence level. These results indicate that process optimization significantly affects production performance in food manufacturing firms.

4.6 Multiple Linear Regression Analysis

The regression analysis was conducted to predict production performance from changes in the business process re-engineering. The results are presented in Tables 29, 30, and 31.

Table 29

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.921[a]	.849	.834	.15665

a. Predictors: (Constant), Process Optimization, Integrated Production Technology, Strategic Cost Analysis, Business Needs Analysis

The model summary reveals high correlation coefficient (R) of 0.921 and a coefficient of determination (R^2) of 0.849, indicating that 84.9% of the variation in production performance was attributable to the business process re-engineering components. These encompass process optimization, integrated production technology, strategic cost analysis, and business needs analysis. The findings highlight the substantial effect of business process re-engineering on enhancing production performance within food manufacturing firms. They underscore the importance of strategically managing costs, adopting advanced technologies, and optimizing processes to achieve operational improvements, competitiveness in the industry and production performance.

Table 30

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.781	4	1.445	58.896	.000[b]
	Residual	1.031	42	.025		
	Total	6.812	46			

a. Dependent Variable: Production Performance

b. Predictors: (Constant), Process Optimization, Integrated Production Technology, Strategic Cost Analysis, Business Needs Analysis

The analysis of variance (ANOVA) results revealed a highly significant F-value of 58.896 (p=0.000), indicating that the overall model fitness involving business needs analysis, strategic cost analysis, integrated production technology, and process optimization. This underscores the importance of BPR collectively in affecting and improving the operational performance within the food manufacturing firms.

Table 31

Regression Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.631	.252		2.505	.016
	Business Needs Analysis	.531	.075	.541	7.125	.000
	Strategic Cost Analysis	.112	.040	.177	2.816	.007
	Integrated Production Technology	.154	.035	.319	4.398	.000
	Process Optimization	.091	.031	.196	2.958	.005

a. Dependent Variable: Production Performance

The regression model applied was represented as $Y= \beta_0 + \beta_1X_1 + \beta_2X_2+ \beta_3X_3 + \beta_4X_4 + \varepsilon$, with the coefficients interpreted as $Y= \beta_0 + 0.531X_1 + 0.112X_2 + 0.154X_3 + 0.091X_4 + \varepsilon$. This shows that a one-unit change in business needs analysis resulted in a 0.531-unit change in production performance, while a one-unit change in strategic cost analysis and integrated production technology led to 0.112 unit and 0.154-unit changes in production performance, respectively. Additionally, a one-unit change in process optimization led to a 0.091-unit shift in production performance. The findings imply that the food manufacturing firms' production performance is dependent on business process re-engineering.

4.7 Hypotheses Testing

The hypotheses were tested and conclusions drawn based on the regression coefficients. The first null hypothesis was **$H0_1$**: Business needs analysis has no statistically significant effect on production performance of food manufacturing firms in Nakuru County. Based on the results, the significant t-value of 7.125 (p=0.000) at a 95% confidence level implies a relationship between business needs analysis and food manufacturing firms' performance. This resulted in the rejection of the first null hypothesis. Therefore, it was concluded that business needs analysis affects food manufacturing firms' production performance. The second null hypothesis was **$H0_2$:** Strategic cost analysis has no statistically significant effect on production performance of food manufacturing firms in Nakuru County. According to the results, the t value of 2.816 was statistically significant (p=0.007) at the 95% confidence level. This means that the relationship between strategic cost analysis and the performance of food manufacturing firms was significant.

Therefore, the second null hypothesis was rejected, leading to the conclusion that the strategic cost analysis of food manufacturing companies affects production performance. The third null hypothesis was **$H0_3$:** Integrated production technology has no statistically significant effect on production performance of food manufacturing firms in Nakuru County. According to the findings, the t-value of 4.398 was statistically significant (p=0.000), indicating a significant relationship between integrated production technology and production performance. The rejection of the third null hypothesis led to the conclusion that integrated production technology affects production performance. The fourth null hypothesis was **$H0_4$:** Process optimization has no statistically significant effect on production performance of food manufacturing firms in Nakuru County. The results indicated a statistically significant t-value of 2.958 (p=0.005) at a 95% confidence level, demonstrating the significance of the relationship between process optimization and production performance. This led to the rejection of the fourth null hypothesis, ultimately concluding that process optimization impacted the production performance of food manufacturing firms.

Hypothesis testing was carried out using the regression coefficients presented in Table 32.

Table 32

Hypotheses Testing

Hypotheses	Regression Coefficients	Reject	Fail to reject
$H0_1$: Business needs analysis has no statistically significant effect on production performance of food manufacturing firms in Nakuru County.	$\beta_1 = 0.531$ t=7.125 $p=0.000<0.05$	√	
$H0_2$: Strategic cost analysis has no statistically significant effect on production performance of food manufacturing firms in Nakuru County.	$\beta_2 = 0.112$ t=2.816 $p=0.007<0.05$	√	
$H0_3$: Integrated production technology has no statistically significant effect on production performance of food manufacturing firms in Nakuru County.	$\beta_3 = 0.154$ t=4.398 $p=0.000<0.05$	√	
$H0_4$: Process optimization has no statistically significant effect on production performance of food manufacturing firms in Nakuru County.	$\beta_4 = 0.091$ t=2.958 $p=0.005<0.05$	√	

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

This section presents the summary of findings on the effect of business process re-engineering encompassing business needs analysis, strategic cost analysis, integrated production technology and process optimization on production performance.

5.1.1 Business Needs Analysis and Production Performance

The descriptive findings established that business needs analysis in the realm of business process re-engineering affects the food manufacturing firms' production performance. Therefore, the prioritization of process improvement initiatives through business needs analysis is essential for the firms. Such efforts hold potential for enhancing efficiency, reducing costs, and ultimately improving the overall outcomes of the firms' production processes. As per the findings, business needs analysis also determines the long-term viability of food manufacturing firms.

This emphasizes that the integration of business needs analysis into overall strategy is imperative for ensuring the long-term viability of food manufacturing firms. Through this integration, firms can adapt more effectively to market demands, optimize operations, and sustain competitiveness over time. Moreover, understanding of specific requirements and goals of the business, enables them to tailor their processes more effectively, leading to increased efficiency and optimized performance. Both correlation and regression analysis established a significant relationship between business needs analysis and the production performance of food manufacturing firms. As such, the food manufacturing firms' production performance is dependent on the business needs analysis under the business process re-engineering.

The study hypothesized that business needs analysis does not significantly affect the production performance of food manufacturing firms in Nakuru County. However, the results showed a significant t-value of 7.125 (p=0.000) at a 95% confidence level, indicating a relationship between business needs analysis and production performance. Consequently, the null hypothesis was rejected, leading to the conclusion that business needs analysis does indeed affect the production performance of these firms.

5.1.2 Strategic Cost Analysis and Production Performance

The findings revealed that business process re-engineering, particularly strategic cost analysis, impacts production performance. Consequently, it enables these firms to optimize production processes, leading to enhanced efficiency, quality, and overall profitability. Additionally, business process re-engineering allows organizations to trim costs without compromising quality, empowering food manufacturing firms to streamline operations and eliminate inefficiencies. By optimizing workflows and resource allocation, firms can reduce expenses while maintaining or enhancing product quality, ensuring competitiveness. Furthermore, value chain analysis has bolstered customer value propositions in food manufacturing firms by identifying areas for value addition throughout the production process and tailoring products and services to meet customer needs effectively.

Similarly, the cost driver analysis significantly contributes to cost reduction in their respective manufacturing firms. Correlation results indicated a positive and significant association between the strategic cost analysis and production performance at a 1% significance level. The implication of the result is that strategic cost analysis affects production performance. Additionally, regression analysis results demonstrated a significant relationship between strategic cost analysis and production performance.

The study hypothesized that strategic cost analysis does not significantly affect the production performance of food manufacturing firms in Nakuru County. However, the results revealed a statistically significant t-value of 2.816 (p=0.007) at a 95% confidence level, indicating a significant relationship between strategic cost analysis and production performance. Consequently, the null hypothesis was rejected, concluding that strategic cost analysis affects the production performance of these firms.

5.1.3 Integrated Production Technology and Production Performance

Findings established that integrated production technology optimizes workflows and resource utilization, reducing waste and increasing output efficiency. Furthermore, it promotes sustainability by facilitating the adoption of eco-friendly practices such as energy conservation and waste reduction throughout production processes. Real-time monitoring capabilities of integrated production technology enable the optimization of workflows for enhanced efficiency and performance. Additionally, integrated production technology contributes to time savings and efficiency gains.

By automating processes and synchronizing workflows, integrated production technology enhances operational efficiency, leading to reduced downtime and increased productivity. This seamless integration fosters coordination across various production stages, minimizing delays and maximizing resource utilization, ultimately saving time and enhancing production performance. Both correlation and regression analyses revealed a significant relationship between integrated production technology and the food manufacturing firms’ production performance. The third null hypothesis posited that integrated production technology does not significantly affect the production performance of food manufacturing firms in Nakuru County.

The findings, however, showed a statistically significant t-value of 4.398 (p=0.000), indicating a significant relationship between integrated production technology and production performance. As a result, the third null hypothesis was rejected, leading to the conclusion that integrated production technology affects production performance.

5.1.4 Process Optimization and Production Performance

Descriptive findings established that process optimization affects the manufacturing firms' production performance. In particular, process optimization enhances productivity by identifying and eliminating inefficiencies, streamlining workflows. This reduces manufacturing costs through waste reduction, thereby increasing efficiency, and ultimately improving the overall production performance. Additionally, process redesigning fosters standardized manufacturing processes, reducing risks by establishing consistent procedures and protocols across operations. This standardization enhances predictability, quality control, and compliance, thereby reducing the likelihood of errors or deviations that could lead to risks or inefficiencies.

Furthermore, process monitoring optimizes operations by continuously monitoring and analyzing production processes, promptly identifying potential issues in real-time, facilitating swift adjustments, and ultimately enhancing product quality. Similarly, correlation results indicated a positive and significant association between process optimization and production performance at a 1% significance level. The finding implies that process optimization affects production performance. Regression analysis results also indicated a significant relationship between process optimization and production performance. The fourth null hypothesis stated that process optimization does not significantly affect the production performance of food manufacturing firms in Nakuru County.

The results revealed a statistically significant t-value of 2.958 (p=0.005) at a 95% confidence level, indicating a significant relationship between process optimization and production performance. This led to the rejection of the fourth null hypothesis, concluding that process optimization impacts the production performance of these firms.

5.2 Conclusions

Conclusions were made based on the summary of the major findings of the study.In conclusion, business needs analysis within business process re-engineering on the food manufacturing firms' production performance. Customer needs assessment ensures that production processes align with consumer demands, enhancing customer satisfaction and loyalty. In particular, strategic alignment ensures that business objectives are integrated into production strategies, optimizing resource allocation and operational efficiency. Furthermore, quality-based positioning emphasizes the importance of maintaining high standards throughout production, leading to improved product quality. Collectively, business needs analysis contributes to enhancing production performance by aligning processes with market demands, organizational goals, and quality standards, ultimately ensuring competitiveness and sustainability.

The study concluded that strategic cost analysis within business process re-engineering is vital effectively managing production costs. Production cost control ensures efficient allocation of resources, minimizing wastage and optimizing expenditure to enhance production performance. Value chain analysis identifies areas where value can be added throughout the production process, optimizing operations and maximizing value for the organization. Additionally, cost driver analysis facilitates a deeper understanding of the factors influencing production costs, enabling targeted cost reduction strategies. Strategic cost analysis enables businesses to streamline operations, improve efficiency, and maintain competitiveness in the market by effectively managing and controlling production costs.

In conclusion, the streamlined production systems optimize workflows and resource utilization, reducing waste and enhancing efficiency throughout the production process. Production Scheduling enables better coordination and synchronization of tasks, minimizing downtime and maximizing productivity. Time Savings are achieved through automation and real-time monitoring, allowing for swift adjustments and improvements. As such, integrated production technology contributes to enhanced operational efficiency, reduced costs, and improved overall performance.

The study also concluded that process redesigning facilitates the streamlining and standardization of manufacturing processes, minimizing inefficiencies and enhancing operational effectiveness. Process monitoring enables continuous oversight and analysis of production processes, facilitating prompt identification of potential issues and opportunities for improvement. Process automation enhances efficiency and reduces human error by automating repetitive tasks, thereby improving productivity and resource utilization. Overall, process optimization contributes to increased efficiency and improved production performance.

5.3 Recommendations

The policy recommendations and recommendations have been outlined in this section.

5.3.1 Policy Recommendations

Food manufacturing firms currently prioritize the adoption of technology and modern production techniques in their operational policies. However, these policies often operate independently and are inadequately aligned with key aspects of business process re-engineering such as conducting thorough business needs analysis, strategic cost analysis, integrating advanced production technologies, and optimizing operational processes. While there is a strong focus on leveraging technology to improve efficiency and product quality, specific initiatives often lack integration with comprehensive BPR strategies. This disconnect hinders the firms' ability to strategically align technological investments with broader organizational goals, thereby limiting their potential to achieve significant operational enhancements and production performance.

The current study recommends that food manufacturing firms should conduct thorough analyses of customer needs and industry trends to better align production processes with consumer preferences. This can involve market research to gain insights into evolving customer expectations and tailor production strategies accordingly. By understanding and addressing customer needs effectively, food manufacturing firms can optimize their product offerings and enhance customer satisfaction, ultimately leading to improved production performance.

The study recommends that food manufacturing firms should scrutinize production costs by conducting value chain analyses, and identifying key cost drivers to optimize resource allocation and minimize wastage. By strategically managing costs and maximizing operational efficiency, food manufacturing firms can enhance their competitiveness and production performance while maintaining product quality.

It is recommended that food manufacturing firms should embrace advanced technologies to streamline operations and enhance productivity. Investing in automation and data-driven analytics can optimize production workflows, reduce cycle times, and improve resource utilization.

It is recommended that food manufacturing firms should focus more on continuous process improvement initiatives to enhance efficiency and flexibility in production operations. This should encompass regular evaluation and refining of production processes, leveraging tools such as lean manufacturing principles and Six Sigma methodologies to identify and eliminate bottlenecks, redundancies, and non-value-added activities. By optimizing processes for agility, responsiveness, and quality, food manufacturing firms can improve the overall production performance.

The findings can be effectively applied in food manufacturing through several strategic initiatives designed to boost production performance. Initially, firms should conduct a thorough business needs analysis to identify market demands, customer preferences, and existing inefficiencies, utilizing methods such as surveys and market research to ensure operations align with actual market needs. Following this, a strategic cost analysis should be performed to evaluate the cost structure of production processes, allowing firms to identify potential savings while preserving product quality, often through techniques like activity-based costing to eliminate non-value-adding activities. Moreover, integrating advanced production technologies such as automation and data analytics can significantly enhance operational efficiency; automation reduces manual errors and accelerates production cycles, while data analytics provides real-time insights that support quick adjustments and informed decision-making, including predictive maintenance to reduce downtime. Finally, implementing process optimization techniques like Six Sigma and Lean Manufacturing fosters a culture of continuous improvement by focusing on waste reduction, streamlining processes, and enhancing quality control. By regularly evaluating workflows and encouraging employee involvement in problem-solving, firms can drive innovation and adaptability, leading to greater efficiency, lower operational costs, improved product quality, and increased customer satisfaction in a competitive market.

5.3.2 Recommendations for Further Research

Other researchers should examine the integration of sustainability principles into business process re-engineering strategies within manufacturing firms. They should assess how initiatives such as eco-friendly production methods, and waste reduction strategies contribute to production performance improvement. Research should also be extended to explore the applicability and effectiveness of business process re-engineering in various industry sectors beyond manufacturing. Other authors should further examine how the principles and methodologies of process re-engineering can be adapted and tailored to sectors such as healthcare, finance, and service industries to enhance operational efficiency and performance.

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APPENDICES

Appendix I: Introductory Letter

Dear Sir / Madam,

Re: Permission to Collect Data for Academic Research

I am Janet Mueni, currently enrolled in the Master of Business Administration program with a specialization in Strategic Management at Kabarak University. I am embarking on a research endeavor titled *"Effect of Business Process Re-engineering Strategies on Production Performance of Food Manufacturing Firms in Nakuru County, Kenya."* You have been identified as a respondent for this study. The intention of this letter is to seek your consent for data collection. Please note that the data collected is solely intended for academic purposes and will be treated with the utmost confidentiality.

Yours Faithfully,

Janet Mueni

Appendix II: Research Questionnaire

Please provide information by ticking {√} appropriately in the spaces provided. The obtained information will be used only for academic purposes. The researcher will ensure your privacy and confidentiality. Thank you. Please indicate your level of agreement regarding the statements on business needs analysis:

Key: 5 = Strongly Agree (SA), 4= Agree (A), 3 = Neutral (N), 2 = Disagree (D), 1 = Strongly Disagree (SD)

Section I: Business Needs Analysis

Business Needs Analysis	**SA** **5**	**A** **4**	**N** **3**	**D** **2**	**SD** **1**
Business needs analysis prioritizes process improvement initiatives.					
Business needs analysis is essential for long-term viability of our firm.					
Business needs analysis aligns business process re-engineering are aligned with overall business strategy.					
The products are positioned based on quality needs of the customers.					
Business needs analysis has helped us to streamline operations and improve efficiency.					

Section II: Strategic Cost Analysis

Strategic Cost Analysis	**SA 5**	**A 4**	**N 3**	**D 2**	**SD 1**
Strategic cost analysis has improved resource prioritization in our firm.					
Business process re-engineering enable organizations to reduce cost without compromising quality.					
Value chain analysis has promoted customer value proposition in our firm.					
Cost driver analysis has significantly contributed to cost reduction in our firm.					
Redesigning enhances identification of new cost-saving opportunities.					

Section III: Integrated Production Technology

Strategic Networks	**SA** **5**	**A** **4**	**N** **3**	**D** **2**	**SD** **1**
Integrated production technology improves the efficiency and sustainability of production processes.					
Our production processes are flexible and adapts to changing customer requirements.					
Our firm maintains well streamlined production systems.					
Integrated production technology provide real-time monitoring of production optimizes and workflows.					
Integrated production technology contributes to time savings and efficiency.					

Section IV: Process Optimization

Process Optimization	**SA** **5**	**A** **4**	**N** **3**	**D** **2**	**SD** **1**
Process optimization maximizes productivity and minimizes the manufacturing costs.					
Process redesigning leads to standardized manufacturing processes that reduce risks.					
Our firm emphasizes on delivering value to customers through agile workflows.					
Our firm has adopted Process automation which has increased productivity.					
Process monitoring streamlines operations thereby enhancing product quality.					

Section V: Production Performance

Production Performance	**SA 5**	**A 4**	**N 3**	**D 2**	**SD 1**
Our operational efficiency has improved over the past five years.					
We have incorporated business process re-engineering in our operational strategy.					
Business process re-engineering improves process productivity.					
Our profit levels have been on upward trend for the past five years.					
The quality of our services meets the customer needs and expectations.					
Business process re-engineering affect production performance.					

Thank You for Your Time and Cooperation

Appendix III: KUREC Clearance Letter

KABARAK UNIVERSITY RESEARCH ETHICS COMMITTEE

Private Bag - 20157
KABARAK, KENYA
Email: kurec@kabarak.ac.ke

Tel: 254-51-343234/5
Fax: 254-051-343529
www.kabarak.ac.ke

OUR REF: KABU01/KUREC/001//14/02/24

Date: 27th Feb 2024

MUTUA JANET MUENI
Kabarak University
Reg. No: GMB/NE/0143/01/22

Dear Janet,

RE: EFFECT OF BUSINESS PROCESS RE-ENGINEERING STRATEGY ON PRODUCTION PERFORMANCE OF FOOD MANUFACTURING FIRMS IN NAKURU COUNTY, KENYA.

This is to inform you that ***KUREC*** has reviewed and approved your above research proposal. Your application approval number is ***KUREC-140224.*** The approval period is 27***/02/2024 – 26/02/ 2025.***
This approval is subject to compliance with the following requirements:

i. All researchers shall obtain an introduction letter to NACOSTI from the relevant head of institutions (Institute of postgraduate, School dean or Directorate of research)
ii. The researcher shall further obtain a RESEARCH PERMIT from NACOSTI before commencement of data collection & submit a copy of the permit to **KUREC.**
iii. Only approved documents including (informed consents, study instruments, MTA Material Transfer Agreement) will be used.
iv. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***KUREC***:
v. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***KUREC*** within 72 hours of notification.
vi. Any changes anticipated or otherwise that may increase the risk(s) or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to ***KUREC*** within 72 hours.
vii. Clearance for export of biological specimens must be obtained from relevant institutions and submit a copy of the permit to KUREC.
viii. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
ix. Submission of an executive summary report within 90 days upon completion of the study to ***KUREC***

Sincerely,

KABARAK UNIVERSITY
INSTITUTIONAL RESEARCH ETHICS COMMITTEE
28 FEB 2024
APPROVED
P. O. PRIVATE BAG - 20157, KABARAK

Prof. Jackson Kitetu PhD.
KUREC-Chairman

Cc Vice Chancellor
DVC-Academic & Research
Registrar-Academic & Research
Director-Research Innovation & Outreach
Institute of Post Graduate Studies

As members of Kabarak University family, we purpose at all times and in all places, to set apart in one's heart, Jesus as Lord. (1 Peter 3:15)
Kabarak University is ISO 9001:2015 Certified

Appendix IV: NACOSTI Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **482078**

Date of Issue: **12/March/2024**

RESEARCH LICENSE

This is to Certify that Ms.. janet mueni mutua of Kabarak University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nakuru on the topic: EFFECT OF BUSINESS PROCESS RE-ENGINEERING STRATEGY ON PRODUCTION PERFORMANCE OF FOOD MANUFACTURING FIRMS IN NAKURU COUNTY, KENYA for the period ending : 12/March/2025.

License No: **NACOSTI/P/24/33796**

482078

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

Appendix V: Evidence of Conference Participation

Certificate of Participation

This is to certify that

Mutua Janet Mueni

Participated in the Education Management Society of Kenya (EMSK) 10th International Research Conference Held in Collaboration with the Kenya Highlands University and the Education and Social Sciences Research Association of Kenya (ESSRAK) on Thursday 3rd & Friday 4th OCTOBER, 2024. The Theme of the Conference was: ***Innovating the Future: Reshaping Education and Social Sciences Research for a Transformative World***

She Presented a Paper Entitled: ***EFFECT OF PROCESS OPTIMIZATION ON THE PRODUCTION PERFORMANCE OF FOOD MANUFACTURING FIRMS IN NAKURU COUNTY, KENYA***

Dr. Eliud Nyakundi
Chair- EMSK

Prof. Henry Onderi
Chair- Conference Committee

Appendix VIII: List of Publication

The Strategic JOURNAL of Business & Change MANAGEMENT
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EFFECT OF PROCESS OPTIMIZATION ON PRODUCTION PERFORMANCE OF FOOD MANUFACTURING FIRMS IN NAKURU COUNTY, KENYA

[1] Mutua Janet Mueni, [2] Mong'are Omare & [3] Gibson Gitachu

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ABSTRACT

*Food manufacturing firms in Kenya are currently contending with inefficient processes that have caused a rise in production costs. The current study assessed the effect of process optimization within business process re-engineering on the production performance of food manufacturing firms in Nakuru County, Kenya. The study was anchored on absorptive capacity theory. A correlational research design was adopted. The study's target population was the 13 food manufacturing firms in Nakuru County. Data was collected by questionnaire and analyzed through descriptive and inferential statistical methods. Statistical Packages for Social Sciences (SPSS) aided data analysis. According to the descriptive findings, the manufacturing firms' production performance was affected by the process optimization. As per the correlation analysis results, the correlation coefficient was (r=0.528**; p=0.000). This implies a significant relationship, hence process optimization affects production performance. The regression analysis findings revealed R-squared value of 0.279, indicating that 27.9% of the variability in production performance was explained by process optimization. In conclusion, the process optimization streamlines manufacturing activities and enhances operational efficiency. The study recommends that food manufacturing firms integrate process optimization into their overarching operational strategy. The study provides valuable insights into enhancing manufacturing processes for improved production efficiency. It contributes to academic understanding and offers practical solutions for optimizing performance in the manufacturing industry.*

Key Words: *Process Optimization, Business Process Re-engineering, Production Performance, Food Manufacturing Firms*

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