Effect of production process capabilities on supply chain performance of sugar manufacturing firms in western region, Kenya

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ABSTRACT

Supply chain performance refers to the ability of an extended supply chain to meet end-customer demands through responsive inventory and capacity management, timely delivery, and product availability. This study examined the effect of production process capabilities on supply chain performance. The study was anchored on the Dynamic Capabilities Theory. A descriptive survey research design was employed, targeting four sugar manufacturing firms with a total population of 281 respondents. A sample size of 165 was selected from a population of 281 using purposive and simple random sampling techniques. Data was collected using structured questionnaires. A pilot study conducted at Kibos Sugar Company in Kisumu County tested the reliability and validity of the research instruments. Reliability was confirmed with Cronbach's alpha coefficients of 0.7 and above, while validity was ensured through expert reviews. Data analysis involved descriptive statistics (frequencies, percentages, means, and SDs) and inferential statistics, including linear, multiple, and hierarchical regression analysis. The findings revealed that production process capabilities ($r = 0.525$, $R^2 = 0.276$, $p = 0.000$) had a significant positive effect on supply chain performance. It is evident that production process capabilities had a significant positive influence on the supply chain performance of sugar manufacturing companies since they have a significant impact on the outcomes attained. These results implied that supply chain performance was higher for sugar manufacturing companies with more robust production process capabilities. The study recommends that sugar manufacturing firms streamline production cycles.

Keywords: Production Process Capabilities, Supply Chain Performance, Sugar Firms, Western Region, Kenya

I. INTRODUCTION

Production process capabilities are becoming known worldwide as one of the most important sources of supply chain performance (SCP) in the rapidly competitive and integrated markets. These strengths comprising of process control, manufacturing efficiency, flexibility and technological competence help firms to achieve a consistent response to quality, cost and delivery requirements (Schönsleben, 2018). Powerful production processes will increase coordination among supply chain operations, which will boost responsiveness, dependability, and customer value.

However, research over the years and especially in advanced economies has demonstrated that, firms whose capabilities in production processes are well established are better positioning themselves in achieving high levels of SCP, by cutting down the cost of operation, lead times as well as accuracy of delivery. In the contemporary supply chains, however, internal production efficiency is not enough (Noneng *et al*., (2023) The companies need to coordinate between their suppliers, distributors and production processes to be able to maintain smooth material flows, good capacity utilization, and better performance measures like inventory turnover and order delivery rates.

The positive correlation between capabilities in production processes and the results of the supply chain is evidenced by the global contexts. Asian studies have shown that process capability, flexibility, and information integration are the key factors to improving supply chain integration and competitiveness (Wu et al., 2015; Nimmy et al., 2019). However, the results are still also inconsistent across the industries and regions implying that the efficiency of production process capabilities depends on the circumstances of management approaches, the use of technology, and the state of the markets.

Weak production capabilities and use of outdated technology and infrastructural constraints have remained a major challenge to manufacturing companies in Africa in regard to the supply chain. The research conducted in nations like South Africa and Ghana suggests that when there is better planning of production, control of process as well as coordination of operations, the supply chain efficiency can be greatly improved and the performance of the organization will be enhanced (Muller & Ndlovu, 2023 Adelwini *et al*. (2023). In spite of these revelations, the high cost of production and the poor quality of output remains a major challenge to many African industries.

The sugar industry in Kenya, which is mainly concentrated in the Western Region, is critical to the economy of Kenya with ineffective production processes, outdated infrastructure and lack of coordination of the supply chain. Constant production shortages and losses point to the necessity to have greater capabilities of the production processes to enhance SCP (Njeru & Omwenga, 2021). Though the available research literature recognizes this relationship, little empirical research has focused on the same based on the sugar industry in Kenya, especially when management style moderation is considered. This paper thus aims at filling this gap by looking at how production process capabilities influence the performance of supply chain of sugar manufacturing companies in Western Kenya.

1.1 Statement of the Problem

Sugar manufacturing business in the Western Region of Kenya is one of the crucial economic players in the economic sector in terms of provision of employment, and generating revenue and rural development. Nonetheless, the industry has been facing poor performance in its supply chains because of lack of capabilities in the production processes including inefficient production planning, high frequency of process breakdowns, poor quality control, and low application of contemporary technologies (Mutuku *et al*., 2018). The effects of these challenges have been increased cost in operations, delays in production, poor and inconsistent quality of products, and failure to react favorably to the market demand.

According to reports by World Bank in 2016, the lack of growth in Kenya in the manufacturing industry is partly due to the inefficiency in production process and unstable management practices. These weaknesses in the sugar sub-sector have caused loss of competitiveness, market share within the East African Community as well as recurrent supply chain disruptions. The sugar manufacturing companies in Western Kenya especially have difficulty in ensuring that production patterns are in tandem with demands of the supply chains in the business with resulting in supply chain imbalances and delays.

Whereas past research has been conducted into the supply chain performance of different industries, little has been done to the impact of production process capability on the supply chain performance of the sugar manufacturing industry in Western Kenya. Also, the mediating power of the management style in this relationship has not been fully studied. This paper is thus aimed at filling this gap by analyzing the role of production process capabilities in supply chain performance with management style taken as a moderating factor.

1.2 Research Objectives

The objective of this study was to determine the effect of production process capabilities on SCP of sugar manufacturing firms in Western Region, Kenya.

1.3 Research Hypothesis

$H0_1$: There is no significant effect of production process capabilities on SCP of sugar manufacturing firms in Western Region, Kenya.

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Dynamic Capabilities Theory

Dynamic Capability Theory (DCT) was initially proposed by Penrose (1959), is a direct extension of the Resource-Based View in that it brings in the aspect of time-based renewal, creation, and reconfiguring of resources by firms to suit changing environments. Dynamic capabilities are focused on the capability of an organization to incorporate both internal and external resources to adapt successfully to uncertainty in the market as well as improve performance.

Dynamic capabilities in the sugar industry allow companies to diversify and innovate using the by-products like molasses, bagasse and press mud to make ethanol, electricity, cardboard and other value-added products to increase profitability and market share. In spite of the mentioned strengths, DCT has some drawbacks such as conceptual ambiguity, operational difficulties, and little empirical grounds to make causal inference. The theory is specifically applicable in analyzing the capabilities of the production processes and how this impact on supply chain performance (SCP) (Bleady et al., 2018).Through DCT application in production processes, companies can also be able to increase the flexibility, innovation, learning and allocation of resources, resulting in better coordination, efficiency, quality and on time delivery in the supply chains.

In general, DCT is a valuable conceptual framework that helps to gain insight into the way in which flexible and innovative production operations enhance the work of supply chains and competitive advantage in the context of the sugar manufacturing industry, which is dynamic and uncertain in Western Kenya.

2.2 Empirical Review

Process capability is the capability of the firm to perform production and logistic activities in a way that is consistent and efficient so as to minimize costs, standardization of work and attainment of customer specifications. It also focuses on stability of the process, repetitiveness, and conformance with set standards, which is an objective metric of how the production processes meet quality and service expectations (Liu & Luo, 2012).

Empirical studies point to the strategic value of the capabilities that are related to production in propelling firm performance. Csiki et al. (2023) proved that production dynamic capabilities and production ordinary capabilities have a different but important impact on the formation of shop-floor practices, including the adoption of Industry 4.0 and lean production, and both types of capabilities directly affect the performance of the firm. Nevertheless, their research failed to associate these abilities with the performance of the supply chains and was carried out in a different manufacturing environment to sugar companies in western Kenya.

Equally, Sousa *et al*.. (2018) discovered that good practices in production and operations management have positive effect on the financial performance of the organizations, especially through supply chain integration. Their results indicate that it is of high significance to match the internal production processes with the larger supply chain systems, even though the research was conducted in the country of Jordan and did not concentrate on the sugar industry situation.

In terms of the strategic capabilities, Adebanjo et al.. (2018) defined the positive relationships between innovative process and product capabilities, manufacturing performance, and supply chain integration. Based on the resource-based view and the institutional theory, their study revealed that the efficiency and competitiveness are improved with better process innovation. However, the research was on the capability development, but did not directly look at the outcome of the performance in the supply chain.

Continuous monitoring of process capability is also supported by the quality and process control studies. As Sousa et al.. 2018) found, the lack of regular review of the processes capabilities may result in the increased variability and inefficiencies in the long run, despite the seemingly good quality of production at the beginning. Their results put emphasis on the need to have quality control mechanisms that are continuously maintained to maintain operational effectiveness.

Process capability, as revealed by Liu and Luo (2012), was found the most significant process logistics capability of influence on firm performance in the context of logistics and manufacturing over the other two dimensions of flexibility and information integration. Although flexibility and information integration positively contributed to competitive advantage, process competence directly affected overall organizational performance the most, which supports the importance of a stable and efficient process.

The Kenyan based research gives more support to the correlation between process capability and supply chain results. Mutuku et al…, (2018) and Kimwaki et al.., (2022) have discovered that operational processes, technology integration, and process competency are connected positively to supply chain and organizational performance in manufacturing companies. These results indicate that process capability is a vital area that improves performance of supply chains, but there is limited evidence in the sector, especially in the sugar industry of Western Kenya

III. METHODOLOGY

3.1 Study Area

The research was based on the Western Region of Kenya, that is, Bungoma and Kakamega counties, because of the presence of a large number of sugar firms. The companies targeted were four large companies which included Mumias, Nzoia, West Kenya and Butali Sugar Companies. The fertile soils and agreeable weather in the region have made it a sugarcane producing area. This study sought to find out the effect of logistic capabilities and management style on Supply Chain Performance (SCP) among these companies as a gap in existing research. The area was also convenient in data collection as access to sugar firms and diversity were available.

3.2 Research Design

Descriptive survey design was used to study the relationship between Production process capabilities and supply chain performance (SCP) in Western Kenya's sugar manufacturing firms. The goal was to describe the situation without altering conditions, providing a snapshot of the population's characteristics, trends, and demographics. This design allowed for a systematic description of existing conditions, identifying patterns and relationships, and analyzing the moderating effect of management style.

3.3 Target Population

The study population comprised staff drawn from four sugar manufacturing companies, namely Mumias Sugar, Nzoia Sugar, West Kenya Sugar, and Batali Sugar Company, covering procurement, finance, and marketing and

logistics departments. In each company, the procurement function consisted of one procurement manager, one procurement sectional head, and between nine and twelve procurement staff, yielding a total of 42 procurement staff across all firms. The finance department in each company was represented by one finance manager, one sectional head, and between seven and ten finance staff, resulting in an overall total of 34 finance staff. Similarly, the marketing and logistics function in each company included one logistics manager, one logistics sectional head, and between 42 and 48 marketing and logistics staff per firm. Overall, the study targeted a total population of 281 respondents, comprising 4 procurement managers, 4 procurement sectional heads, 42 procurement staff, 4 finance managers, 4 finance sectional heads, 34 finance staff, 4 logistics managers, 4 logistics sectional heads, and 186 marketing and logistics staff across the four sugar companies.

3.4 Sample Size and Sampling Procedures

The study used purposive sampling to select respondents with relevant information, and simple random sampling to choose employees from each department, ensuring no bias and equal participation. The sample size was determined using Yamanes' (1967) formula, aiming for efficiency, representativeness, reliability, and adaptability.
The sample was 165 respondents and Table 1 below shows the distribution of the sample sizes from various companies.

Table1

Sample Distribution

Company	Population	Sample size
Mumias Sugar	72	42
Nzoia Sugar	75	44
West Kenya	66	39
Butali Sugar Company	68	40
Total	**281**	**165**

3.5 Data Collection Instruments

Primary data was collected through standardized questionnaires containing both open and closed-ended questions. This relates to the data collection tools and the process by which they were developed. A questionnaire included a list of unstructured questions, structured questions, and Likert rating scales relevant to the topic of study, as well as space for respondents' exploratory answers and choice selection. The Likert scale was set at 5 = SA, 4 = A, 3 = N, 2 = D, and 1 = SD. Closed-ended questions were useful in collecting viable quantitative data, however open-ended questions allow respondents to provide in-depth responses and the freedom of responding queries. There were five sections in the questionnaire. Information pertaining to personal data was included in Section A, and data regarding the effects of logistic capabilities on SCP in relation to the four objectives was included in Sections B through F. Drop and pick were used to administer the questionnaires.

3.6 Reliability

Reliability assesses the extent to which the results obtained from a sample can be replicated. The point at which a testing device consistently generates accurate findings or records after multiple trials. If a scholar conducts a test on an issue twice and obtains the same scores on both administrations, then the tool is deemed accurate (Mugenda & Mugenda, 2003).

The internal consistency of the research instruments was assessed by computing Cronbach's alpha using data from the pilot study. Kothari (2007) suggested that a reliability coefficient of 0.7 was deemed acceptable. Cronbach's alpha scores of are classified as outstanding, good, acceptable, poor, and unacceptable. If the instrument exhibits poor reliability, individual items within the scale must be re-evaluated and modified or replaced entirely as necessary.

3.7 Validity

First, using a pilot study and the content validity through the expert opinion approach, the investigation determined whether the research instruments are valid. The designated research supervisors were contacted to examine and clarify the validity of the research instruments in light of the expert opinion. The supervisor's advice assisted the researcher in evaluating the validity of the study tools. The guidance containing recommendations, explanations, and further information. The required adjustments were made using these ideas to see if the outcomes would hold true over time.

3.8 Data Analysis

Data analysis involves examining, purifying, converting, and modelling data to find and emphasize relevant information, draw conclusions, and offer decision-making assistance. Subsequently, the data collected for the study

were classified, organized into tables, and grouped together. The primary data was modified by carefully examining the acquired raw data for any errors or omissions and making the necessary corrections. This necessitated a comprehensive analysis of the filled questionnaires. Subsequently, the responses were assigned numerical values to encode the data and limit it to a finite number of categories or classifications. The data was presented using tables. The data analysis was performed in alignment with the research purpose. Several statistical tests rely on certain assumptions on the distribution and quality of the data. One of the crucial requirements that data must adhere to is:

3.9 Descriptive Statistics

Essentially, this showcased the pattern in the fundamental data. The researcher utilized descriptive statistics, including measures of variability, central tendency (mean and SD), maximum and minimum values. Descriptive statistics were used to create measures and indices that summarize the collected data in a concise manner (Kothari, 2007). The interviews were analyzed using a thematic analysis approach to examine qualitative data. The qualitative data was systematically arranged and prepared for theme analysis. This was crucial in the quantification of independent variables. The data was displayed in tabular format.

Inferential Statistics: Model 1: A Simple linear regression model was constructed:

$Y = B_o + \beta_1 X_1 + \varepsilon$……(i)

Where;

Y = SCP

B_o = Constant

β_1 = Coefficients

X_1 = Production process capabilities

ε = Error Term

3.10 Ethical Considerations

Ethical considerations were prioritized to ensure the study's integrity and respect for participants. Measures included protecting participant privacy, maintaining confidentiality, obtaining informed consent, minimizing harm, and ensuring transparency and fairness. The researcher also ensured proper citation to avoid plagiarism, upholding academic honesty.

IV. FINDINGS & DISCUSSION

4.1 Response Rate

A total of 165 questionnaires were sent for data collection, of which 140 were completed and returned. The response rate was 84.85%, suggesting a conducive environment for the generalizability of the research findings to a wider community. The achieved response rate of 84.85% in this study is considered good, as it above the 60% threshold.

Table 3

Response Rate

State of Response	Frequency	Percentage
Response	140	84.85
Non response	25	15.15
Total	**165**	**100.00**

4.2 Analysis of Descriptive Data

The data are descriptive and originate from the summation of responses to structured inquiries regarding the impact of logistic capabilities on the SCP of sugar production enterprises in the Western Region.

4.2.1 Production Process Capabilities

There are descriptive statistics on the extent to which production process capabilities determines SCP of sugar manufacturing firms in Western Region, Kenya as summarized in Table 4.

Table 4

Descriptive Statistics: Production Process Capabilities

Statement	5	4	3	2	1	Mean	SD.
The firm has reduced the set-up time between the production of one item to another part to ensure continuous availability of products to clients	5.7 (8)	38.6 (54)	44.3 (62)	8.6 (12)	2.9 (4)	3.36	0.83
The firm practices product customization by allowing customers to provide unique features like colour, design and packages relating to their orders	8.6 (12)	27.1 (38)	47.1 (66)	11.4 (16)	5.7 (8)	3.21	0.96
Our firm can effectively simplify the logistics processes related to manufacturing, material handling, shipment and delivery	14.3 (20)	44.3 (62)	34.3 (48)	0 (0)	7.1 (10)	3.59	0.99
The firm has the capability to quickly scale up production when demand increases	5.7 (8)	38.6 (54)	45.7 (64)	5.7 (8)	4.3 (6)	3.36	0.85
The firm has achieved the minimum of its total costs through effective operations and technology	2.9 (4)	40 (56)	45.7 (64)	7.1 (10)	4.3 (6)	3.30	0.82

The results show that there is moderate agreement (Mean = 3.36; SD = 0.83) that the company has reduced set up time between production runs. This finding is consistent with that of Csiki et al. (2023), who underscore the fact that the minimization of set-up time is one of the fundamental operational capacities that support manufacturing flexibility and responsiveness. In their analysis, they are able to show that companies that have implemented lean production methods especially Single Minute Exchange of Die (SMED) processes are more likely to have a favourable flow of production and enhanced availability of products.

Nonetheless, such a large percentage of respondents who responded with moderate agreement (44.3%) indicates that, despite the efforts to reduce set-up time, the effect is not yet well maximized or even experienced equally in all operations. This partially supports the findings that Liu and Luo (2012) recorded that the benefits of operational flexibility are often incremental and not instantaneous with respect to performance especially when a firm is shifting to advanced operational practices.

The findings of the survey indicate that there is a moderate agreement (Mean = 3.21; SD = 0.96) as to whether or not the firm engages in product customization. This can be compared to Sousa et al. (2018), who state that mass customization can increase customer value in case of the effective use of flexible manufacturing systems and combined information technologies. The relatively large dispersion (SD = 0.96) suggests that the perception of the customization capabilities is variable, which might indicate the uneven integration of the product lines of the customization process.

On the same note, Liu and Luo (2012) argue that customization plays an important role in creating customer satisfaction, although it can create complexity in operations when not facilitated by effective coordination systems. The results thus imply that customization may exist but the system or process may still limit its operational implementation.

The greatest degree of consensus among the respondents was noted to be depending on streamlining logistics processes (Mean = 3.59; SD = 0.99). This result reinforced the arguments by Csiki et al. (2023) who emphasize that logistics integration of manufacturing, material handling, and distribution is a key factor to improve the performance and efficiency of operations.

Additionally, Rahim et al. (2020) state that digitisation of logistics, as well as coordinated supply chain operations, minimise lead times and redundancies in operations. The mean score is quite large, which implies that the logistics optimization can be among the most developed operational opportunities of the firm that can be used to provide better services and manage costs.

Rapidness in production that the firm exhibited when demand increased generated an average amount of agreement (Mean = 3.36; SD = 0.85). This is consistent with Liu and Luo (2012) who established that capacity planning, the coordination of suppliers, and the ability to flex the workforce are of critical importance with regards to the scalability of production.

Although the results show that the company does have a certain degree of responsiveness to the external environment, the prevalence of moderate concurrence indicates that scaling can be limited by capacity constraints or resource inflexibility, as Csiki et al. (2023) warn that flexibility capabilities need to be reinforced continuously in order to maintain responsiveness in volatile markets.

Lastly, the findings indicate moderate consensus that the company realizes minimum total costs by having efficient operations and technology (Mean = 3.30; SD = 0.82). This fact is consistent with Noneng et al. (2023), who claim that the efficiency of the integration of technologies and the efficiency of the processes are essential factors that lead to the decrease of costs, though the influence depends on how well the technology and the operational strategy are aligned.

In line with Liu and Luo (2012), the results indicate that cost efficiency is not entirely a technological adoption process that is dependent on process coordination and organizational learning, which could be the reason why a large number of respondents were found to be neutral.

Overall, the results show that the company has mediocre to high operational strengths especially in streamlining of logistics where other strength areas, including set-up time reduction, customization, scalability and cost minimization are partially developed. These findings support the previous research by Csiki et al. (2023) and Liu and Luo (2012), which note that operational excellence is not a one-time affair but an ongoing process that must be invested in terms of process integration, flexibility and technology alignment.

4.2.2 Supply Chain Performance

The study sought to gather descriptive statistics on the SCP of sugar manufacturing firms in Western Region, Kenya as summarized in Table 5.

Table 5

Supply Chain Performance

Statement	5	4	3	2	1	Mean	S.D
The firm has shortened the lead time period between placement of an order and delivery of the same to clients	1.4 (2)	70 (98)	28.6 (40)	0 (0)	0 (0)	3.73	0.48
The firm has efficient delivery means that ensure faster movement of goods to final destinations	2.9 (4)	65.7 (92)	31.4 (44)	0 (0)	0 (0)	3.71	0.51
The firm's production systems have reduced on the average time it takes to process raw materials into completed end-products	2.9 (4)	50 (70)	47.1 (66)	0 (0)	0 (0)	3.56	0.555
The firm has ensured strict adherence to the degree to which an order's specifications match the original order request from a client without any deviations	10 (14)	55.7 (78)	31.4 (44)	0 (0)	2.9 (4)	3.70	0.77
The firm has improved on required adherence standards of companies in relation to relevant laws, regulations and industry standards regarding to product and process qualities	10 (14)	55.7 (78)	31.4 (44)	0 (0)	2.9 (4)	3.70	0.77

The results of the current study to a great extent support previous empirical data that can be found in studies by Mutuku et al. (2018) and Kimwaki et al. (2022) concerning the impact of operational efficiency and process integration on the outcome of the performance of firms, in terms of shorter lead time, effective delivery, efficiency of the production cycle, and ensuring quality compliance.

To begin with, the overlaying effect of concurrence (mean = 3.73; SD = 0.48) that the company has successfully managed to decrease the lead time between order placement and delivery is consistent with Mutuku et al. (2018), who concluded that the organization of supply chains and processes automation can greatly decrease the order fulfillment period in industrial manufacturing companies. On the same note, Kimwaki et al. (2022) discovered that companies investing in responsive logistics systems and demand-driven planning have shorter lead times and better customer satisfaction. The small standard deviation in the current study indicates that there is some commonality in the perception of the respondents thereby validating the argument that the two studies put forward that lead time reduction is a direct result of productive operational practices.

Secondly, the unanimous agreement on the effective delivery methods of the firm (mean = 3.71; SD = 0.50) is correlated with the results of Kimwaki et al. (2022), who found that the efficiency of the distribution strategies and optimization of the transport systems promotes the speed and reliability of the product delivery. Similarly, Mutuku et al. (2018) highlighted that integrated delivery systems minimize transit delays and logistical inefficiencies and allow the goods to arrive at final destinations on time. The average consensus of few respondents also indicates the transitional quality of improved delivery systems that are observed in both investigations wherein improvements are not made immediately, but gradually.

In reference to the production systems, the results (mean = 3.56; SD = 0.555) indicate that the company has achieved moderately success in the time taken to transform the raw materials to the final products. This finding is reflective of Mutuku et al. (2018), who stated that the decrease in the production cycle time is typically slow and relies on the degree to which the technological equipment is utilized and the workflow is streamlined. Conversely, Kimwaki et al. (2022) hold that companies that have developed lean manufacturing operations are more likely to record a more significant decrease in processing duration. The mean score in this study is relatively low and thus could be a sign of partial adoption of such production efficiencies.

Moreover, the strong values of the consistency in following the order specifications (mean = 3.70; SD = 0.77) corroborate Kimwaki et al. (2022), who concluded that the quality of conformance and deviation of the customer

requirements are enhanced by the process standardization and quality control mechanisms. On the same note, Mutuku et al. (2018) realized that adherence to customer specification builds trust and relationship with clients on long term basis. The minor percentage of disagreement in the present study indicates that there are isolated inconsistencies, which is agreeable in both studies as being prevalent in times of operational adaptation.

Lastly, the results of enhanced compliance with legal, regulatory, and industry quality standards (mean = 3.70; SD = 0.77) found a lot of reflection in the work by Mutuku et al. (2018), who state that the compliance with the quality standards is one of the major predictors of operational maturity and competitiveness. Kimwaki et al. (2022) also argue that adherence to regulatory and industry standards increases the reliability of the process and credibility in the market. The consensus among respondents of the present study is so strong thus validating the claim by both research that quality compliance is part of sustainable operational performances.

In general, the findings of the current research align with the empirical data provided by Mutuku et al. (2018) and Kimwaki et al. (2022) and support the argument that efficient operational systems, including logistics, production, and quality management, play an important role in efficiency, responsiveness, and compliance in organizational performance.

4.3 Linear Regression Analyses

To assess the effect of production process capabilities on supply chain performance of sugar manufacturing firms in Western Region, Kenya, a regression analysis was conducted. Findings as shown in Table 6.

Table 6

Production Process Capabilities on Supply Chain Performance

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.525[a]	.276	.271	.74135	.276	52.626	1	138	.000

a. Predictors: (Constant), Production Process Capabilities

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.923	1	28.923	52.626	.000[b]
	Residual	75.846	138	.550		
	Total	104.769	139			

a. Dependent Variable: Supply Chain Performance
b. Predictors: (Constant), Production Process Capabilities

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.372	.431		.864	.389
	Production Process Capabilities	.876	.121	.525	7.254	.000

a. Dependent Variable: Supply Chain Performance

There is a link between production process capabilities and supply chain performance of sugar manufacturing firms in Western Region, Kenya as shown by the R value of 0.525 in the model summary tabulation. As a consequence, a rise in production process capabilities should lead to supply chain performance. The R square, or coefficient of determination, demonstrates that production process capabilities account for 27.6% of the variance in supply chain performance (R^2=0.276). This suggests that production process capabilities have a major bearing on the results achieved.

The F test indicates that the model is an excellent fit for describing the variance in the dependent variable, with a value of F = 52.626, P<0.05. In addition, this demonstrates that production process capabilities are a reliable indicator of supply chain performance. According to Table 6, at a significance level of 0.00<0.05, the unstandardized regression coefficient (β) for production process capabilities was 0.882. This suggested that a shift of one unit in production process capabilities would shift supply chain performance by 87.6%. Results in sugar manufacturing firms as a consequence of production process capabilities were estimated using the following regression equation:

Supply chain performance = 0.372 + 0.876 production process capabilities

According to the findings, it is clear that production process capabilities have a major beneficial impact on supply chain performance. This suggests that sugar manufacturing firms with stronger production process capabilities will achieve higher levels of supply chain performance. Adebanjo et al. (2018) study discovered a positive relationship between manufacturing performance and creative product and process capabilities such as production process

capabilities. This further agrees with Mutuku et al. (2018) who sought to determine the influence of process capabilities on the SCP of Kenyan manufacturing firms. The study conducted by Kimwaki et al. (2022) investigated the impact of operational processes and procedures on the performance of manufacturing firms situated in Kenya. The research findings unveiled a noteworthy correlation between performance and operations and processes, indicating that these variables significantly impacted the performance of manufacturing companies in Kenya.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

Based on results provided the study derived the following conclusions: Production process capabilities have a major bearing on the results achieved hence it is clear that production process capabilities had a major beneficial impact on supply chain performance of sugar manufacturing firms. This suggested that sugar manufacturing firms that had stronger production process capabilities achieved higher levels of supply chain performance.

5.2 Recommendations

Basing on findings and recommendations provided the study presents the following recommendations; Sugar manufacturing companies have production as their key objective and hence they should set time for cycles to achieve production. Furthermore, production should be customized. Similarly material handling should be done cautiously to minimize wastages.

Conflict of Interests

The author has not declared any conflict of interest.

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