

Effect of Production Flexibility on Performance of State-Owned Sugar Companies in Western Region, Kenya

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Abstract:- The underperformance of the Kenyan sugar sector is a major issue that is affecting the ability of the sector to generate revenues or profits that can be used for supporting economic growth and development. Even though the current sugarcane cover is more than 220,000 ha, productivity has remained low achieving only 55 tonnes/ha. Meanwhile, production costs rose sharply reaching US\$1007/tonne in 2018. Strategic flexibility in the form of production flexibility has been proposed as a potential solution to help improve the performance and competitiveness of the sugar sector. The aim of this study was to examine the effects of production flexibility on the performance of state-owned sugar companies in Western Kenya. A cross-sectional interview was conducted on a sample of 63 supervisors from the sugar factors selected (Miwani, Mumias, Nzoia, Sony Sugar, Muhoroni and Chemelil Sugar Companies). The regression analysis depicting the relationship between the strategic performance of these organizations and the production flexibility approaches put in place shows that the relationship was significant, $F(9, 53) = 27.076$, $p = 0.000$. In this relationship, there was a strong positive relationship between production flexibility and the strategic performance of the organizations in the market. Therefore, the relationship implied that the amount of responsiveness to potential changes in the market through product design changes and the development of new products and new services was pivotal for the strategic performance and productivity of the factories. The other two factors included in the model namely education and years of experience of the employees did not affect the strategic performance of these factories. From the study, it is recommended that there is need for public sugar companies to adjust production capacity, adopt automation and evolving technologies so as to improve on their performance and be able to remain competitive in the market.

I. INTRODUCTION

Production is a key feature of the manufacturing sector where the focus of many business organizations is to generate products that meet the needs or the customers and demand in the market. Businesses are putting an ever-increasing emphasis on addressing the uncertainties, risks, and opportunities in the market, such as changes in consumer preferences and competitor moves (Miroshnychenko et al., 2021). These elements force businesses to constantly review their business priorities, revise their plans of action, and modify their methods in order to survive, maintain a competitive edge, and thrive in challenging circumstances (Chebo and Wubatie, 2021). Firms have to deal with an unpredictably changing environment that is marked by quickly developing technologies, significant swings in customer demand, and significant swings in the availability of raw materials in the face of volatile and turbulent dynamics. Given the sudden and unpredictable changes in the competitive environment, managers are putting more and more emphasis on flexibility as a way to create fresh kinds of competitive advantage. In this situation, organizations frequently develop strategic flexibility to deal with the external pressures brought on by constant changes in customer expectations, shifting market trends, and competitive actions (Sen et al., 2023).

Due to the dynamic nature of the business landscape, the firm quickly retracts these actions and resource commitments after acknowledging changes in its surroundings. According to research results, strategic flexible businesses perform better than their counterpart. The performance in this contexts refers to a specific outcome achieved in management, economics, and marketing, stemming from elements related to competitiveness, efficiency, and the effectiveness of the organization, including its procedural and structural components. Empirical data from the United States, China, and various European nations demonstrate the crucial role played by strategic adaptability in enhancing corporate performance (El-Khil & Darwish, 2019; Maggon, 2022; Delic & Eyers, 2020).

To illustrate, in their examination of strategic adaptability within the American automotive industry, El-Khil & Darwish (2019) found that 70% of manufacturing enterprises employed various facets of strategic adaptability, including production flexibility and supply chain adaptability, resulting in improved performance.

Kenya now has a total capacity of 520,000 metric tons for sugar production (Mati & Thomas, 2019). The majority of the country's sugar production is produced by privately held sugar millers, led by West Kenya Sugar Company, which holds a market share of 30.1%. According to Odollo et al (2018), Sukari Factory is in second place with 21.4%, followed by Butali Sugar Mills (17.7%), Transmara Sugar (5.2%), Nzoia Sugar (5%), South Nyanza Sugar (4.4%), Muhoroni Sugar (3.7%), Mumias Sugar (1.9%), and Chemelil Sugar (1.1%). From 635,700 tonnes in 2015 to 491,100 tonnes in 2018, there has been a discernible decline in milled sugar production in recent years. In the meantime, imports of sugar have been steadily increasing (Mati and Thomas, 2019). The production of sugar is a major problem in the Kenya sugar sector where production is currently lower than the demand in the market. As a result of the low production capacity of the Kenya sugar factory, the government has been forced to import sugar which often retails at higher prices. Given the evidence that strategic flexibility may improve the production and adaptability of the business organizations, it remains interesting to examine how production flexibility can be used to fix the problems witnessed in the Kenya sugar sector.

The success of sugar production hinges not only on environmental, social, and cultural factors but also on a company's internal initiatives and its ability to adapt to competitive pressures and challenges (Singh, Modgil, & Acharya, 2019). Additionally, firms, including those in the sugar sector in Kenya, exhibit the capacity to respond effectively to market conditions due to their agile supply chains. Furthermore, these firms can meet product demand and achieve shorter product cycle times. From the perspective of production in the manufacturing sector, flexibility involves engaging in practices that will improve the production capabilities of the organization in relation to the demand in the market. In the Kenya content, production flexibilities of the sugar factories mean that these organizations have to adjust their business operations and production capabilities to meet the needs of consumers in the market. According to Chisanga et al. (2014) issues such as high input costs, poor management of production operations adversely affects the ability of the sugar sector to achieve the goals and meet the needs of the market. External market-related factors are the main challenges facing sugar factories in Kenya, adversely affecting the performance and productivity of these firms, leading to lower production costs relative to the demand in the market (Mati & Thomas, 2019). Therefore, this paper examines the extent to which the implementation of production flexibility

practices will help address the core issues present in the Kenyan sugar sector.

➤ *Statement of the Problem*

The Kenyan sugar subsector remains one of the crucial components of the economy given its potential to generate huge amounts of profits and revenues that can be channeled to other sectors of the economy. Despite having a large sugar cultivation area, sugar production in Kenya has remained low since the 1970s. At the same time, production costs have skyrocketed, the sector is faced with a high debt portfolio and massive inefficiencies in the value chain. These factors have continued to make the sector unable to meet the sugar demand. There is an urgent need for solutions to be implemented to support the sector and improve performance and competitiveness. Production flexibility has been proposed as a potential solution. This research study aimed to fill a gap in understanding how production flexibility can affect performance of state-owned sugar factors which own the significant market share and whose production has been massively reduced.

➤ *Objective*

The study examined the effects of production flexibility on the performance of state-owned sugar companies in the Western Region of Kenya.

II. LITERATURE REVIEW

The Dynamic Capabilities Theory is a major theoretical framework that can be used for understanding the position of production flexibility in modern manufacturing organizations. Dynamic capabilities are the cornerstone on which a company can build a competitive edge, according to a 1997 theory introduced by Teece, Gary Pisano, and Amy Shuen. Dynamic Capabilities Theory (DCT) focuses on the ways in which businesses can adapt and innovate regarding to business environmental changes. Additionally, it highlights an organization's capability to combine, implement, and redesign both its inner and outer proficiencies to successfully address quickly evolving markets and technologies. Strategic management has benefited greatly from the DCT, which has become a cornerstone in understanding how businesses can maintain a competitive advantage in challenging situations. Organizations' dynamic capabilities take on many different forms; Companies with dynamic capabilities must possess the ability to both skillfully utilize their existing resources and acquire fresh external resources. In relation to production capability of organization the DCT would argue that when faced with business challenges, firms must adjust their production operations accordingly in response to these issues but still ensure the production targets are achieved. Effective management of production operations in the organization can be used to achieve competitive advantage in the market since the production operations would take strategic positions in the company's operations.

Numerous studies have researched into modeling decisions related to adopting production flexibility and production postponement. Early research in this area focused on modeling the choice to invest in flexibility when confronted with uncertainties in product demand (Goyal, Netessine & Randall, 2012). More recent empirical inquiries have aimed to comprehend the factors influencing manufacturing flexibility, particularly within the field of the automotive sector (Chevalier-Roignant et al., 2019). The application of real options analysis enables the quantification of a firm's capacity to adapt to external market shifts and provides an estimate of the value of production flexibility amid uncertainty (Chen et al., 2017). This is facilitated by drawing parallels between financial and real options. In contrast to efficient capital markets where strategic interactions hold less significance, the business arena abounds with strategic real options shared with industry peers.

Moreno and Terwiesch (2015) conducted an investigation into the realm of pricing and production adaptability within the U.S. automotive sector. Their research was based on a dataset spanning from 2002 to 2009 and employed a diverse array of econometric techniques. The results revealed that the ability to adjust production mixes was linked to reductions in manufacturer discounts, driven by an improved capacity to meet supply with demand. In the prevailing market environment, this blend adaptability led to significant cost savings, reducing price discounts by approximately 10% of the industry's average discount rate. The study's conclusion stressed the importance of considering associated expenses when assessing the implementation of adaptability. These costs are closely tied to a company's existing plant and product portfolio. In the case of newly constructed facilities, the costs of a flexible plant closely resemble those of a rigid one. However, the capital investment required for a new facility is substantial, leading many companies to choose upgrades and retrofits for their existing facilities instead.

From the study empirical literature, Moreno and Terwiesch (2015) investigated production flexibility in the US automotive sector and use data adopted from econometric methods. Haraisa (2018) examined how production flexibility enhances organizational effectiveness. Furthermore, El-Khali and Darwish (2019) analyzed data from 420 factory managers on company's adoption of flexibility dimensions including production flexibility, Cao and Wang (2021) found that debt financing has a critical role in the production flexibility and they identify the improvement of three major cross-functional elements, including quality, time, and cost, as a main target of the flexible production paradigm, emphasizing the need of implementing overall quality management. These studies were conducted in other sectors and not the sugar manufacturing companies. They adopted different study designs different from correlation research design which this study seeks to adopt.

III. METHODOLOGY

The purpose of this study was to examine the effect of production flexibility on the performance of state-owned sugar factories in western Kenya. As such, the quantitative research approach was preferred to allow the hypothesis to be tested appropriately. The study employed a descriptive correlational research design to answer the research questions and objectives of interest in this research. The descriptive correlational design is suited for describing variables of interest in the research and also examine the relationships existing between variables under study (Driessnack et al., 2007). The design was selected because it allowed relationships between variables in the study to be examined which allowed the objectives of the study to be achieved. This research strategy aimed to examine the degree of the relationship between production flexibility and the performance of the sugar factories, which explains why the research design selected was appropriate for this research study. The study targeted state-owned sugar companies; Miwani, Mumias, Nzoia, Sony Sugar, Muhoroni and Chemelil Sugar Companies located in former Nyanza and Western provinces. These factories are located in western Kenya and were selected due to close proximity with each other allowing easier accessibility during data collection. The study was done on a sample of 63 individuals.

The research gathered primary data through structured questionnaires because of the cost-effectiveness and lack of bias associated with questionnaire administration. As noted by Mugenda and Mugenda (2003), the questionnaire method proves convenient as each item is specifically designed to address a particular research objective. To enhance response rates and data quality, a 5-point Likert-type scale was used, with particular emphasis on avoiding participant frustration. The questionnaires were self-reported meaning they were given to the individuals who were required to provide detailed information answering all aspects of the study. The resulting data was analyzed using regression analysis via STATA statistical software.

IV. RESULTS AND DISCUSSION

The study aimed to administer 108 questionnaires. Out of these participants, 10 respondents were used for the pilot study. Out of the remaining 98 individuals, 63 were successfully filled and returned generating a response rate of 64.3%. About 69.8% of the participants were male, while the remaining 30.2% of the participants were female. The findings showed that the majority of the participants, 34.9%, had worked in the sector for 6 – 10 years, while 30.2% of the participants reported having worked in the sugar sector for 11 – 15 years. The study also showed that 14.3% of the participants had worked in the sector for less than five years, while another 14.3% had worked in the sector for 16 – 20

years. Only 6.3% of the individuals included in the study had worked in the sector for over 20 years.

Production flexibility of the public sugar companies was captured in the survey, as summarized in Figure 1 below. The majority of the participants, 26.6%, strongly agreed that the production flexibility of the factories was achieved through the development of appropriate approaches to adjust the production capacity of the factories depending on the changes in the market demand. Another 25.5% of the participants strongly agreed that the companies achieved production

flexibility by adopting automation based on technologies that enhance production flexibility. At the same time, 24.5% of the participants strongly agreed that the factors have adopted the technological evolution of its power plants in attempts to ensure they register shorter lead times when required. These measures have been vital to enhancing the production flexibility of the factors as appropriate. However, whether these approaches directly lead to improved strategic performance of the organizations is crucial and an important area of interest for this research study.

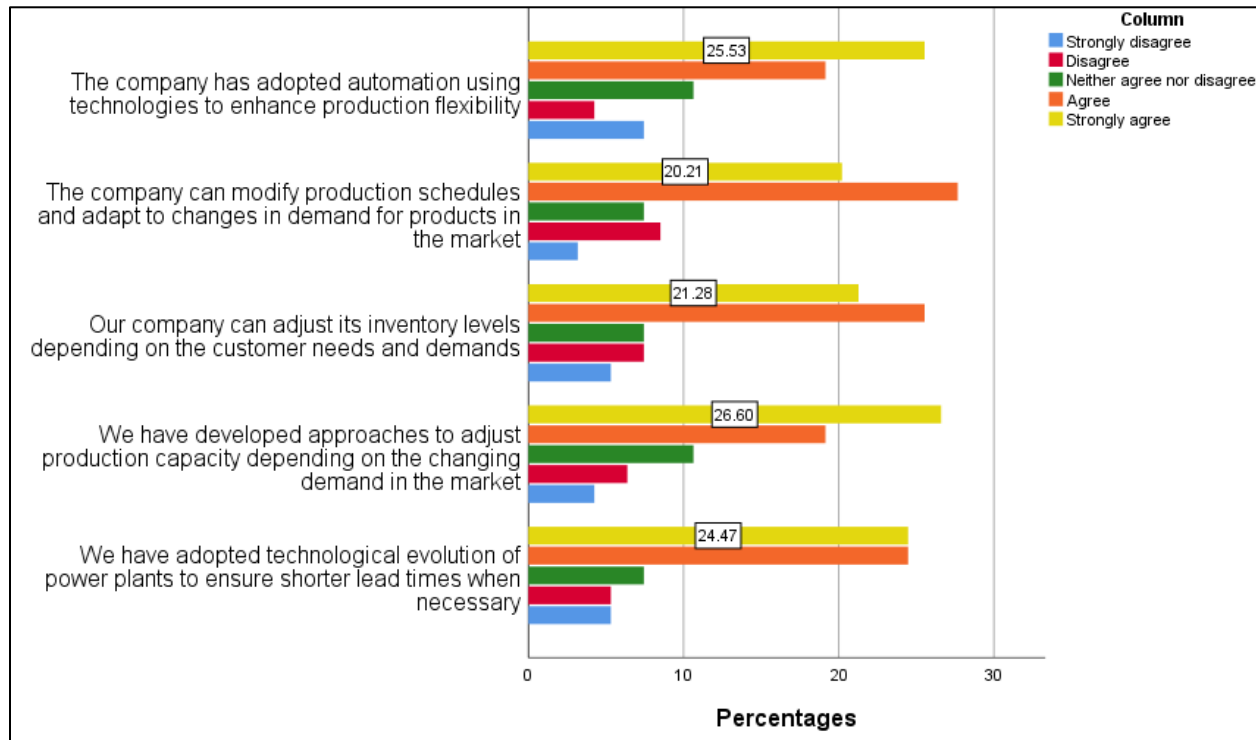


Fig 1: Perception of Production Flexibility on Performance

Based on study’s objective, it was hypothesized that the strategic performance of the organization is strongly dependent on the production flexibility approaches put in place by the organization, education and the years of

experience of the employees. To test this objective, a regression model was developed to examine whether a relationship existed between these two variables, as summarized in Table 1.

Table 1: Regression of the Relationship between Strategic Performance and Production Flexibility of the Companies in the Sugar Sector

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.288	.283		1.019	.313
Production flexibility overall	.932	.062	.938	15.001	.000
Education=Primary school education	.336	.388	.055	.866	.390
Education=Secondary school education	.110	.189	.038	.580	.564
Education=Diploma level	.135	.159	.057	.850	.399
Education=Degree level	.121	.187	.042	.646	.521
YearsExperience=Less than 5 years	-.317	.205	-.104	-1.549	.127
YearsExperience=11 - 15 years	.008	.156	.004	.054	.957

	YearsExperience=16 - 20 years	-.134	.196	-.044	-.682	.498
	YearsExperience=Over 20 years	.099	.270	.023	.366	.716
a. Dependent Variable: Performance overall						

The regression analysis depicting the relationship between the strategic performance of these organizations and the production flexibility approaches put in place shows that the relationship was significant, $F(9, 53) = 27.076$, $p = 0.000$. In this relationship, there was a strong positive relationship between production flexibility and the strategic performance of the organizations in the market. Therefore, the relationship implied that the amount of responsiveness to potential changes in the market through product design changes and the development of new products and new services was pivotal for the strategic performance and productivity of the factories. The other two factors included in the model namely education and years of experience of the employees did not affect the strategic performance of these factories.

The findings from this research study showed that production flexibility is an important element of the organization that ensures overall success. In most cases, production flexibility approaches that were implemented in the factories were designed to enhance production lead times in response to market needs and changes in market performance. Therefore, the factories often adjust their production capacities, product design and quality to ensure they capture the needs of the consumers in the market environment.

The use of strategic management approaches by companies is crucial to allowing the companies to achieve their business goals and objectives. As has been shown in this study, strategic flexibility and associated approaches are conducted by the companies in response to changes occurring in the business environment. For the firms to achieve their strategic objectives and targets, it is important to ensure that all the business goals are achieved as appropriate. Similar use of strategic management approaches to achieve organizational success and performance has been reported by other scholars as well. For example, Wandera et al. (2014) showed that to respond to changes in the market environment, the management at Kwale International Sugar Company has to implement a turn-around strategy that involved restricting the company, re-organization, strategic repositioning and modernization of the company's infrastructure. These measures can be grouped as strategic flexibility because they represent the company's efforts to respond to changes occurring in the market environment; both production and supply chain flexibility can be seen in the approaches implemented by the company. These efforts should be aligned with the business strategy of the organization.

In the manufacturing sector, the efficiency of production and operational processes is vital to overall business success. In the sugar manufacturing sector, production flexibility becomes relevant, especially when companies face different types of challenges in the market environment. As has been shown in this paper, production flexibility allows organizations to implement production activities or interventions based on the demand and other characteristic features of the consumers. In relation to strategic flexibility, other scholars such as Fiberesima & Abdul Rani (2013) noted that strategic development is essential to effective business success and operations in the sugar sector, whereby companies engage in approaches to develop new products or improve existing products. The authors noted that strategic flexibility and product development occur in response to market needs and may include making changes to the product packaging and branding as appropriate. Part of strategic product development also includes the extensive use of technological changes to ensure high, diverse and cheaper production. Maintaining lower production costs is an important element of business because it allows the firms to increase their chances of generating greater returns in terms of profits. In terms of product development, it is important for managers to ensure production flexibility objectives align with the goals of the organization and the subsequent issues that may arise from the market environment. There is evidence from the Kenyan sugar sector that the production costs of sugar have remained significantly high, therefore placing many organizations at greater risk of making losses (Mati & Thomas, 2019). Therefore, the business environment in the sugar sector in Kenya places greater risk on the firms, which justifies the need for strategic flexibility to be implemented by organizations in the sector so that the effects of the market environment on the organizations can be reduced.

While the findings from this study showed that production flexibility exists in the sugar sector in western Kenya, other studies, such as Mbithi et al. (2015), concluded that in the Kenyan sugar sector, the introduction of new products different from sugar has been minimal, with most of the improvements focusing on changing product packaging and branding. However, the authors did not specify whether the introduction of new products was in response to strategic moves made by the organization to improve market position or performance, as would be expected in production flexibility. This may explain the differences in the report as compared to this study.

V. CONCLUSION

The research study has shown that the ability of these organizations to exercise and implement flexibility in their business operations and strategies can be valuable to future success.

Based on results from the first objective, production flexibility has impact the performance of public sugar companies. This can be concluded that most public sugar companies need to adjust production capacity, adopt automation, and evolving technologies as it will increase productivity and performance. This research study has shown that the implementation of strategic flexibility interventions can help firms in the sugar sector in western Kenya address the challenges faced in the market and increase their chances of achieving business success.

RECOMMENDATIONS

From the first conclusion, it is recommended that there is need for public sugar companies to adjust production capacity, adopt automation and evolving technologies so as to improve on their performance and be able to remain competitive in the market. Managements of the sugar companies need understand internal forces shaping their activities and operations as these factors will be needed when engaging in strategic flexibility and achieving increased performance in the sector.

Secondly, sugar companies in Kenya need to implement recommendations from market research and assessments that have identified consumer needs, changes in consumer-related factors and the core issues driving business activity in the sector. Strategic flexibility can be applied as a competitive priority for the firms in the sector seeking to remain competitive and maintain performance because it will ensure appropriate business strategies are implemented by the firms.

The use of quantitative research methodologies identified relationships between variables examined but did not get in-depth to understand why these relationships existed, especially from the perspective of farmers and corporate managers in the sector. Therefore, further research can be conducted in the form of a qualitative follow-up study where participants would be interviewed for a deeper understanding of the phenomenon being examined.

This study was limited to public sugar companies in Western region and therefore further studies could be done to compare performance with private sugar companies in regards to production flexibility. Perhaps the findings from further studies could validate the findings of this dissertation through comparative study of the phenomenon.

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