

Effect of COVID-19 Pandemic Containment Measures on Production Cost of Animal Feed Companies in Nakuru County

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ABSTRACT

The COVID-19 virus emergence resulted in extraordinary challenges globally and brought the world to stand still. The governments responded by putting measures to curb the spread which included lockdowns, curfews, and social distancing among others. The pandemic control measures disrupted operations in sectors such as the health sector, hospitality and tourism, transport sector, agriculture, manufacturing, and service sectors. Animal feed companies fall under the Agricultural manufacturing sector in Kenya and are registered under the Association of Kenya Feed Manufacturers to distribute animal feeds to farmers at just prices and cost. The companies contribute 50 percent to the total agricultural sector Gross Domestic Product (GDP). This study sought to determine the effect of the COVID-19 pandemic on cost as a dimension of the operational performance of animal feed companies in Nakuru County. A descriptive research design was adopted. Census of the entire population of 46 (Forty-Six) companies registered by the Association of Kenya Feed Manufacturers (AKEFEMA). A structured questionnaire was used to collect data over drop-and-pick method. SPSS (version 28) software analyzed the data collected. Data was analyzed using descriptive and inferential statistics. Simple linear regression investigated the relationship between the variables and tested the hypothesis at $\alpha=0.05$ significance level. The study established that COVID-19 containment measures had a positive correlation with production costs. Lockdown ($r=0.520$), Social distancing ($r=0.317$) and Curfew ($r=0.381$). Regression analysis was statistically significant ($p=0.001 < 0.05$). The study concluded that containment measures affected production costs and recommended that the animal feed companies needed Government and other regulatory figures' support in dealing with emergency pandemics.

Keywords: Production cost, operational performance, COVID-19 pandemic containment measures, and animal feed companies

INTRODUCTION

Operational performance is vital in manufacturing companies. It signifies the aptitude to content customer needs and requirements. Organizations experience rapid dynamic changes characterized by increased technological advancements and new challenges of the global competitive environment which result in unstable operational performance (Barakat *et al.*, 2020). The experience of constantly changing economic conditions over the years has forced organizations to advance unceasingly their operations and procedures to espouse, continue, and advance. Implementation of new strategies and improvement of other functions in companies have led to improved operations, productivity, and increased competitiveness. (Geoffrion, 2002). Many organizations' focus has been on reducing costs, ensuring steady profits, increasing operational efficiency, and meeting customer needs. This has been achieved through organizations' combined efforts in optimizing their process, people, finances, and technology (Gunasekaran & Ngai, 2012).

The coronavirus emergence in December 2019, originated in Wuhan, China was termed a contagious viral disease. The spread of the virus was rapid due to China being the major commercial partner with pronounced ability in air traffic and trade, these led to the declaration of the virus as a COVID-19 pandemic and an

epidemic globally (WHO, 2021). These provoked influence on operations in various sectors leading the governments to put in place various preventive measures, according to World Health Organization guidelines to bring the spread of the virus under control, as the search for the right treatment for the virus continued FAO (2020). Social distancing, lockdown, curfew, quarantines, and wearing of face masks in public places were some of the preventive measures that were put in place (Mohamoud, 2022). The government initiated social security monitoring and actions comprising closures of educational facilities, postponement of domestic and international flights and transportation, reduction in gatherings including churches, hotels, bars, and restaurants, twilight to dawn curfews, and distribution restrictions (Onyango & Ondiek, 2022).

According to Haider et al., (2020), lockdown is a procedure and measures used to strategically control the spread of the virus which led to restrictions of movement and limitations on international trade. Mohamoud (2022) noted that the lockdown affected the cost of production in terms of input costs, and forced the prices for customers to go up leading to high operating expenses in manufacturing companies. Fafiolu *et al.*,(2020) defined social distancing as the control measure used to reduce physical distance between two people. The measure aimed to reduce transmission of the COVID-19 virus. According to Mochi, (2022) curfew is a mandate that stipulates the period during which specified regulations apply. It mostly required individuals to remain indoors. The pandemic disrupted the global economy through interrupted feed supply, reduced access to markets, higher operating expenses, and high costs for running companies. High prices for raw materials needed for the formulation of feeds went up leading companies to change their operations to adapt to the drastic changes (Rahimi *et al.* 2020).

Operational performance objectives are strategically important for any organization to measure its performance and satisfy customer needs. Cost among other operations performance objectives is strategically important to organizations (Batista, 2009). Despite conflicting results regarding measuring operational performance, most researchers in production and processes organizations settle upon cost, quality, flexibility, and speed in the delivery of production services as the scopes of operational performance (Barakat *et al.* 2020)

Statement of the Problem

Before the COVID-19 Pandemic Animal Feed Companies were not able to keep up with the fast growth rate of the population and ever-increasing demand for livestock products, economic uncertainties, rising purchasing power, and technological advancements in production. Lack of raw materials, non-optimal transport, and storage of products, real application practices, and feed testing facilities were some of the challenges that deterred animal feed companies from keeping up, with the development pace of the livestock sector. The government reacted by permitting import duty-free waivers for imported materials, however, this mediation was not long-term (Kothari C.R., 2014)(Kothari C.R., 2014)(AKEFEMA, 2020).

Animal feed companies in Nakuru County were closing down due to financial challenges, high manufacturing costs, carrying expenses, and scarcity of raw materials Nyambura (2017). The emergence of the COVID-19 pandemic in December 2019 caused radical changes and control measures implemented by the governments. This instigated great influence on operations in various sectors disrupted economic activities and, there was a need for the companies to adapt to the pandemic situation and continue performing their operations (Rahimi *et al.*, 2020).

There exists several literature on the effect of the COVID-19 pandemic measures on operations in various industries carried out. Joudeh *et al.* (2021) carried out a study in Jordan, on Small and Medium-sized companies and found that Corona pandemic affected operational performance: cost, quality, and productivity. Similarly, Barakat *et al.* (2020) established that the COVID-19 pandemic containment measures disrupted enterprise culture operations disrupted the desired level of performance and business environment in Egyptian markets. Arthur *et al.*(2021) focused on the effects of the COVID-19 pandemic on the performance, operations, and sustainability of small and medium businesses in Uganda, and concluded that stability and performance were significantly affected.

Kiwara (2021), Kinanga (2021), and Kiptoo and Mote (2022) assessed the COVID-19 pandemic in the service sector in Nairobi County and concluded that financial performance was affected. Mohamoud, (2022) assessed

economic and Socio-cultural impacts on the operations of SMEs, along the Moyale -Nairobi livestock supply chain, in terms of reduction of financial performance. Moochi (2022) assessed COVID-19 Containment Measures on the Financial Performance of Small and Medium Enterprises in Nairobi CBD, Kenya. The study established that COVID-19 pandemic containment measures greatly disrupted business activities leading to poor financial performance. The focus was on the financial performance of SME enterprises operating in the Nairobi CBD.

Several studies focused on the COVID-19 pandemic and its containment measures in the service sector with financial performance as the dependent variable. A few studies used operational performance through Cost, quality, and productivity. The study therefore sought to establish the effect of the COVID-19 pandemic on operational performance through selected measurement dimensions Cost Quality and delivery of products of animal feed companies in Nakuru County.

Objective of the study

To establish the effect of COVID-19 pandemic containment measures on the production cost of animal feed Companies in Nakuru County.

Research Hypothesis

H₀₁: COVID-19 pandemic containment measures have no significant effect on production costs in animal feed companies in Nakuru County.

LITERATURE REVIEW

The Theory of Constraint

Goldratt (1984) developed the theory of Constraint (TOC). It is a procedure of finding the most imperative restrictive factor that hinders the achievement of goals and helping organizations to continually improve their systems and achieve their performance objectives (Şimşit *et al.*, 2014). TOC inherently prioritizes the improvement of activities and describes a constraint in place of anything that restricts an organization's performance in terms of objectives. The top priority for the theory is defining the current constraint in environments where there is an urgent need to improve, TOC offers a highly focused methodology for creating rapid improvement (Gupta & Boyd, 2008). The theory advocates for identifying the current constraint, making quick improvements to the throughput of the constraint using existing resources, and subordinates by reviewing all other activities in the process to ensure that they are aligned with and truly support the needs of the constraint.

This study was guided by the Theory of Constraint since it evaluates current constraints and prioritizes them according to the urgency and the need to address the constraint. In the context of this study, the COVID-19 pandemic containment measures caused challenges of different forms to different companies and as a result, there was the need to adopt possible solutions to curb the situation. The animal feed companies needed to identify where they had the most constraints and make quick improvements using available resources in the company.

Dynamic Capabilities Theory

Teece (2007) defined Dynamic Capabilities as the company's capacity to integrate, build, and restructure internal and external resources to address the rapidly ever-changing environment. Dynamic capabilities emphasize the ability of an organization to adequately respond to external changes, through shifting operations and developing resources (Teece *et al.*, 2009). A firm's distinctive resources can be aligned and realigned to match the opportunities and requirements of the business environment (Teece, 2014). The theory focuses more on the issue of competitive survival in response to rapidly changing contemporary business conditions. Dynamic capabilities are considered sources of competitive advantage and influence the firm's performance (Dejardin *et al.*, 2022).

The main assumption of the theory is that the basic organizations' competence should be used to create short-term competitive positions that can build long-term competitive advantage. The theory advocates sensing and understanding the opportunities and creatively finding new ways of mobilizing resources to adopt and realign the organization. The theory is relevant to this study in that it explains how the pandemic affected operations in companies and there was a need to have strategies to overcome the challenges of the COVID-19 pandemic and have a competitive advantage.

Empirical Review

Barakat *et al.* (2020) in their study carried out in the Egyptian market, developed a mediating role of resilience between supply chain integration and organizational performance during the COVID-19 pandemic. The study aimed to establish the relationship between supply chain integration and operational performance through cost, quality, and delivery performance during the COVID-19 pandemic. 224 questionnaires were collected and analyzed over the process macro technique. The results highlighted that the COVID-19 pandemic disrupted the desired level of performance and business environment.

Arthur *et al.* (2021) analyzed the effects of COVID-19 on operations in Uganda and the results showed that the pandemic affected the performance, operations, and sustainability of Small and Medium Enterprises (SMEs). The study scrutinized factors for competent operations and sustainability of SMEs intending to establish the consequence of COVID-19 on operations. The study used a quantitative approach with a correlation design and cross-sectional survey design. A sample size of 205 SMEs was used for the study. The findings revealed that the COVID-19 pandemic had a significant effect on the sustainability of SMEs and noted a positive effect on performance, operations, and sustainability.

Mohamoud (2022) sought to assess the economic and socio-cultural impacts of the COVID-19 pandemic on the operations of SMEs, along the Moyale -Nairobi livestock supply chain, in terms of reduction of financial performance. The study used the multiple linear regression model and employed a stratified quota sampling technique and purposive sampling design. The findings revealed that COVID-19 negatively affected the operations. The effect of the pandemic on the operations of SMEs along the Moyale- Nairobi livestock supply chain in terms of reduction of financial performance was done in the year 2020. The study noted that the economic effects of the pandemic on operations included high prices and operating costs. Social-cultural effects involved restriction of human and livestock movement, closure of businesses, and social distancing which affected operations in terms of financial performance.

Moochi (2022) determined the effect of COVID-19 containment measures on the small and medium enterprises in Nairobi CBD. The study targeted 5000 licensed SMEs licensed by Nairobi Metropolitan Services that operated within Nairobi CBD. Stratified sampling was used to obtain a sample size of 370 SMEs and simple random sampling to identify the businesses to contribute to the study. Questionnaires were used to collect data; a descriptive method was adopted to describe respondents and other perspectives regarding the effects of pandemic containment measures on financial performance. The study also found out that the SME's businesses were affected by social distancing by limiting the number of customers served at a time. Further, the study indicated that the businesses also felt the effect of curfew.

RESEARCH METHODOLOGY

The study adopted a descriptive research design. The descriptive research design was used to analyze the effect of COVID-19 pandemic containment measures on the cost with evidence from animal feed companies in Nakuru County. The design was appropriate for the study for it precisely and analytically describes the situation or phenomenon of a study, illustrates the characteristics of the population being studied, and addresses the who, what, where, and how of a phenomenon (Kothari, 2014).

The study focused specifically on animal feed companies registered under the Association of Kenya Feed Manufacturers (AKEFEMA). The target population was 46 (Forty-Six) registered animal feed companies that manufacture and distribute animal feeds in Nakuru County. It was a small population, hence the study used a census survey, and the entire population was considered. The study respondents were operations managers or

their equivalents in each of the registered animal feed companies as representatives. The data was collected between December 2023 and June 2024.

A structured questionnaire, with closed-ended questions, was used to collect data. The questionnaires were administered through drop and drop-and-pick method. Collected data was analyzed using SPSS (version 28) software. Pearson correlation analysis was used to establish the relationship between the independent variable and the dependent variable. Simple regression analysis investigated the strength between the study variables and tested the hypothesis at significance level $\alpha = 0.05$ (95% confidence level). To test the hypothesis a linear regression equation was modelled as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where: Y= Cost

- β_0 = Constant
- $\beta_1, \beta_2, \beta_3$ = Regression Coefficients
- X_1 = Lockdown
- X_2 = Social distancing
- X_3 = Curfew
- ε = Error term

RESULTS AND DISCUSSION

Correlation Analysis

The test was done using Pearson’s correlation, to determine the strength and direction of the relationship of COVID-19 pandemic containment measures as the independent variable and production cost as the dependent variable. The analysis assumed normally distributed data and continuous variables. The coefficient values range from +1, which is a perfect positive correlation to -1 which is a perfect negative correlation with 0 (zero) indicating no correlation. Table 1 indicates that there is a positive correlation between COVID-19 pandemic measures and cost indicated ($r = 0.520$) that is statistically significant ($p = 0.001 < 0.05$).

Table 1: Correlations matrix

Correlations					
		Lockdown	Social Distancing	Curfew	Cost
Lockdown	Pearson Correlation	1	.630**	.571**	.520**
	Sig. (2-tailed)		.000	.000	.001
Social Distancing	Pearson Correlation	.630**	1	.553**	.317
	Sig. (2-tailed)	.000		.001	.064
Curfew	Pearson Correlation	.571**	.553**	1	.381*
	Sig. (2-tailed)	.000	.001		.024
Cost	Pearson Correlation	.520**	.317	.381*	1
	Sig. (2-tailed)	.001	.064	.024	
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

Hypotheses testing

Regression analysis was conducted to test hypothesis and establish the relationship between the dependent and independent variables. Simple linear regression was carried out on the objective.

The objective was to establish the effect of COVID-19 pandemic containment measure of the cost in animal feed companies in Nakuru County, Kenya. The hypothesis stated that COVID-19 pandemic had no significant effect on cost in animal feed companies in Nakuru County. Simple linear regression was embraced to test the hypothesis.

Table 2: Model summary of Cost

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.640 ^a	.409	.352	.391

a. Predictors: (Constant), COVID-19 pandemic containment measures Lockdown, Social Distancing, Curfew

The model summary for cost analysis in Table 2 reveals that the coefficient of correlation (R) was 0.640. The results show that there is a positive relationship between cost and Covid-19 pandemic containment measures in the animal feed companies in Nakuru, county. R² coefficient of determination reveals the cost changes explained by the COVID-19 pandemic containment measures (Lockdown, Social distancing, and Curfew). The R² which was 0.409, that is 40.9% of the variation in cost is explained by COVID-19 pandemic containment measures (Lockdown, Social distancing, and Curfew).

Table 3: ANOVA^a for cost

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.296	3	1.099	7.158	.001 ^b
	Residual	4.758	31	.153		
	Total	8.055	34			

a. Dependent Variable: Cost of production

b. Predictors: COVID-19 pandemic containment measures (Constant), Lockdown, Social Distancing, and Curfew.

The ANOVA Table 3 specifies that the regression model F- Statistics was 7.158 > 2.91 F-Critical whereas the P-value = 0.001 < 0.05.

Table 4: Coefficients^a for cost

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.057	.667		3.092	.006
	Lockdown	.494	.141	.520	3.500	.001
	Social Distancing	.304	.159	.317	1.918	.064
	Curfew	.398	.168	.381	2.366	.024

a. Dependent Variable: Cost

The coefficient results from Table 4, reveal unstandardized coefficients of $\beta_0=2.057$, P value= $0.006<0.05$ constant, and $\beta_1=0.494$, P-value= $0.001<0.05$ for lockdown analysis. Social distancing $\beta_2=0.304$, P-value= $0.064>0.05$ and curfew $\beta_3=0.398$, P-value= $0.024>0.05$. Therefore, the simple regression equation is modelled as:

$$Y = 2.057 + 0.494X_1 + 0.304X_2 + 0.398X_3$$

It was observed from the results that when all the variables are held constant, the cost equals 2.057. Taking all the other independent variables at zero, a unit increase in lockdown led to a 0.494 in production cost, a unit increase in social distancing led to a 0.304 increase in the cost, and a unit increase in curfew, led to a 0.398 increase in cost, in animal feed companies in Nakuru County. The regression coefficients inform that Covid-19 pandemic containment measures have a statistically significant effect on cost in animal feed companies in Nakuru County as the p value= 0.001 < 0.05. Hence, the null hypothesis H_{01} was rejected since the p-value is less than 0.05. This means that COVID-19 pandemic measures had a significant effect on the cost of animal feed companies in Nakuru County.

The results concurred with that of Kiwara (2021), the study investigated the impact of the Covid-19 pandemic containment measures on the performance of micro small, and medium enterprises in the service sector in Nairobi County. The study established that companies experienced increased costs in ensuring that safety measures were adhered to.

CONCLUSIONS

Based on the study findings, COVID-19 pandemic containment measurements affected the cost of animal feed companies in Nakuru County. This implies that the cost of production is important in operational performance. COVID-19 pandemic containment measures led to increased costs that affected competitive advantage and disrupted animal feed companies' operations. Hence the conclusion that the cost of running companies, due to strict lockdowns, social distancing, and curfews slowed down production.

RECOMMENDATIONS

To improve operational performance the animal feed companies needed the Government and other regulatory figures to support dealing with pandemic effects and other influences on production costs.

Figure 1. Animal feed prices before and during the pandemic.

The cost of animal feeds	
Before COVID-19 pandemic	During the COVID-19 pandemic
KES. 300	KES. 400 per 70 kg
Maize KES 3,000 per 90 kg	KES. 4,200 per 90 kg
Soya KES. 90 per Kg	KES. 120 per Kg
Dairy meal KES.2, 500 per 70kg per bag	KES. 3300 70kg per bag
Layers KES. 3,500 per 90Kg	KES.4200 per 90Kg bag
Broiler starter mash at KES. 4,750 per 70 kg bag	KES.2, 550 per 70Kg bag
Pig feed KES.2, 550 per 70Kg bag	KES.3, 000 per 70Kg bag

Source: Association of Kenya Feed Manufacturers [AKEFEMA]

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