

# AN ASSESSMENT OF CAPACITY UTILIZATION AND PERFORMANCE OF PUBLIC SUGAR MANUFACTURING FIRMS IN KENYA

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**Abstract:** Kenya's sugar sector dates back to the early 1920s when it first began operations. According to a research that was published in 2015 by the Export Processing Zone Authority, the sugar sector provides jobs for more than six million people in the nation, which is more than 16% of the total population of Kenya. Huge difficulties in operations management have plagued the industry, which has contributed to the underperformance of public sugar manufacturers. Low capacity utilization is one of the critical challenges. As a consequence of this, the majority of public companies that manufacture sugar has requested financial assistance from the government, in contrast to their counterparts in the private sector. This study was anchored on Dynamic Capabilities Theory to establish how capacity utilization affect performance of public sugar manufacturing firms in Kenya. The research design utilized in the study was a mixed one, more particularly, a cross-sectional and an explanatory research design. The target population of the study comprised of 450 respondents stratified as 384 sugar cane farmers, 6 operations managers and 60 heads of departments of public sugar manufacturing firms in Kenya. Multiple regression and correlation analysis was used to determine the effect of capacity utilization on firm's performance. From the data analysis an R value of 0.835 ( $R^2 = 0.698$ ) was obtained which indicates there exists a strong influence of capacity utilization on performance of public sugar companies in Kenya. From the findings on capacity utilization, it can be recommended that public sugar firms to acquire modern technology on crushing with high efficiency levels. There is also need to empower farmers so to guarantee steady supply of cane. Factories to set up power plants to supplement on national grid and also act as back up in case of power outage. Dual crushing system should also be envisioned as a safety net in the event of machines breakdown.

**Keywords:** Operations management, Capacity Utilization, Performance.

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## 1. INTRODUCTION

### 1.1 Background Information

Management of operations is distinct from other facets of management in that it focuses on both the material and the interpersonal aspects of a company (Drejer, 1998). It has a significant impact on the company's overall financial performance and, as a result, plays a significant role in deciding the success of the business (Kigo, 2015). According to the many theories that have been developed in the area of operations management, the stakeholders in an organization as well as the resources that are at their disposal are what mostly decide the sort of operations management strategy that is

implemented by that company. For instance, the resource-based perspective theory contends that an organization may maintain a competitive edge and enhance its performance by capitalizing on resources that are valued, uncommon, only partially imitable, and cannot be substituted (Crook, Ketchen, Combs & Todd, 2008).

When it was originally created in the early 1920s, Kenya's sugar industry was already well on its way to being successful. According to a research that was conducted and released by the Export Processing Zone Authority in 2015, the sugar industry in Kenya is responsible for providing employment for more than six million people, which is comparable to more than 16 percent of the entire population of the nation. The sugar business as a whole has been beset by major issues in terms of operations management, which has led to the underwhelming performance of state sugar producing firms. These problems include high costs of transportation for raw materials as well as finished items, high costs of pay for human resources, poor use of capacity, high costs of plant maintenance, and inadequate board structures. As a result of this, the majority of public companies that manufacture sugar have requested financial assistance from the government, in contrast to their private counterparts. The outcomes of the research, which focused on influence of capacity utilization on performance of public sugar production enterprises in Kenya, provided further insight into these tactics for operations management.

### ***1.1.1 Operations Management***

A management function that is focused with executing, designing, and maintaining control over the creation of product and service plans is called operations management (Kemunto, 2016). Because of this, one is obligated to guarantee that quality is accomplished via the efficient use of resources and that value for money is accomplished through the fulfillment of consumer demands and prerequisites. It is concerned with activities that transform resources, like as human labor and materials, into the desired products and services (Kemunto, 2016).

In a firm, the management of operations is another example of a multidisciplinary functional area, alongside finance and marketing. It guarantees that resources, like as labor and materials, as well as any other input, are used within an organization in the most effective and efficient manner possible, hence increasing the amount of output produced (Kemunto, 2016). According to observations made by Pearson (2010), operations managers are held responsible for all actions in their businesses that lead to the provision of services that are both seamless and efficient. However, the specific nature of the tasks that are associated with the operations functions might vary, and they will to some degree rely on the strategic activities that are performed by an organization, such as its strategic, tactic, and operational functions. Management of operations is concerned with the microenvironment of an organization for the purpose of maximizing performance and making decisions.

Operations management are internal variables that contribute to the growth of competence, and as a consequence, they may provide organizations benefits in the marketplace (Pisano, 1996) The term "operations management" refers to processes or methodological solutions that are implemented in companies with an emphasis on quality and the optimization of limited resources in order to generate outputs. According to (Pisano, 1996) and (Pearson, 2010) operations management is an example of an internal component that contributes to competence development. The major goals of operations management are to get an understanding of the needs of consumers, determine the degree to which they are satisfied with the goods or services they receive, and then utilize this information to create new and improved versions of those products and services. Embedding quality into products, services, and processes, as well as continuously improving these areas in order to cut down on mistakes, flaws, and waste, and making better choices by leveraging information on customers, products, services, operations, supply, and workers (Kemunto, 2016). The choices that are taken in operations management convert into practices in operations management that play transformative roles to create customer value (Kigo, 2015).

According to the theory put forward by Russell (2007), there is more to operations management than planning and controlling. Achieving the necessary levels of efficiency and effectiveness in operations management is based on a number of interrelated initiatives, all of which play a role in ensuring that the whole process runs smoothly. It is necessary to make the most of the resources, time, and decision-making processes that are available in order to successfully manage operations. These practices of operations management include things like the design of products and services, the design of processes, the layout of facilities, inventory control, planning and control, personnel and job design, facility improvement, and organization for quality, among other things (Kemunto, 2016). Making available goods and services to consumers requires the use of plant facilities to a significant extent. The procedure or sequence of procedures that is determined to be superior to those already in place must be chosen. Implementing programs with an accurate schedule will make it easier for other

activities to contribute to the organization's progress toward achieving its objectives. Skilled labor ensures that the appropriate choices were taken in order to provide goods and services that are tailored to the requirements of the target market (Byegon, 2015).

### 1.2 Specific Objective

To determine the extent of capacity utilization against performance of public sugar manufacturing firms in Kenya

### 1.3 Hypothesis

H<sub>01</sub> There is no significant relationship between capacity utilization and performance of public sugar manufacturing firms in Kenya.

### 1.4 Scope of The Study

The purpose of this research was to investigate how proper operations management might improve the overall performance of public sugar production companies in Kenya. The practices of operations management that were used in the research were costs associated with capacity utilization. The effectiveness of the research was evaluated by calculating its profitability, production volume, and total revenue. The six public sugar producing plants in Kenya that have been operating during the last ten years, beginning on January 1, 2009, and ending on December 31, 2018, served as the units of analysis for this study. This encompassed many different regions in Kenya, East Africa, including Kakamega, Bungoma, Kisumu, Chemilil, Ramisi, Kwale, Siaya, Ndhiwa, and Transmara. This research made use of both primary and secondary sources of information.

### 1.5 Theoretical Framework

The study was guided by the Dynamic Capability Theory (DCT) which provided the theoretical foundation for understanding the research variables.

#### 1.5.1 Dynamic Capabilities Theory

As an extension of the Resource Based View Theory, Teece and Pisano (1997) developed the Dynamic Capabilities Theory. This theory was first presented in their work. The uniqueness of some resources to companies, which are difficult to reproduce in other businesses, is what is meant by the term "dynamic capability." The dynamic capabilities theory investigates how businesses combine, develop, and reorganize their internal and external firm-specific competences into competencies that are suitable for their dynamic environments (Teece, Pisano and Shuen, 1997). In its most basic form, the Dynamic Capabilities Theory seeks to explain how organizations are able to build, utilize, and safeguard their distinctive capabilities in order to acquire a competitive edge over their rivals (Teece et al, 1997).

According to this hypothesis, businesses that have larger dynamic capabilities will have better performance than those who have lower dynamic capabilities. In addition to this, the theory examines how businesses make use of their dynamic capacities in order to obtain a competitive edge by reacting to and causing relevant changes in their surrounding environment. According to this hypothesis, the company that has a stronger dynamic capacity will therefore have a better likelihood of having a more sophisticated operations management efficiency put into place. The theory helped to understand the dynamics in private and public sugar manufacturing firms and to shape out the ideal situation to enhance operations management performance in public sugar manufacturing firms.

### 1.6 Capacity Utilization

The degree to which an organization makes use of its available resources to produce goods or services is referred to as its capacity utilization (Oxford, 2017). It is always quantified in terms of production units, and one way to describe it is as a percentage of the total capacity that has been accomplished at a certain point in time. Utilizing a company's existing facilities and resources in the most effective manner possible is the foundation of effective capacity utilization. This includes the production as well as the supply sectors of the companies, which work together to maintain the smooth operation of the company's procedures. Because it is a factor that determines how well a given business produces its goods or services, the utilization of a company's available capacity is critical to the survival and growth of the business. In addition to this, the capacity utilization results in a significant decrease in the unit costs, which in turn enables the company to obtain a competitive edge over its competitors.

Utilization of available capacity may be accomplished by working to optimize all aspects of production. It is inevitable that the capacity of the sugar industry will be used, which means that sugar milling enterprises will strive to enhance their financial performance by making better use of the resources at their disposal. For example, Mumias Sugar Company installed a diffuser to maximize its capacity utilization and this greatly enhanced its output. As a result, a firm that is able to properly use its capacity has a greater chance of doing better, and so earning a competitive edge.

### **1.6.1 Cane Crushing Capacity**

In 1922, the town of Miwani, located in the Nyanza region of Kenya, became the location of the country's first sugar manufacturing plant. At 1927, a second sugar mill was established in Ramisi, which is located in the coast area; this facility is today known as the Kwale International Sugar Company. After 1963, the Kenyan government increased its sugar farming and founded additional sugar companies, including Chemelil five years later in 1968 with a capacity to produce 3000TCD; Muhoroni a year later in 1969 with a capacity to produce 2200TCD; ten years later, in 1973 Mumias with a capacity to produce of 8000TCD. Five years later, in 1978, Nzoia with a capacity to produce 3000TCD and a year later in 1979, South Nyanza with a capacity to produce 2700TCD. In 1979, private miller, West Kenya with a capacity to produce 4000TCD while in 2007, Kibos was formed with capacity to produce 3500TCD. In 2011, four years later, Butali, Sukari and Transmara were formed with capacity to produce 2500TCD, 1500TCD and 4000TCD respectively. There are five (5) factories that are jointly held by the government and six (6) that are owned by private (KSB, 2013).

### **1.6.2 Raw Material Capacity**

According to the information provided by FAO (2013), these operational manufacturers have a combined output capacity of around 600,000 metric tons, but the yearly domestic demand is approximately 800,000 metric tons, resulting in a shortfall of approximately 200,000 metric tons. According to the Kenyan Sugar Board (2013), It is because of high production costs that Kenya is now experiencing a scarcity in sugar amounts. These high production costs are caused by the use of outdated production technology, ineptitude within governance and management systems, and insufficient investment in new sugar cane. In addition, the KSB (2013) states that the incompetence within management and governance structures contributes to the high costs of production. Out farmers are responsible for producing 92 percent of cane in Kenya, which is comparable to the 93 percent of cane produced in South Africa but lower than the 40 percent produced in Zambia, which has the greatest cane yields in the area (Chisanga, 2014).

The delivery of cane has a tight relationship with the manufacture of sugar. Several Kenyan factories have lately complained about a lack of available cane, limiting their ability to function at maximum efficiency. Low capacity utilization (either because there is not enough cane or because there has been an increased investment in capability) and inefficient output are two reasons that contribute to the high production cost of sugar in Kenya, as explained by Chisanga (2014) (poor management, aging machinery) It was reported that in 2012, Mumias' capacity utilization dropped all the way down to 55%. There must be some kind of competitive challenge amongst the various businesses since sugar cane yield has not increased to meet the demand of millers (cane production and Milling).

### **1.7 Firms Performance**

Performance measurement is the way through which an organization's performance may be measured, therefore it's crucial to have a firm grasp on the concept before diving into an analysis of the company's success. Prathap and Mittal (2010) state that a firm's capacity for monitoring its own performance is a crucial factor in determining the extent to which it is knowledgeable and successful. Tuttle and Heap (2008) define performance measurement as "the process of quantifying activity," where measurement is the method used to arrive at a numerical value and action is what produces results. It was emphasized how crucial it was to meet consumer expectations in a more timely and professional way than the competition. In this context, "effectiveness" refers to the degree to which customer expectations were satisfied, typically in line with the notion that the customer is always appropriate, whereas "efficiency" alludes to the quantification of how economically the company's resources were applied, i.e. total output in comparison with the total input. For the sake of ensuring the maximum possible level of client satisfaction (Islam & Sunders, 2013).

An exact description of factory performance is necessary for clarifying the intricate relationship that exists between operations management and factory performance. According to Richard, Devinney, Yip, and Johnson (2009), there are three main components that make up a company's performance: financial success (return on investment, return on assets, profits), and customer satisfaction and market success (market share, sales) (Richard, et al, 2009). The performance of a company may be defined as its actual output outcomes in comparison to its planned output (or objectives and goals), and it entails

the ongoing processes of setting goals, monitoring progress, and making modifications to attain those goals more effectively and efficiently. Firm performance measures intended outputs against actual output results (Richard, 2009).

There are at least three fundamental reasons why a company would want to assess its performance. For the aforementioned factors, the corporation will use these metrics to reduce operating costs, boost revenue, and increase stock price for its shareholders (Keebler & Plank, 2009). Keeping tabs on operational costs can help you decide if, when, and where to make changes to your operations in order to better control expenses; it can highlight opportunities for better asset management; it can help you attract and keep valuable customers by enhancing the price to value of your products and services; and it can highlight places where you can save money (Keebler & Plank, 2009).

A study on manufacturing performance that was conducted by Leachman, Pegels, and Shin (2005) found that the majority of the researchers who were analyzing manufacturing performance had a common idea that it was necessary to have numerous performance measurements. Before the 1980s, when assessing performance, the focus was on a cost accounting strategy that relied heavily on financial key performance indices like earning per share, return on investment plus profit (Gomes, 2006). Non-financial variables also contributed to company success, although they were less visible when attention was narrowed to financial indicators alone (Thruologachantar & Zailani, 2011). Applying problem-specific strategies within the scope of their study, as well as the significance of measuring processes and tasking flexibility as a means to deal with market volatility and meet consumers' changing needs (Dsouza & Williams, 2000).

The manufacturing strategy included competitive criteria including efficiency, affordability, timeliness, adaptability, originality, and reactivity (Prathap & Mittal, 2010). In addition, competitive considerations have often been a part of how a manufacturing strategy's success is determined (Zenget, 2008). These goals used to be easily attainable for most businesses because to their adoption of innovative production and technologies practices like concurrent engineering, just in time and worker empowerment (Gomes, 2006).

#### ***1.7.1 Operational Performance Measurement Models***

Performance assessment methods trace back to the 1970s as a consequence of the inadequacies of utilizing conventional accounting system (Gomes (2004). This was done as a result of the fact that old accounting systems were not very accurate. According to Oakland (2006), operational performance is the primary determinant of an organization's level of competitiveness. In order for an organization to realize its long-term strategic objectives, its operations need to be both efficient and effective. According to Han and colleagues (2014), businesses are able to gain a competitive edge by demonstrating exceptional performance in terms of the level of satisfaction they provide their customers. As a result, in today's highly competitive environment, businesses constantly evaluate their performance since this factor has a direct bearing on the development of their companies as a whole. Performance measuring models such as the performance pyramid (Cross and Lynch, 1981), the balance score card (Kaplan and Norton, 1990), and the performance measurement questionnaire (Dixon, 1990), amongst others, have been presented by a number of different academics.

#### ***1.7.2 Profitability***

Organizations do profit-and-loss studies for a variety of reasons, including evaluating the effectiveness of management, determining whether or not a business presents a feasible or profitable investment opportunity, and gauging how well a business performs in comparison to its rivals (Mbalwa, 2015). The profitability ratio gives an indication of how a firm utilizes its short-term borrowing to support its operations (Petersen, 2009).

Traditional accounting measurements of profit are used in a significant number of studies. The return on assets is the most prevalent kind of index (Staw & Epstein, 2000; Wan & Hoskisson, 2003). Return on assets is calculated by taking yearly profit or net income and dividing that number by the annual average value of assets. To be more specific, in order to determine the numerator, researchers often begin by first subtracting the yearly profit from the interest expenditure as well as the interest tax savings. According to O'Sullivan (2009), Return on assets (ROA) is a measurement of a company's operational effectiveness that indicates its long-term financial stability.

#### ***1.7.3 Output Volume***

Measures of output are any instruments or indicators that tally the amount of a service or product that an organization has generated. As a metric of output, the number of persons who get services or the number of services given are often utilized (Mbalwa, 2015). It places an emphasis on the quantity, quality, or timeliness of the items and services that are supplied (Mills and Bos, 2011). According to the available literature, outputs are performance metrics, instruments, or indications of



the state's activity in accomplishing a certain aim or target. In general, performance measurements may be broken down into four categorical measures: efficiency, input, outcome and output measures. These categories refer to quantitative proof of the goods or services that a business offers (WHO, 2010). Mills and Bos (2011) define output as the immediate outputs or outcomes of the actions that were executed, such as the number of individuals taught, the number of deliveries made, or the number of bags of sugars delivered. The study was interested to establish output levels of public sugar manufacturing and how they impact on their performance.

#### **1.7.4 Revenue**

The proportion of a certain market that a particular company is responsible for is referred to as that entity's market share. Revenue is measured in terms of market share. Because this will illustrate whether projections are to be accomplished by increasing along with the market or by grabbing share from rivals, marketers need to be able to translate and combine sales objectives into market share (O'Sullivan & Abela, 2007). A careful eye is kept on market share to look for any indicators of a shift in the competitive environment, and this metric is typically used to motivate either strategic or tactical action. One of the most significant goals of every firm is to increase their amount of income.

The most significant benefit of utilizing market share as a measurement of company success is that it is less sensitive to changes in macro-environmental factors, such as the condition of the economy or shifts in tax policy (Mbalwa 2015). One of the most important indicators of a market's competitiveness is a company's market share, which reveals how successful a business is in comparison to its rivals.

#### **1.8 Capacity Utilization and Performance**

Oluwaseun (2018) released a study that examined the influence of capacity utilization on the output of manufacturing enterprises in Nigeria. Using time series data spanning the period from 1981 to 2016, an Autoregressive Distributed Lag (ARDL) model technique was used in this research to investigate the influence that capacity utilization had on the output of manufacturing enterprises in the country of Nigeria. According to the findings of the research, there is a positive but minor link between capacity utilization and the production of manufacturing businesses. This is due to the fact that capacity was chronically underutilized in nearly every productive company in Nigeria. The study found that Nigerian manufacturing businesses had a lot of unused capacity, and that this underutilization mitigated the beneficial impact of capacity utilization in explaining the gain in production that Nigerian manufacturing firms experienced. Findings from the research suggest that authorities in Nigeria should take steps to boost industrial capacity utilization. These measures are intended to encourage an increase in the value of the Nigerian Naira, discourage the haphazard import of products and services, increase the availability of sophisticated machinery at cheap costs, and guarantee a constant supply of electricity across the country of Nigeria. The paper focused on capacity utilization in small scale manufacturing, this could have contributed to the insignificant effect to firms' performance. This research was conducted on public sugar manufacturing firms in Kenya which are believed to be large in size hence will make a substantial contribution to the available knowledge.

Ndemezo, Ndikubwimana, and Dukunde (2018) wrote a study on the topic of the drivers of capacity utilization of food and beverage manufacturing enterprises in Rwanda: do tax incentives Matter? The explicit purpose of the article was to discover the primary characteristics of capacity utilization in the food and beverage production business that are likely to be favorably changed by fiscal incentives. The data came from a thorough study of the manufacturing sector that was conducted in 2013 and 2014 by the Rwandan Ministry of Trade and Industry (MINICOM). The model that was employed was constructed from an expanded Cobb Douglas production function, and its parameters were calculated using the method of regression using ordinary least squares. The following are some of the most important findings that emerged from this research: In the food processing business, a lack of specialized technology, a lack of raw materials, tax administration, and standards are the key issues undermining company capacity utilization; no factor substantially supports this subsector's capacity utilization; The experience (age) of the company and its material-intensive features are the drivers of capacity utilization in the beverage manufacturing sector. Four variables have a detrimental influence on the capacity utilization of beverage manufacturing companies: excessive fixed asset size, insufficient working capital, insufficient levels of demand, and standards. Capacity utilization in the food processing sector can be increased by simplifying tax management and tax compliance tools, ensuring the availability of agricultural raw materials throughout the year and lowering their cost, and assisting businesses, especially younger ones, to assist them in obtaining the right technology and increase production levels. The paper though focused on food and beverage manufacturing firms, it raised pertinent concerns on capacity utilization.

The effect of capacity utilization on performance of public sugar manufacturing firms in Kenya was investigated further to make a contribution to the available knowledge.

Adeyemi and Olufemi (2016) wrote a study on the factors that determine the level of capacity utilization in the manufacturing industry in Nigeria. This research conducted an empirical investigation of the factors that determined the level of capacity utilization in the manufacturing sector in Nigeria between the years 1975 and 2008. In this study, capacity utilization served as the dependent variable, and the study's independent variables included Actual Industrial Production Rate of growth, Rate of Interest, Consumption Index of price, Constant Wealth Creation in Manufacturing Industry, and Generating Electricity upon Rate. Realistic Industrial Production Rate of growth. Real Interest Rate (a proxy for energy). In order to analyze the time series features of the variables and to determine whether or not there is a long-run link between capacity utilization and its determinants indicators, the estimate approach that was used was co-integration, and Error Correction Model was used. According to the results of the research, there is a correlation between the consumers' price index, the amount of fixed capital formed in the manufacturing sector, and the amount of capacity that is being used. The research also revealed that there is a negative link between the production of power, the actual growth rate of manufacturing output, and capacity utilization, which led to a low rate of manufacturing productivity growth in Nigeria. According to the results of the study, the researchers highly suggested that the government should strongly propose that the government should create appropriate supply of infrastructure facilities notably energy generation to improve output. The study made a significant contribution to existing knowledge however the focus was skewed to limited independent variables. The current study will fill the gap by establishing the effect of capacity utilization on performance of public sugar manufacturing firms in Kenya.

### 1.9 Conceptual Framework

Figure 1.1 provides a visual representation of the conceptual framework, which demonstrates how the independent factors have an effect on the dependent variable, which is performance. The operations management efficiency if put in place by public sugar manufacturing firms will enable them gain competitive advantage thus improve their performance. As a result, there is an obvious connection between the variables of the research that are dependent and those that are independent.

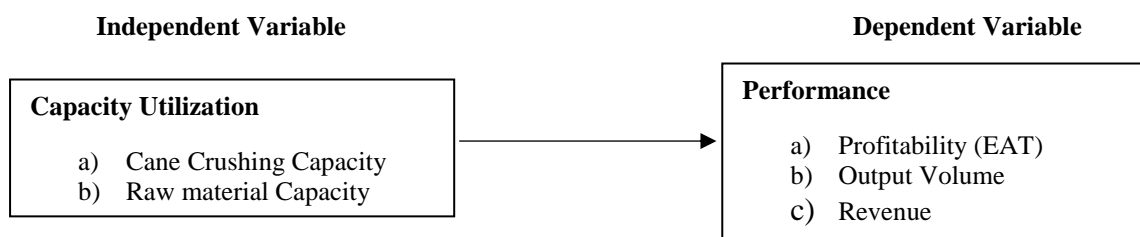


Figure 1.1 conceptual framework, author 2022

### 1.10 Research Methodology

#### 1.10.1 Location of Study

The research was conducted at every single one of Kenya's publicly owned sugar manufacturing companies that have been in operation over the previous ten years, beginning on January 1, 2009 and ending on December 31, 2018. There were five government-owned sugar factories in operation at the time: South Nyanza, Nzoia, Mumias, Chemelil and Muhoroni.

#### 1.10.2 Research Design

A mixed research design was used for this study to guarantee that the information gathered and evaluated was pertinent to the goals of the research.

#### 1.10.3 Reliability Test

All two of the sub-scales in the data collecting instrument had their reliability determined, and the results are shown in Table 1.1. This table shows that the items used in the data collection instrument were extremely well suited for data collection and successfully assessed the constructs they were intended to test.

**Table 1.1: Reliability Statistics**

Scale	N of Items	Cronbach's Alpha	Conclusion
Capacity utilization	10	.937	Reliable
Performance	10	.936	Reliable

### 1.11 Testing Adequacy of Sample Factor Analysis KMO Test

To test for adequacy of sample factor analysis, KMO test was used. If the Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.60 or above, then we should continue with Exploratory Factor Analysis since the sample that was employed was acceptable. In the event that Bartlett's test of sphericity returns a significant result ( $p < 0.05$ ), we need to continue with the exploratory factor analysis.

**Table 1.2: KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.701
Bartlett's Test of Sphericity	Approx. Chi-Square	165.522
	Df	15
	Sig.	.000

From Table 1.2, the two conditions are met here and therefore the sample was adequate.

### 1.12 Performance of public Sugar Firms in Kenya

In order to assess performance of public sugar firms in Kenya data collected from all the five public sugar companies was merged and analyzed. Table 1.3 below shows the descriptive statistics of all the five sugar firms.

**Table 1.3: Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
CU	50	140,000	2,318,000	647,200.00	538,182.960
TR	50	1,096,210,300	15,795,000,000	4,497,785,532.94	3,893,513,817.01
PR	50	-15,141,000,000	1,933,000,000	-1,031,732,083.50	2,660,730,497.87
PER	50	-4,587,284,666.67	5,909,412,000.00	1,155,593,716.48	1,719,115,038.72

### 1.13 Influence of Capacity utilization on performance of sugar firms in Kenya

The purpose of this research was to determine whether or not sugar companies in Kenya's capacity was being fully used. It was hypothesized that Kenya's publicly-owned sugar mills wouldn't do any better if they were operating at lower rates of capacity utilization. The results of this endeavor are shown in Table 1.4, which was created using a linear regression model.

**Table 1.4: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.835 <sup>a</sup>	.698	.692	954540085.47440

a. Predictors: (Constant), CU

From Table 1.4 the R value is at .835 which shows that there exists a strong influence of capacity utilization on performance of public sugar companies in Kenya.  $R^2$  shows .698 on variation of performance of public sugar companies caused by capacity utilization. An analysis of variance (ANOVA) was also done to ascertain whether capacity utilization was significant predictor of performance of public sugar companies. The results were summarized as shown in Table 1.5.



**Table 1.5: ANOVA of Performance and Capacity Utilization**

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	101077424112699950000.00	1	101077424112699950000.00	110.934	.000 <sup>b</sup>
	Residual	43735045189318705000.00	48	911146774777473020.00		
	Total	144812469302018650000.00	49			

a. Dependent Variable: PER

b. Predictors: (Constant), CU

From Table 1.5, where [F (1, 49) = 110.934, P<.05] it is evident that capacity utilization influence performance of public sugar companies in Kenya and thus a significant predictor. To ascertain the influence of predictor variable on the response variable, a regression equation model was fit. Table 1.6 shows the coefficients of the regression equation.

**Table 1.6: Coefficients of the regression equation**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-571586316.970	212400768.993		-2.691	.010
	CU	2668.696	253.376	.835	10.533	.000

a. Dependent Variable: PER

The output in Table 1.6 shows the results of fitting a multiple linear regression model to describe the relationship between PER and 1 independent variable. The equation of the fitted model is  $PER = -5.71586E8 + 0.835*CU$

Statistically speaking, there is a connection between the variables at the 95.0% confidence level, since the P-value in the ANOVA table is less than 0.05. Take CU's highest P-value of 0.0000 on the independent variables into account when deciding whether the model may be simplified. If the P-value for a given term is less than 0.05, then it can be said with 95.0% certainty that the term is significant.

These results resonate with those of Ndemezo, Ndikubwimana and Dukunde (2018) on a study on drivers of capacity utilization of food and beverage manufacturing enterprises in Rwanda. Ndemezo et al (2018) established that lack of specialized technology, lack of raw material; tax administration and standards are the key issues undermining company capacity utilization. The study further postulates four variables which have a detrimental influence on the capacity utilization of beverage manufacturing companies: excessive fixed asset size, insufficient working capital, insufficient levels of demand and standards.

The findings are also in coherent with those of Adeyemi and Olufemi (2016) which postulates that there is a correlation between consumer's price index, the amount of fixed capital formed in manufacturing sector and the amount of capacity that is being used.

#### 1.14 Influence of Capacity Utilization On Performance of Sugar Firms in Kenya

From Table 1.4 the R value is at .835 which shows that there exists a strong influence of capacity utilization on performance of public sugar companies in Kenya.  $R^2$  shows .698 on variation of performance of public sugar companies caused by capacity utilization. An analysis of variance (ANOVA) was also done to ascertain whether capacity utilization was significant predictor of performance of public sugar companies. From Table 1.5, where [F (1, 49) = 110.934, P<.05] it is evident that capacity utilization influence performance of public sugar companies in Kenya and thus a significant predictor. A regression equation model was fitted in order to determine the extent to which a predictor variable had an impact on a responder variable. The equation that best describes the fitted model is as follows:  $PER = -5.71586E8 + 0.835*CU$ . Due to the fact that the P-value in the ANOVA table is lower than 0.05, there is a statistically significant link between the variables with the level of confidence of 95.0%.

### 1.15 Conclusion On Capacity Utilization and Performance of Sugar Firms In Kenya

The results on capacity utilization on performance of public sugar firms in Kenya revealed that public sugar firms are underutilizing their full potential. The firms could not meet their recommended crushing capacity due to lack of raw material and frequent breakdown of the machines leading to long idle hours. Those firms relying on national grid as the main source of power were equally affected in meeting their capacity due to unprecedented power outages. With the inability to fully utilize the firm's capacity it becomes imperative for the firm to crush sufficient cane to enable the sales meet its internal demand. With such backdrop, capacity utilization becomes a significant predictor of performance of public sugar manufacturing firms.

### 1.16 Recommendation

From the findings on capacity utilization, it can be recommended that public sugar firms to acquire modern technology on crushing with high efficiency levels. There is also need to empower farmers so to guarantee steady supply of cane. Factories to set up power plants to supplement on national grid and also act as back up in case of power outage. Dual crushing system should also be envisioned as a safety net in the event of machines breakdown.

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