

# **OPERATIONS MANAGEMENT AND PERFORMANCE OF FOOD AND BEVERAGE MANUFACTURING FIRMS IN KENYA**

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## **ABSTRACT**

Despite the importance of the food manufacturing industry in Kenya, it has been experiencing a lot of turbulence in the recent past including a drop in the GDP, an increasing imbalance of trade, and the exiting of large multinationals. The main focus of this study was to assess the effect of operations management on the performance of food and beverage manufacturing firms in Kenya. The research design that was appropriate for this study was a descriptive cross-sectional design. 246 food and beverage manufacturing firms formed the source from which the respondents will be sourced. The population frame was thus the procurement managers of the 246 food and beverages firms. These firms are registered under the Kenya Association of Manufacturers. The study used a Stratified random sampling technique. The study further used simple random sampling within the different strata of 152 food and beverage manufacturing firms. The heads of departments concerned with procurement formed the unit of observation. The questionnaire was used to collect primary data. Quantitative and qualitative data were generated from the closed-ended and open-ended questions, respectively. Descriptive statistics such as frequency distribution, mean (measure of dispersion), standard deviation, and percentages were used. Inferential data analysis was conducted by use of univariate regression analysis, Pearson correlation coefficient, and multiple regression analysis. The inferential statistic is used to make judgments about the probability that an observation is dependable or one that happened by chance in the study. The study results were presented through the use of tables and figures. The study found that operations management is statistically significant in explaining performance of food manufacturing firms in Kenya. The influence was found to be positive, indicating that an increase in operations management would lead to an increase in performance of food manufacturing firms. Therefore, the study concluded that operations management has a positive and significant relationship with performance of food manufacturing firms in Kenya. The study therefore recommends that manufacturing firms should reduce excess inventory by implementing just-in-time (JIT) inventory systems. This minimizes carrying costs, reduces the risk of waste due to product expiration, and optimizes working capital. In addition, the firms should develop standardized work procedures and ensure that all employees follow these procedures rigorously. This will lead to consistent product quality and efficient production processes

## **Background of the study**

Operating a successful business can be a challenging fate. This is because the world has become more globalized and local firms have to compete with their local counterparts as well as international ones (Aguko, 2018). Businesses thus have to adopt strategies that will ensure they outperform their competition by having a strategic advantage over them. One of the ways a firm can gain a strategic advantage over its competitors is through operational efficiency and effectiveness. Dhillon and Vachhrajani (2016) define operational efficiency as the right mix of people, processes, and technology that enhances the productivity and value of a business.

This means the producer can enjoy larger profit margins as compared to a firm that does not consider the value chain. Consequently, this will give the firm a competitive advantage over other players in the industry (Donelan, & Kaplan, 2019). Other than increasing the profit margin, managing the value chain also means that the qualitative aspects that make up a firm can be managed. Qualitative aspects of a firm such as employee morale and customer experience are crucial to the performance of the firm in general (Johnson, Scholes, & Whittington, 2018).

Technological development has allowed access to real-time, up-to-date information across the entire value chain, which is having a significant impact on how organizations are doing and expect to do business. Integration of technology is informed by the need to allow quicker and easier connectivity between suppliers and their customers. It enhances the visibility of the customers whose needs and expectations are changing regarding response times, delivery times, and transparency (Iyer, Germain & Claycomb, 2019).

Technological integration facilitates the members to exchange information as well as enables real-time information sharing, thus increasing visibility (Prajogo & Olhager, 2016). Kim (2017) has introduced the concept of Integrative Information Technology in the context of SCI and has defined it as being the technology that enables the collection of relevant information relating to critical business processes while ensuring that the same is shared across all functional areas as well as across the firm boundaries. From the above definition, IT integration is essential in ensuring internal and external integration. Information systems are essential to managing the value chain integration, also referred to as the glue that holds the chain together.

IT development has two components mainly capabilities and information sharing, which, according to Prajogo and Olhager (2016) has significant effects on integration. Researchers have concluded that information sharing with internal and external parties such as the supplier and functional departments is a good precondition for external integration which leads to optimization (Zhao et al., 2017). For example, customer integration, according to Flynn et al. (2019), is the forward integration that links company technology and infrastructures such as point of sales (POS) systems, inventory management systems, and customer ordering systems. Technological integration assists the organization in communicating with customers resulting in increased accuracy in terms of demand planning and the speed of meeting demand variations (Flynn et al., 2019). Technological integration also ensures the resource requirement which is subsequently communicated to the suppliers assisting in forecasting given that the company can predict customer demands to lead to the operational performance given that the demand uncertainty ordinarily faced by the suppliers is eradicated (Danese & Romano, 2016).

According to Walters and Lancaster (2016), value chain management is a business system that creates end-user satisfaction and realizes the objectives of other member stakeholders

and therefore needs for value chain management to facilitate the realization of these objectives. Value chain management requires "examining processes (physical, financial and informational) and uncertainties (opportunities for improvement and risks to achievement) from beginning to end of the chain (or network) in an integrated manner to optimize overall value (Hardacre & Collins, 2018). Awino (2016) identified such universal value chain management practices as operating policies, linkages within value chain firms, improved performance, information technology systems, strategic alliance, performance measures, goal orientation, customer relationships, guidelines and procedures, supplier selection and supplier evaluation found to compare with best practices globally

However, these practices although compared with best practices globally, require a further study to establish other value management practices that add value to both the firm and customers. This research therefore seeks to explore such practices as procurement and sourcing, operational excellence, value chain network design, and distribution. Although not universal, value from these practices can only be achieved if and when an organization connects and convenes key players, develop the right strategies, practices seeing the system through one another's eyes, builds partnerships, evaluates and scales up the value chain, and institutionalize successful approaches (Schweitzer, et al., 2018)

With the advancement in technology, there has been the introduction of automated systems and complex machinery has revolutionized mass production (Nurazwa et al 2019). Increased output has slashed manufacturing costs, which in turn has led to cheaper costs on the high street. Electronic gadgets are now cheaper than ever, which in part is down to the low cost of manufacturing (Amy, Sithole & Buchana, 2022). Other several benefits are attributed to the adoption of technology. They include: increasing the efficiency of your business systems; streamlining your relationships with suppliers and customers; increasing the speed, flexibility, and efficiency of the production process; and expanding the range of what can be produced (Mkala, Wanjau & Kyalo, 2018).

### **Statement of the Problem**

The manufacturing sector has a great potential for promoting economic growth and competitiveness in a country like Kenya. Data shows that the Government of Kenya spends between 10% - 30% of the Gross Domestic Product on procurement alone (Maria, 2022). In Kenya, the manufacturing sector is the third leading sector contributing to GDP in Kenya. It contributed 11% of the GDP in 2020 (Kenya Association of Manufacturers, 2020). Despite the importance of the food manufacturing industry in Kenya, it has been experiencing a lot of turbulence in the recent past including a drop in the GDP, an increasing imbalance of trade, and the exiting of large multinationals (Magutu, Aduda & Nyaoga, 2020). In addition to that, food manufacturing companies in Kenya have been experiencing fluctuations in profitability in their production and inbound logistics (KAM, 2019). The food manufacturing sector recorded a significant drop in performance from 4.7% to 1.6% and 2.7% to 0.2% respectively according to the World Bank Economic Update 2018. Further to this, there was a declining performance of agricultural real value-added from 5.2% in 2019 to 1.6% in 2021 (World Bank, 2022). According to the Kenya National Bureau of Statistics (KNBS) Economic Survey report of 2022, there has been a tremendous increase in the quantity of manufactured and processed food products by 3.1 percent in the year 2021 compared to a performance of 5.6 percent in 2020.

The performance was mainly driven by the processing of sugar, meat and meat products, dairy products, and bakery products. However, prepared and preserved fruits and vegetables, and animal and vegetable fats and oils registered negative performances in the

same period. Production of meat and meat products recorded a 13.1 percent performance, while dairy production registered a 10.8 percent performance in 2021, compared to a slump of 6.7 percent in 2020. The grain milling subsector grew by 6.2 percent in 2021 compared to 11.7 percent the previous year as the beverages and tobacco sector showed a 9.2 percent performance (KNBS, 2022). According to a recent report from ING, technological development helps food manufacturers produce more efficiently for a growing world population. According to TechCrunch (2018), the use of robots and machines in the food industry has made the production process much quicker and more efficient while also lowering costs, labor, and potential worker injuries at a minimum. There is no doubt that technology has transformed the food industry for the better, and as technology advances.

Various studies have been conducted on operations management and organization performance and performance. For instance; Gadwe and Sangode (2019) conducted a study on the impact of operations management activities on operational performance in service organizations. Mwale (2016) conducted a study on operations management and organizational performance of large manufacturing firms in Nairobi, Kenya. Sukatia (2016) researched operations management on value chain Performance. Bosire (2018) conducted a study on the effects of operation management on organizational performance in the automotive industry in Kenya: a case study of Scania East Africa Limited. However, none of these studies focused on the performance of food and beverage manufacturing firms in Kenya.

### **General Objective of the Study**

The main focus of this study was to establish the influence of operations management on the performance of food and beverage manufacturing firms in Kenya.

### **Theoretical Review**

Theories are formulated to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge within the limits of critical bounding assumptions (Swanson, 2017). The theoretical review is the structure that can hold or support a theory of a research study. The theoretical review introduces and describes the theory that explains why the research problem under study exists (Ravitch & Carl, 2016). The following section analyses the theories that are relevant to the existing study. This study was anchored on Systems Theory

### **Systems Theory**

Systems theory was founded by the biologist Ludwig von Bertalanffy in the year 1972. Systems theory is an interdisciplinary approach that views complex phenomena as interconnected systems, consisting of components or elements that interact with each other to form a unified whole (Mwale, 2016). It provides a framework for understanding the behaviour, structure, and dynamics of systems, ranging from natural ecosystems to organizations and social systems. A system is a set of interrelated components or elements that work together to achieve a common purpose. These components can be physical entities, processes, or abstract concepts. Systems can be further divided into subsystems, which are smaller systems within the larger system. Each subsystem contributes to the overall functioning and behaviour of the entire system (Gadwe & Sangode, 2019).

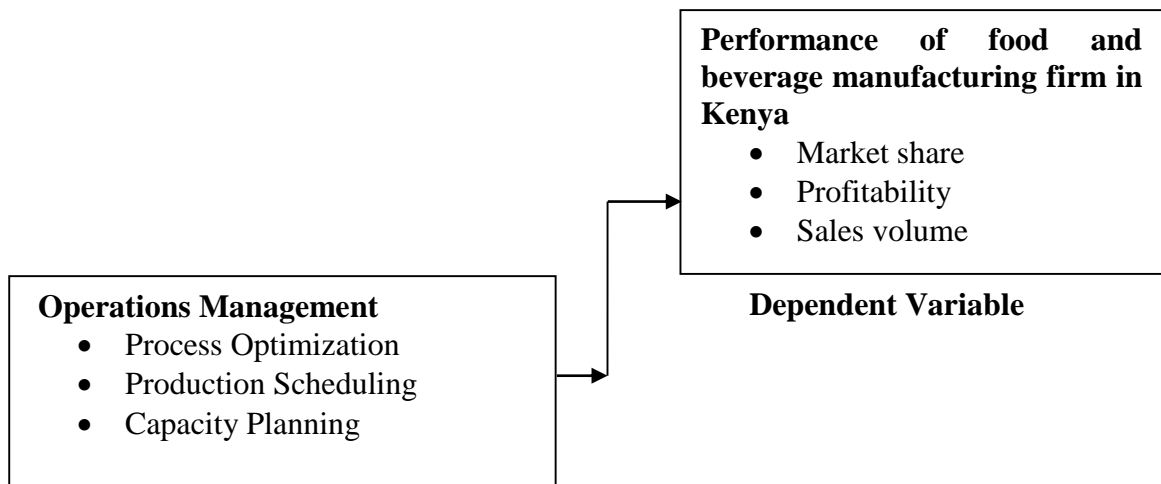
Systems theory emphasizes the importance of interactions and relationships between the components of a system (Sukatia, 2016). The behavior and characteristics of a system are

not solely determined by the individual components but also by the relationships and interactions among them. Changes in one component or subsystem can have ripple effects on other components or subsystems within the system. Systems theory recognizes that systems exhibit emergent properties that cannot be explained by studying the individual components in isolation. These emergent properties arise from the interactions and relationships between the components, giving the system unique characteristics and behaviours. Systems theory also emphasizes the holistic perspective, viewing the system as more than the sum of its parts. Systems theory often focuses on open systems, which interact with their environment and exchange inputs, outputs, and information with it. Open systems are influenced by external factors and adapt to changes in their environment. They maintain a dynamic equilibrium through continuous interaction and feedback with their surroundings (Bosire, 2018).

Systems theory encourages a holistic view of operations, considering the interconnections and relationships between various components involved in the manufacturing process (Bosire, 2018). Food and beverage manufacturing firms comprise subsystems such as procurement, production, quality control, logistics, and distribution. Systems thinking helps identify how these subsystems interact and influence each other, enabling a comprehensive understanding of the overall manufacturing operation (Walker & Strickler, 2020). This theory therefore used to assess the influence of operations management on the performance of food and beverage manufacturing firms in Kenya

## Conceptual Framework

Conceptual framework refers to a diagrammatic set of interrelated ideas on a particular phenomenon and it's characterized by cause-and-effect relationships which help interpret more and hence make it easily understandable. This makes it more straightforward and also easily predictable (Svinicki, 2019). It is a diagram that explains the relationship between dependent and independent variables. In this study, the independent variables include operations management while the dependent variable was the performance of food manufacturing firms in Kenya.



**Figure 2.1: Conceptual Framework**

## **Operations Management**

Operations, as a part of the value chain analysis model, refers to the core production activities that transform inputs into finished products or services. It encompasses the processes and activities directly involved in creating value for the organization's customers (Mwale, 2016). Operations play a vital role in the overall value-creation process and can significantly impact a company's competitive advantage. Operations aim to optimize the utilization of resources, including materials, equipment, labour, and technology, to achieve efficient production processes. The focus is on improving productivity, reducing waste, and enhancing cost-effectiveness. Efficient operations contribute to cost reduction, better profit margins, and competitive pricing. Operations entail; process Optimization, Production Scheduling, and capacity planning (Gadwe & Sangode, 2019).

Process optimization refers to the systematic improvement of processes within an organization to maximize efficiency, quality, productivity, and overall performance (Sukatia, 2016). It involves analysing and re-evaluating existing processes, identifying areas for improvement, and implementing changes to achieve better outcomes. The first step in process optimization is to map out the current process, including all its steps, inputs, outputs, and dependencies. Process mapping helps visualize the workflow, and identify bottlenecks, redundancies, and areas of inefficiency (Sukatia, 2016). Analyzing the process flow and performance metrics helps understand the current state and potential areas for improvement (Bosire, 2018).

Production scheduling is a critical aspect of operations management that involves determining the timing and sequencing of production activities to efficiently meet customer demand while optimizing the use of resources (Bosire, 2018). It entails creating a detailed plan for when and how each task in the production process will be executed. Effective production scheduling ensures smooth operations, minimizes bottlenecks, reduces lead times, and maximizes overall productivity. Accurate demand forecasting is essential for effective production scheduling. By analysing historical data, market trends, customer orders, and other relevant factors, organizations can estimate future demand and plan production accordingly. Demand forecasts provide the basis for determining production volumes and scheduling timelines. Production scheduling takes into account the availability of various resources required for production, including labour, machinery, materials, and facilities. By considering resource constraints, organizations can ensure that production schedules are feasible and achievable within the available capacity (Walker & Strickler, 2020).

Capacity planning is a critical aspect of operations management that involves determining the optimal level of resources required to meet the demand for goods or services (Wathome, 2018). It entails analysing current and future demand patterns, evaluating available resources, and making informed decisions to achieve a balance between capacity and customer needs. The goal of capacity planning is to ensure that an organization has the right level of capacity to meet demand without incurring excessive costs or experiencing shortages (Walker & Strickler, 2020). It involves both short-term and long-term considerations, taking into account factors such as production capabilities, workforce capacity, equipment and facilities, and financial resources. Effective capacity planning helps organizations optimize resource utilization, minimize costs, enhance customer satisfaction, and improve operational efficiency. It enables businesses to respond to demand fluctuations, plan for future growth, and make informed decisions regarding investments in infrastructure and resources (Bosire, 2018).

## **Empirical Review**

### **Operations Management**

Gadwe and Sangode (2019) conducted a study on the impact of operations management activities on operational performance in service organizations. From this study, it is observed that in all the service organizations all operations management activities like scheduling, measurement, service processes, logistics, service, support, facility, features, and efficiency are implemented at different extents. It is found that the highly implemented activities include factors of scheduling, service, features, and service process in the service organizations. It is seen that customer services, processing time/speed, work scheduling, staff scheduling, responsiveness, on-time delivery, quality control, maintenance, resource capacity planning, just-in-time, and procurement purchasing are highly implemented operations management activities.

Mwale (2016) conducted a study on operations management and organizational performance of large manufacturing firms in Nairobi, Kenya. The research design involved a cross-sectional survey of 46 large manufacturing companies in Nairobi, Kenya. Data was collected using a questionnaire that was administered through the “drop and pick” method. Mean and standard deviation were used to analysed objective one whereas regression analysis was used to analysed the effect of value chain management practices and organizational performance among large manufacturing firms in Kenya. The findings are presented in tables. There is a significant relationship between operations management and organizational performance.

Sukatia (2016) researched operations management on value chain Performance. The main tools of data collection instrument used was a questionnaire which was administered to a total sample of 200 managers classified by job title respondents were also classified by their job functions are corporate executive, purchasing, manufacturing/production, distribution/logistic, SCM, transportation, material, and operation from Malaysia manufacturing industry. The response rate was 62% while 51% was usable questionnaires. Sample selection was based on convenience sampling. The data were analysed using mean, standard deviation, and correlation between independent and dependent variables. The analyses involved statistical methods such as reliability and validity tests and multiple regressions. The finding showed that operations management has a significant relationship with value chain performance statically.

Bosire (2018) conducted a study on the effects of operation management on organizational performance in the automotive industry in Kenya: a case study of Scania East Africa Limited. The study employed the use of descriptive survey research design to study the effects of operation strategies on organizational performance in the automotive industry in Kenya. It focused on 97 employees of Scania East Africa Limited. Descriptive statistics were percentages, frequencies, mean, and standard deviation. Inferential correlation was used. Data was presented in the form of frequency tables, charts, graphs, and written reports. The study findings showed a positive correlation between customer-driven strategies, product development strategies, personnel development strategies, competitive advantage strategies, and organization performance. The study concluded that organizations used various customer strategies that attract more new customers hence achieving a wider range of markets improved performance and loyalty to the organization increased product flexibility and superior customer value delivery impacts positively organizational performance.

Walker and Strickler (2020) conducted a study on the impact of operations management practices on firm performance: An Empirical Analysis of Vietnam's Mechanical Firms. The statistical methods used are descriptive statistics, reliability analysis, and regression analysis for hypothesis testing. The findings present, firstly, the extent of operations management practices implemented in Vietnam's mechanical firms is fairly high; secondly, the impact of these practices on firm performance was positive. Equipment layout and supplier quality management are positively and significantly related to financial performance; whereas equipment layout, JIT delivery by supplier, Kanban, cleanliness and organization, and information and feedback are positively and significantly related to non-financial performance. This result suggests to mechanical firms in Vietnam that they should employ these practices to maintain and improve performance as well as to gain competitive advantages.

## RESEARCH METHODOLOGY

### Research Design

This study adopted a cross-sectional survey research design. This design suits the scenario where the correlation of two variables is to be determined at an instant in time (Mugenda, 2008; Cooper & Schindler, 2019). Cross-sectional surveys are versatile and therefore give accurate means of evaluating information while enabling the researcher to confirm whether there are significant causalities among the variables (Harlow, 2017). Further, the design offers the researcher the opportunity to capture population characteristics and test hypotheses quantitatively and qualitatively. Orodho's (2018) cross-sectional research design analyses the cause-effect relationship between two or more variables. Hence the design was appropriate to the study because the research sought to establish a cause-effect relationship. The study adopted a cross-sectional since it uses theories and hypotheses to account for the forces that cause a certain phenomenon to occur (Cooper & Schindler, 2018).

Cross-sectional surveys are diverse; thus, they provide an accurate means of analysing information while also allowing the researcher to confirm whether there are substantial causal relationships between the variables (Harlow, 2019). Furthermore, the design allowed the researcher to collect demographic features and statistically and qualitatively test hypotheses. Previous researchers that have utilized a cross-sectional survey approach are (Musawir, Serra, Zwikael & Imran, 2017; Joslin & Müller, 2016; Pinyarat et al., 2018; Ihab, 2017; Asadullah et al., 2019).

### Research Philosophy

This study adopted a positivist research paradigm. Cooper and Schindler (2017) assert that the positivist research paradigm takes the quantitative approach and is based on real facts, objectivity, neutrality, measurement, and validity of results. The roots of positivism lie particularly with empiricism, that is, all factual knowledge is based on positive information gained from observable experiences, and only analytic statements are allowed to be known as true through reason alone. Positivism maintains that knowledge should be based on facts and not abstractions; thus knowledge is predicated on observations and experiments based on existing theory (Cooper & Schindler, 2017). Epistemological research in the positivist paradigm is how the social world can be investigated as a natural science. Hypotheses have to be tested by empirical approaches. Koul (2018) posits that since the focus of the positivist paradigm is to discover the 'truth' through empirical investigation, the quality standards under this paradigm are validity and reliability. The positivist research philosophy was used in this study because it is grounded in theory, it uses quantitative methods, and the findings obtained through positivist research can be generalized to the larger population

### Target Population

The target population is a collection of research components that refers to all members of an actual or imaginary group of people, events, or objects to whom the findings should be applied (Prabhat & Meenu, 2019). It can also be described as the set of sampling units or cases that the researcher is interested in. The target population, according to Kothari (2019), is a physical representation that contains all the units that could be members of the sample. A population can alternatively be thought of as the whole collection of elements from which the study wants to conclude. Mugenda and Mugenda (2018) define a population as a group of people, objects, persons, or items from which a sample is extracted for analysis and to which generalizations can be made of the whole population. According to KAM (2022), there are 246 food and beverage manufacturing firms in number. These firms are grouped

into 8 categories including: Alcoholic Beverages & Spirits, Bakers & Millers, Cocoa, Chocolate and Sugar Confectionery, Dairy Products, Juices / Waters / Carbonated Soft Drinks, Slaughtering, Preparation, and Preservation of Meat, Tobacco, and Vegetable Oils. The unit of analysis was therefore the firms while the unit of observation was the procurement managers working in the firms. The target population is presented in Table 3.1.

**Table 3.1: Target Population**

Category	Target population
Alcoholic Beverages & Spirits	43
Bakers & Millers	39
Cocoa, Chocolate and Sugar Confectionery	31
Dairy Products	28
Juices / Water / Carbonated Soft Drinks	40
Slaughtering, Preparation, and Preservation of Meat	30
Tobacco	5
Vegetable Oils	30
<b>Total</b>	<b>246</b>

**Source: KAM (2022)**

### Sample and Sampling Technique

The study's sample size was reached using the Krejcie and Morgan sample size determination formula (Russell, 2018). Using this formula, a representative sample was obtained. The study's total population is 251. Simple random sampling was used to select 139 respondents from the total population.

formula used or arriving at the sample size is; 
$$= \frac{x^2 NP(1-P)}{(E^2(N-1)) + x^2 P(1-P)}$$

Where:

n=sample size

$x^2$ =Chi-square for the specified confidence level at 1 degree of freedom

N=Population size (246)

P = is the proportion in the target population estimated to have characteristics being studied. As the proportion was unknown, 0.5 was used.

Chuan and Penyelidikan (2016) indicate that the use of 0.5 provides the maximum sample size and hence it is the most preferable.

ME=desired margin of Error (Expressed as a proportion)

$$= \frac{1.96^2 251 * 0.5 * 0.5}{(0.05^2 * 251) + (1.96^2 * 0.5 * 0.5)}$$

$$= 152$$

**Table 3.2: Sampling Table**

<b>Category</b>	<b>Target population</b>	<b>Sample Size</b>
Alcoholic Beverages & Spirits	43	26
Bakers & Millers	39	24
Cocoa, Chocolate and Sugar Confectionery	31	19
Dairy Products	28	17
Juices / Water / Carbonated Soft Drinks	40	22
Slaughtering, Preparation, and Preservation of Meat	30	18
Tobacco	5	3
Vegetable Oils	30	18
<b>Total</b>	<b>246</b>	<b>152</b>

### **Data Collection Instruments**

This study used both primary and secondary data. Secondary data refers to information that has been collected, processed, and documented by others for purposes other than the current research or study being conducted (Kultar, 2017). It is data that has already been gathered and made available in various forms, such as research reports, government publications, academic journals, databases, and websites (Singpurwalla, 2019). Secondary data was used to measure performance. Primary data (both qualitative and quantitative) was used in this study. Greener (2018) indicates that primary data is made up of first-hand information that has not been processed or analyzed. A questionnaire which is a form of quantitative data collection tool was used to collect primary data. The study's primary data was obtained using semi-structured questionnaires. This allows the study to collect quantitative data through the structured questions; the structured questions were useful as they enabled easy analysis of data and reduced the time and resources needed for data collection. On the other hand, the unstructured questionnaires will help the researcher get in-depth responses from the respondents as they give them a chance to provide views and suggestions on the various issues not captured by the structured questions

### **Data Collection Procedures**

The researcher obtained a letter of confirmation from Jomo Kenyatta University of Agriculture and Technology for the collection of data. A research permit was also obtained from the National Commission for Science, Technology, and Innovation. The collection of data was conducted by use of the drop-off and pick-up-later method and the questionnaires were collected after one week. This accorded the respondents enough time to answer the questions. The researcher used this method due to the variances in respondents' time availability.

### **Pilot Study**

The researcher carried out a pilot study to test for reliability and validity of the data collection tool. Results from the pilot test helped correct the challenges encountered before undertaking the final study. The pretesting sample was made of 15 respondents, representing 10% of the sample size. Piloting was done in large and small food manufacturing companies which were not part of the final study but have similar characteristics to manufacturing companies. The results from the pilot test were not used in the main study

## **Data Processing and Analysis**

Quantitative and qualitative data were generated from the closed-ended and open-ended questions, respectively. Qualitative data was analyzed on a thematic basis and the findings were provided in a narrative form. Before the data could be analyzed, the researcher ensured the data was checked for completeness, followed by data editing, data coding, data entry, and data cleaning. Inferential and descriptive statistics were employed for the analysis of quantitative data with the assistance of Statistical Package for Social Sciences (SPSS version 28). To summarize the respondent's responses about their views on the various aspects of the variables, the respondents' demographic information analysis was undertaken using descriptive statistics (Bhattacharjee, 2016).

Descriptive statistics such as frequency distribution, mean (measure of dispersion), standard deviation, and percentages were used. Descriptive statistics therefore enables researchers to present the data in a more meaningful way, which allows for simpler and easier interpretation (Singpurwalla, 2017). Inferential data analysis was conducted by use of univariate regression analysis, Pearson correlation coefficient, and multiple regression analysis. The inferential statistic is used to make judgments about the probability that an observation is dependable or one that happened by chance in the study. Before conducting inferential statistics, the researcher conducted diagnostic tests.

### **Regression Analysis**

A multiple regression model was used to test the significance of the influence of the independent variables on the dependent variable. Multiple regression analysis was used to establish the influence of operations management on the performance of food and beverage manufacturing firms in Kenya. Regression analysis attempts to determine whether a group of variables together predict a given dependent variable and, in this way, attempts to increase the accuracy of the estimate (Mugenda & Mugenda, 2003). The use of regression model is ideal due to its ability to show whether a positive or a negative relationship exists between independent and dependent variables (Mason, Lind, & Marchal, 1999).

### **Statistical Model**

The multiple regression equation model was as illustrated below: -

$$Y = \beta_0 + \beta_1 X_1 + e$$

Where:

Y is the dependent variable (Performance of food and beverage manufacturing firms in Kenya),

$\beta_0$  is the constant (Co-efficient of intercept)

$\beta_1$ , is the slope of the regression equation,

$X_1$  is the Operations Management independent variable,

while

e is an error term

The equation was solved using statistical model where SPSS was applied to generate the t- value.

## RESEARCH FINDINGS AND DISCUSSION

### Descriptive Analysis

In this section, the study presents findings on Likert scale questions where respondents were asked to indicate their level of agreement with various statements that relate to the relationship between operations management and the performance of food and beverage manufacturing firms in Kenya. They used a 5-point Likert scale where 1-strongly disagree, 2-disagree, 3-moderate, 4-agree, and 5-strongly agree. The means and standard deviations were used to interpret the findings where a mean value of 1-1.4 strongly disagreed, 1.5-2.4 disagree, 2.5-3.4 neutral, 3.5-4.4 agree and 4.5-5 strongly agree. Standard deviations greater than 1 implied great deviation in data points from the mean. This section of the study also presented findings from open-ended questions which were presented in prose form.

### Operations Management

The objective of the study was to assess the influence of operations management on the performance of food and beverage manufacturing firms in Kenya. Respondents were asked to indicate the extent to which they agree or disagree with statements relating to the effect of operations management on the performance of food manufacturing firms in Kenya. Table 4.1 presents a summary of the findings obtained.

About Process Optimization, the findings showed that the respondents agreed on average ( $M= 3.964$ ,  $SD= 0.896$ ) that the efficiency of their production processes enables us to minimize waste and maximize resource utilization as supported by 52.9% agreeing and 26.1% strongly agreeing. Also, respondents agreed ( $M= 3.921$ ,  $SD=1.007$ ) that they effectively manage inventory levels to ensure a continuous supply of raw materials for production as shown by 61.1% agreeing and 20.5% strongly agreeing. Further, respondents agreed ( $M= 3.814$ ,  $SD= 0.915$ ) that their quality control measures effectively ensure that their food products meet regulatory standards and customer expectations as supported by a majority of 56.2% agreeing and 20.6% strongly agreeing. The study findings concur with those of Gadwe and Sangode (2019) who established that process mapping helps visualize the workflow, and identify bottlenecks, redundancies, and areas of inefficiency.

Concerning production scheduling, the respondents agreed ( $M= 3.808$ ,  $SD= 0.895$ ) that they integrate technology and automation into their operations to improve efficiency and productivity as supported by 55.8% and 18.6% agreeing and strongly agreeing respectively. In addition, respondents agreed ( $M=3.756$ ,  $SD= 0.87$ ) that their collaboration with suppliers ensures a reliable and cost-effective supply chain for raw materials and ingredients supported by 54.5% agreeing and 13.6% strongly agreeing. Also, respondents agreed ( $M= 3.743$ ,  $SD= 0.734$ ) that they monitor and optimize the performance of their production lines to achieve maximum output and minimize downtime supported by 46.5% and 20.9% agreeing and strongly agreeing respectively. Bosire, (2018) revealed that production scheduling is a critical aspect of operations management that involves determining the timing and sequencing of production activities to efficiently meet customer demand while optimizing the use of resources

Regarding capacity planning, the respondents agreed on average ( $M= 3.732$ ,  $SD= 0.909$ ) that their organization has a formal capacity planning process to ensure adequate production capabilities supported by 57.3% agreeing and 15.9% strongly agreeing. Respondents also agreed ( $M= 3.635$ ,  $SD= 0.893$ ) that they consider both short-term and long-term demand forecasts when determining production capacity 56.9 % agreeing and

11.4% strongly agreeing. Also, they agreed (M= 3.515, SD= 0.636) that cross-functional collaboration is key in their capacity planning process, involving production, sales, and supply chain teams with 42.7% agreeing and 16.4% strongly agreeing. The results are in line with the findings of Wathome, (2018) who established that effective capacity planning helps organizations optimize resource utilization, minimize costs, enhance customer satisfaction, and improve operational efficiency. It enables businesses to respond to demand fluctuations, plan for future growth, and make informed decisions regarding investments in infrastructure and resources.

The aggregate mean of 3.765 (SD= 0.862) indicates that respondents agreed on average on the influence of operations management on the performance of food and beverage manufacturing firms in Kenya. These findings align with Gadwe and Sangode (2019) who conducted a study on the impact of operations management activities on operational performance in service organizations. Their findings revealed that operations management activities such as scheduling, service processes, logistics, and efficiency were highly implemented in service organizations. This suggests that effective implementation of these activities can contribute to improved operational performance. Also, Mwale (2016) investigated the relationship between operations management and organizational performance and found a significant relationship between operations management and organizational performance. This highlights the importance of effective operations management practices in enhancing overall performance

**Table 4. 1: Descriptive Statistics on Operations Management**

Statements	1 %	2 %	3 %	4 %	5 %	Mean	Std. Dev.
<b>Process Optimization</b>							
The efficiency of our production processes enables us to minimize waste and maximize resource utilization.	0.7	7.2	13	52.9	26.1	3.964	0.896
We effectively manage inventory levels to ensure a continuous supply of raw materials for production.	2.1	5.8	10.5	61.1	20.5	3.921	1.007
Our quality control measures effectively ensure that our food products meet regulatory standards and customer expectations.	4.6	6.7	11.9	56.2	20.6	3.814	0.915
<b>Production Scheduling</b>							
We integrate technology and automation into our operations to improve efficiency and productivity.	2.9	6.4	16.3	55.8	18.6	3.808	0.895
Our collaboration with suppliers ensures a reliable and cost-effective supply chain for raw materials and ingredients.	0.6	5.1	26.1	54.5	13.6	3.756	0.87
We monitor and optimize the performance of our production lines to achieve maximum output and minimize downtime.	1.1	11.8	19.8	46.5	20.9	3.743	0.734
<b>Capacity Planning</b>							
Our organization has a formal capacity planning process to ensure adequate production capabilities	1.2	13.4	12.2	57.3	15.9	3.732	0.909
We consider both short-term and long-term demand forecasts when determining production capacity	1.2	13.8	16.8	56.9	11.4	3.635	0.893
Cross-functional collaboration is key in our capacity planning process, involving production, sales, and supply chain teams	4.1	15.8	21.1	42.7	16.4	3.515	0.636
<b>Aggregate Score</b>						<b>3.765</b>	<b>0.862</b>

When asked about the other ways in which operations management affects the performance of food manufacturing firms in Kenya, respondents provided valuable insights into various aspects of operations management that impact overall performance. Respondents highlighted the significance of efficient production processes, one individual stating,

"Streamlining our production operations, optimizing workflows, and ensuring smooth coordination among different departments have significantly improved our productivity and overall performance." They also emphasized the importance of quality control in operations management. They explained that implementing rigorous quality control measures and adhering to strict standards throughout the production process has helped them maintain high product quality, which in turn enhances customer satisfaction and brand reputation. Furthermore, respondents recognized the role of inventory management in operations management. A respondent explained, "Effective inventory management practices, such as accurate demand forecasting, just-in-time inventory systems, and efficient stock replenishment strategies, help us minimize holding costs, reduce wastage, and ensure optimal inventory levels, thereby improving our overall performance."

Respondents also highlighted the significance of effective value chain management. A respondent stated, "Efficient coordination with suppliers, timely procurement of raw materials, and streamlined logistics operations have enabled us to minimize lead times, reduce stockouts, and enhance our ability to meet customer demands, ultimately improving our performance." The importance of continuous improvement and process optimization was brought up. They mentioned, that regularly analyzing their processes, identifying bottlenecks, and implementing process improvements based on lean manufacturing principles have led to increased efficiency, reduced waste, and improved overall performance. Additionally, the role of workforce management in operations management was emphasized. A respondent stated, "Investing in training and development programs, promoting a culture of employee empowerment and engagement, and ensuring a skilled and motivated workforce are crucial aspects of operations management that contribute to our performance and competitiveness." From streamlining production processes and ensuring quality control to effective inventory management, value chain coordination, process optimization, and workforce management, operations management plays a critical role in enhancing performance and driving success in the industry.

When asked to suggest ways of improving operations management to benefit food manufacturing firms, respondents provided valuable insights on enhancing operational efficiency and effectiveness. Respondent emphasized the importance of leveraging technology, stating, "Investing in advanced operations management systems and automation can streamline processes, improve data accuracy, and enhance overall operational efficiency." Another suggestion focused on optimizing supply chain integration. A respondent mentioned, "Developing strong relationships with suppliers, implementing collaborative planning processes, and adopting real-time communication systems can improve supply chain visibility, reduce lead times, and enhance operational performance." Respondents also highlighted the significance of continuous process improvement. They explained that implementing lean manufacturing principles, conducting regular process evaluations, and involving employees in problem-solving initiatives can drive operational excellence, reduce waste, and improve overall efficiency.

Additionally, the importance of effective resource allocation and capacity planning was emphasized. A respondent mentioned, "By conducting robust demand forecasting, optimizing production schedules, and aligning resources accordingly, food manufacturing firms can ensure optimal utilization of resources, minimize downtime, and increase productivity." Another aspect that emerged was the need for talent management and skills development. A respondent suggested, "Investing in training programs, fostering a culture of continuous learning, and nurturing a skilled workforce can enhance operational capabilities, promote innovation, and improve overall performance." Furthermore, respondents stressed the significance of implementing quality management systems.

Adopting quality assurance processes, conducting regular inspections, and implementing rigorous quality control measures can ensure consistent product quality, customer satisfaction, and brand reputation. Lastly, sustainability practices were mentioned as a way to improve operations management. A respondent recommended, "Integrating environmentally-friendly practices, such as waste reduction, energy efficiency, and responsible sourcing, can contribute to operational efficiency, cost savings, and environmental stewardship." The results are in line with the findings of Mwale (2016) who established that organizations used various customer strategies that attract more new customers hence achieving a wider range of markets improved performance and loyalty to the organization increased product flexibility and superior customer value delivery impacts positively organizational performance.

### **Performance of Food and Beverage Manufacturing Firms in Kenya**

The performance of food and beverage manufacturing firms was measured through market share, profitability, and sales. Statistics presented in this section cover a period of 5 years from the years 2018 to 2022 and are done in billions.

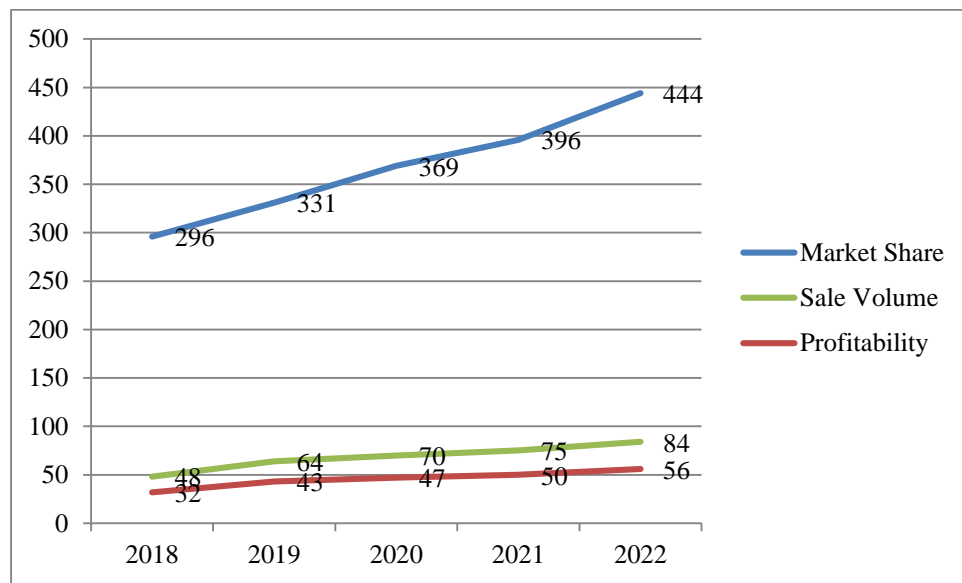
Results for the market share of food and beverage manufacturing firms in Kenya for the period between 2018 and 2022 are shown in Table 4.2. In the year 2018, the market share for food and beverage manufacturing firms was 296 billion which increased to 331 billion in 2019. In 2020, the market share was 369 billion before increasing to 396 billion in the following year (2021) and finally 444 billion in the year 2022

Results for the profitability of food and beverage manufacturing firms in Kenya for the period between 2018 and 2022 are shown in Table 4.2. In the year 2018, the profitability of food and beverage manufacturing firms was 32 billion which increased to 43 billion in 2019. In 2020, the profitability was 47 billion before increasing to 50 billion in the following year (2021) and finally 56 billion in the year 2022. Magutu, Aduda and Nyaoga, (2017) revealed that Organizations which are able to cater for their expenses and retain savings are profitable and this is a sign of upwards performance.

Results for the sales volume of food and beverage manufacturing firms in Kenya for the period between 2018 and 2022 are shown in Table 4.2. In the year 2018, the sales volume of food and beverage manufacturing firms was 48 billion which increased to 64 billion in 2019. In 2020, the sales volume was 70 billion before increasing to 75 billion in the following year (2021) and finally 84 billion in the year 2022. Beth, Burt and Capacino, (2019) revealed that sales volume is a key performance indicator in measuring performance of an organization.

**Table 4. 2: Organization Performance**

Year	2018	2019	2020	2021	2022
Market Share (Billions)	296	331	369	396	444
Profitability (Billions)	32	43	47	50	56
Sales Volume (Billions)	48	64	70	75	84



**Figure 4. 1: Organization Performance**

### Test for Hypothesis Three

The objective of the study was to evaluate the relationships between operations management on performance of food and beverage manufacturing firms in Kenya. The associated null hypothesis was that operations management has no effect on performance of food manufacturing firms in Kenya. A univariate analysis was conducted to test the null hypothesis.

R is the correlation coefficient, which indicates the strength and direction of the relationship between the predictor and outcome variables. In this case,  $R = .788$  suggests a strong positive relationship between operations management and the outcome variable (performance of food manufacturing firms in Kenya). R Square is the coefficient of determination, which indicates the proportion of variance in the outcome variable that can be explained by the predictor variable. In this case,  $R \text{ Square} = .621$  suggests that 62.1% of the variation in the performance of food manufacturing firms in Kenya can be explained by operations management.

The remaining 38.4% variation in performance of food manufacturing firms in Kenya suggests that there are other important factors that influence the outcome variable, and

further research may be needed to identify these factors and improve the predictive accuracy of the model.

**Table 4.3: Model Summary for Operations Management**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.788 <sup>a</sup>	.621	.619	.40181

a. Predictors: (Constant), operations management

The analysis of variance was used to determine whether the regression model is a good fit for the data. From the analysis of variance (ANOVA) findings in Table 4.4, the study found out that  $\text{Prob}>F(1, 220) = 0.000$  was less than the selected 0.05 level of significance. This suggests that the model as constituted was fit to predict performance of food manufacturing firms in Kenya. Further, the F-calculated, from the table (22.502) was greater than the F-critical, from F-distribution tables (3.915) supporting the findings that Operations management can be used to predict performance of food manufacturing firms in Kenya.

**Table 4.4: Analysis of Variance for Operations Management**

Model	Sum Of Squares	Df	Mean Square	F	Sig.
Regression	6.413	1	6.413	22.502	.000 <sup>b</sup>
1 Residual	36.52	128	.285		
Total	42.933	129			

A. Dependent Variable: performance of food manufacturing firms

B. Predictors: (Constant), Operations management

From the results in Table 4.5, the following regression model was fitted.

$$Y = 1.279 + 0.725 X_3$$

( $X_3$  is Operations management)

The coefficient results showed that the constant had a coefficient of 1.279, suggesting that if operations management was held constant at zero, performance of food manufacturing firms in Kenya would be 1.279 units. In addition, results showed that operations management coefficient was 0.725, indicating that a unit increase in operations management would result in a 72.5% improvement in performance of food manufacturing firms in Kenya. It was also noted that the P-value for operations management coefficient was 0.000, which is less than the set 0.05 significance level, indicating that operations management was significant.

Based on these results, the study rejected the null hypothesis and accepted the alternative that there is a positive significant influence of operations management on the performance of food manufacturing firms in Kenya. The finding is consistent with that of a study by Gadwe and Sangode (2019) who showed that operations management has a significant relationship with value chain performance statically. It is found that the highly implemented activities include factors of scheduling, service, features, and service process in the service organizations. It is seen that customer services, processing time/speed, work scheduling, staff scheduling, responsiveness, on-time delivery, quality control, maintenance, resource capacity planning, just-in-time, and procurement purchasing are highly implemented operations management activities

**Table 4.5: Beta Coefficients for Operations Management**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.279	0.226		5.659	.000
Operations management	.725	.117	.785	6.208	.000

a. Dependent Variable: performance of food manufacturing firms in Kenya

## **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

### **Summary of Findings**

#### **Operations Management**

The objective of the study was to assess the influence of operations management on performance of food and beverage manufacturing firms in Kenya. The study found that operations management has a positive and significant influence on performance of food and beverage manufacturing firms in Kenya. From the results, the respondents agreed that the efficiency of their production processes enables us to minimize waste and maximize resource utilization. In addition, the respondents agreed that they effectively manage inventory levels to ensure a continuous supply of raw materials for production. Further, the respondents agreed that their quality control measures effectively ensure that our food products meet regulatory standards and customer expectations.

Regarding production scheduling, the respondents agreed that they integrate technology and automation into our operations to improve efficiency and productivity. Further, the respondents agreed that collaboration with suppliers ensures a reliable and cost-effective supply chain for raw materials and ingredients. Further, the respondents agreed that they monitor and optimize the performance of our production lines to achieve maximum output and minimize downtime. The respondents further indicated that their organization has a formal capacity planning process to ensure adequate production capabilities. In addition, it was revealed that manufacturing firms consider both short-term and long-term demand forecasts when determining production capacity. The respondents also agreed that cross-functional collaboration is key in their capacity planning process, involving production, sales, and supply chain teams

### **Conclusions**

#### **Operations Management**

The null hypothesis for this variable was 'Operations management has no effect on performance of food manufacturing firms in Kenya.' However, the study found that operations management is statistically significant in explaining performance of food manufacturing firms in Kenya. The influence was found to be positive, indicating that an increase in operations management would lead to an increase in performance of food manufacturing firms. Therefore, the study concluded that operations management has a positive and significant relationship with performance of food manufacturing firms in Kenya.

### **Recommendations**

#### **Operations Management**

Manufacturing firms should reduce excess inventory by implementing just-in-time (JIT) inventory systems. This minimizes carrying costs, reduces the risk of waste due to product expiration, and optimizes working capital. In addition, the firms should develop standardized work procedures and ensure that all employees follow these procedures rigorously. This will lead to consistent product quality and efficient production processes

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