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LEAN MANAGEMENT PRACTICES AND SUSTAINABLE OPERATIONS OF FOOD AND BEVERAGE COMPANIES IN SOUTH-SOUTH NIGERIA

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Abstract

The study investigated lean management practices and sustainable operations of food and beverage companies in South-South Nigeria. The specific objective is to determine the effect of on pull system on job satisfaction and assess the effect of value stream mapping on service delivery of food and beverage companies in South-South Nigeria. A survey research design was adopted. The researcher made use of primary source of data. The total population of the study was one thousand five hundred and ten (1510). The sample size was four hundred and twenty-nine (429) derived from Godden (2004) formula. A purposive sampling and random sampling technique was adopted. Regression model was used to test the hypotheses of the study. A total number of four hundred and twenty-nine (429) questionnaire was administer to the respondents at the selected foods and beverage firms in South-South, Nigeria seventy-one (71) questionnaire were lost with the percentage ratio of 16.6%, while three hundred and fifty eight (358) questionnaire were retrieved with the percentage ratio of 83.4% which was suitable for the study to carry out the analysis. The findings of the study found out that pull system has a significant effect on job satisfaction of food and beverage companies in South-South Nigeria. Value stream mapping has a significant effect on service delivery of food and beverage companies in South-South Nigeria. The study concluded that organizations that adopt lean management practices often experience

improved quality, increased efficiency, reduced costs, and higher customer satisfaction. The study recommended that companies under the study should adopt a pull-based work system where tasks are assigned based on actual demand and employees' capacity. This approach prevents workload overload, reduces stress, and allows staff to work at a manageable pace.

Introduction

Backfround of the Study

Lean is a strategy to improve an organization's performance by removing all forms of waste from the production process. Focusing on continuous process improvement, lean is the quality program that offers the most successful business improvement approaches. These methods are used to enhance company procedures, get rid of flaws, shorten cycle times, expedite delivery at a low cost, and quicken the process of finding and fixing problems in order to guarantee excellence in business and operational management (Antony, 2022). There are a number of important factors or components related to lean management. Value stream mapping and waste removal are two of the many variables that were considered in this investigation. A visual tool called value stream mapping is used to examine and record the movement of data and materials inside a process or value stream. It assists in locating inefficiencies, bottlenecks, and places that could use improvement. Elimination of waste: Recognizing and getting rid of garbage, or "muda." There are many different ways that waste can occur, including extra production, waiting, excess inventory, needless travel, flaws, over processing, and underutilization of talent. It is noteworthy that the particular metrics employed may differ based on the industry, organization, and goals of the lean management programs. The metrics chosen should support the objectives of the company and offer insightful data on how well lean techniques are working.

Lean Management (LM) has been regarded by practitioners and academics alike as one of the most effective methods capable of propelling organizations to attain operational and/or manufacturing excellence (Abdallah & Abdulsattar Al-Ali, 2016). Lean management is perceived as a successor of Toyota Production System (TPS) and due to its proven effectiveness (Afonso & Cabrita, 2020), it is recognized as one of the world's known management systems. Although the focus of lean management is on waste elimination, improved operational efficiency, value addition and enhanced employee and customer satisfaction, there is no single definition for lean (Sangwa & Sangwan, 2018). Bernardo Lopes de Andrade (2017), stated that "Lean can have four distinctly different meanings: a condition (being Lean); a process (becoming Lean); a "toolbox" (doing Lean), or a philosophy (Lean Thinking)". Lean can be: A management strategy which focuses on the elimination of waste by optimizing processes and improving customer value (Netland, 2016). A concept which seeks to help organizations attain a 'slim shape' or A cost reduction strategy, an important performance indicator across sectors including the manufacturing sector (Achanga, Shehab, Roy, & Nelder 2016). Therefore, this study examined the effect of lean management on the sustainable operations of foods and beverage firms in South-South Nigeria.

Statement of the Problem

Food and beverage companies operate in highly competitive and

dynamic environments where operational efficiency, cost control, and timely service are critical for business survival and growth. However, many of these companies face persistent challenges such as long lead times, inefficient workflows, underutilized or overburdened equipment, excessive waste, and disorganized task allocation. These operational inefficiencies often result in delays, increased costs, inconsistent product quality, and reduced customer satisfaction. The application in the lean management in food and beverage sector remains limited. Many companies have not fully integrated these practices into their operational processes, leading to suboptimal performance and limited sustainability. The food industry is one of the most dynamic and competitive sectors globally, driven by changing consumer preferences, technological advancements, and rising expectations for quality and timely service. Companies operating in this sector are under constant pressure to deliver high-quality products efficiently while minimizing operational costs and waste. Despite these pressures, many food and beverage organizations continue to face significant operational challenges that limit their performance and competitiveness.

Nash and Poly (2018), stated that among the most critical challenges are long lead times, which delay service delivery and reduce customer satisfaction; inefficient workflows, which create bottlenecks and inconsistencies in production and service processes; and underutilized or overburdened equipment, which leads to reduced productivity and frequent downtime. Additionally, many companies struggle with high levels of waste in terms of raw materials, energy, and time, which not only increase operational costs but also negatively impact environmental sustainability. The absence of structured systems for task management and workflow coordination often results in poor employee performance and low job satisfaction, further affecting operational outcomes. While lean management principles including lead time reduction, workflow optimization, equipment capacity planning, waste minimization, pull-based systems, and value stream mapping have been shown to improve efficiency, productivity, and sustainability in various industries, their adoption in the food and beverage sector remains inconsistent and fragmented. Many companies are yet to fully understand or integrate lean practices into their operations, often due to a lack of awareness, inadequate training, or perceived implementation costs. As a result, operational inefficiencies persist, limiting the ability of these companies to meet customer expectations, optimize resources, and maintain a competitive edge. It is against this backdrop that this study tends to the effect of lean management on sustainable operations of foods and beverage firms in South-South Nigeria.

Objectives of the Study

The broad objectives of the study examined lean management practices and sustainable operations of food and beverage companies in South-South Nigeria. The specific objective is to:

i. determine the effect of pull system on job satisfaction of food and beverage companies in South-South Nigeria.
ii. assess the effect of value stream mapping on service delivery of food and beverage companies in South-South Nigeria.

Research Questions

i. What is the effect of pull system on job satisfaction of food and beverage companies in South-South Nigeria?
ii. What is the effect of value stream mapping on service delivery of food and beverage companies in South-South Nigeria?

Research Hypotheses

Ho: Establish pull system has no significant effect on job satisfaction of food and beverage companies in South-South Nigeria

Ho_2: Value stream mapping has no significant effect on service delivery of food and beverage companies in South-South Nigeria.

Review of Related Literature

Theophilus, (2024), studied on lean manufacturing practices and organizational performance: A Literature Review. This literature review examines the relationship between Lean manufacturing practices and organizational performance across various industries. By analyzing recent research from 2020 to 2024, this study synthesizes findings on key Lean practices, their implementation challenges, and their impact on different aspects of organizational performance. The review highlights the evolving nature of Lean manufacturing in the context of Industry 4.0 and sustainable manufacturing. It also identifies gaps in current research and suggests directions for future studies. The findings indicate that while Lean practices generally positively influence organizational performance, their effectiveness depends on various factors including organizational culture, technological turbulence, and integration with other management approaches.

Thawornsujaritkul, and Boonnual, (2024), explored the impact of lean management on sustainable performance: the moderating role of employee performance in the steel industry. Sustainability has become a global imperative, positioning Lean management as a critical approach to achieving this goal, with employee performance efficiency playing a vital role in industrial manufacturing. Therefore, this study investigates how Lean waste management practices, supported by employee engagement, enhance sustainable performance in the steel industry, aligning with ESG indicators and the Sustainable Development Goals (SDGs). The model is empirically validated using Partial Least Squares Structural Equation Modeling (PLS-SEM) based on 385 responses from executives of steel manufacturing plants in the Eastern Region of Thailand. The findings reveal that lean management practices have a significant positive impact on sustainability, contributing to improved environmental, governance, and social outcomes. Employee performance also directly influences sustainability and has a strong positive effect on waste management, emphasizing its critical role in enhancing operational efficiency and sustainable practices. Interestingly, the study finds that employee performance significantly and negatively moderates the relationship between lean management and sustainability. This indicates that while high-performing employees enhance sustainability through their direct contributions, their overall effectiveness in operational areas may reduce the specific measurable impact

of lean practices on sustainability outcomes. The results highlight the importance of integrating employee engagement and lean management strategies to optimize sustainability in the steel industry. Organizations are encouraged to foster a culture of continuous improvement and align operational strategies with human resource capabilities to achieve long-term sustainable success.

Suroso, and Santosa, (2024), assessed effects of lean manufacturing practices on operational performance. Lean manufacturing is a concept of process improvement in production management which focuses on waste elimination. This paper explores relationships between lean manufacturing practices and operational performance. Using data collected from 55 manufacturing companies in Tasikmalaya city. Lean manufacturing were measured by five dimensions: production flow management, customer focus, process management, workforce management, and supplier management. Operational performance comprises four dimensions: cost, quality, lead-time, and flexibility. The findings are that all dimensions of lean manufacturing are significantly related to on operational performance. Production flow management has a higher level of significance in large enterprises compared with SMEs, whereas for customer focus there is a higher level of significance in SMEs compared with large enterprises. Process management, supplier management and workforce management have much lower level of significance for both SMEs and large enterprises.

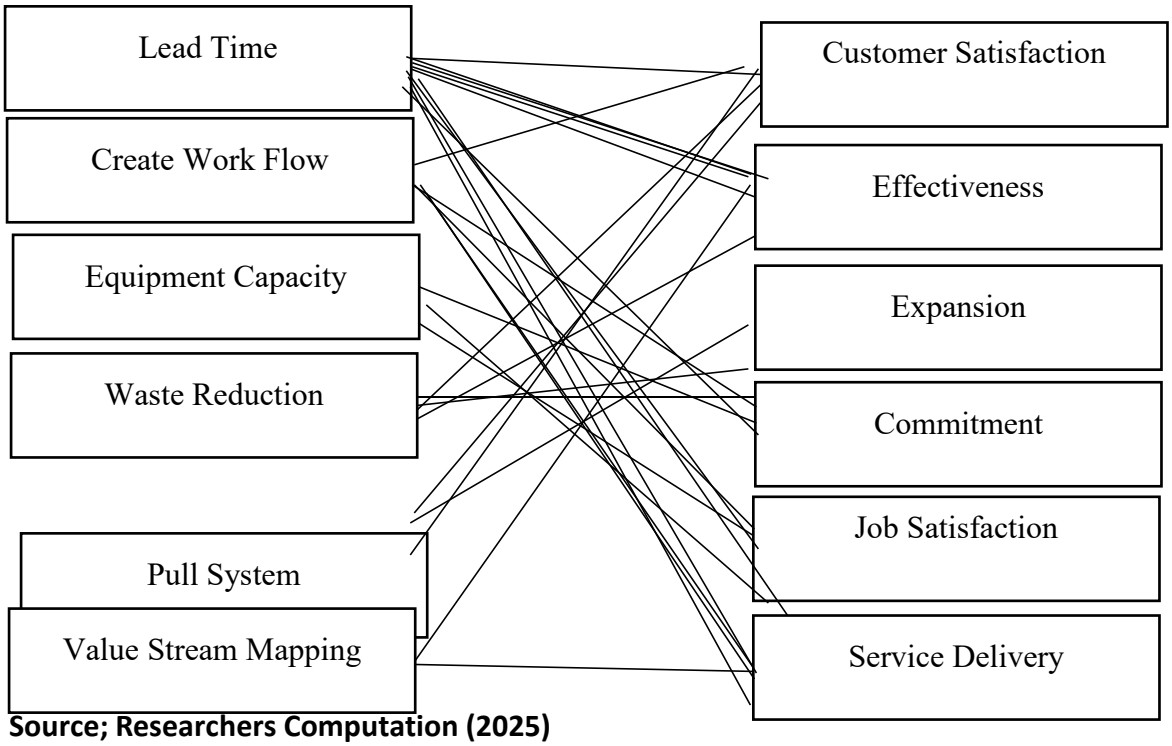
Valente, Sousa, and Moreira, (2023), examined the assessment of the Lean effect on business performance: the case of manufacturing SMEs. The purpose of this paper is to research the way in which Lean practices are affecting the performance of manufacturing small and medium enterprises (SMEs), analyzing the effects of Lean practices on companies' operational, financial and market performance. An online questionnaire was distributed among Portuguese organizations that fitted the category of SMEs and belonged to the manufacturing sector. A sample of 329 enterprises was analyzed with partial least squares–structural equation modelling. Four hypotheses on the impact of Lean practices on company performance were tested. The results show that the effects of Lean on performance are positive, which stresses the benefits attainable with the implementation of Lean practices.

The aggregated implementation of Lean practices, namely, customer involvement, statistical process, continuous flow and total productive maintenance leads to improvements in company's global performance measured by market, financial and operational performance measures, and also improves each of these performance measures individually. It was also noticed that financial capability is one of the indispensable factors for the successful implementation of Lean practices. The results contribute to the investigation on the topic, broadening the literature on the implementation of Lean practices in companies around the world., The research outcomes may be used as a motivation for other SMEs to implement Lean practices by acknowledging the positive impact on their performance.

Furthermore, the degree of Lean implementation in the particular industry may constitute a signal for

government and/or economic decision makers to define incentives such as fiscal benefits for companies that engage in Lean implementation programmes, partly financing workers cross-training, among other necessary investments. This is the first study that examines the impact of the effect of Lean on operational, financial and market performance in a discriminated and simultaneous way.

Fig 1: Conceptual Framework of Lean Management and Performance



Source; Researchers Computation (2025)

Theoretical Review

Expectation Confirmation Theory by Oliver (1980)

The basic premise of Expectation Confirmation Theory is that satisfaction (or dissatisfaction) results from a comparison between pre-use expectations and post-use perceived performance of a product or service. In simpler terms, people first form expectations about something, then experience it, and finally compare the actual experience to their initial expectations. This theory suggests customer satisfaction is determined by confirming or disconfirming their pre-purchase expectations. In the context of lead time management in breweries plant, customers may have certain expectations regarding the time it takes for loan processing and disbursal. If the actual lead time meets or exceeds these expectations, it can positively impact customer satisfaction. Expectation Theory assumes that individuals hold initial expectations or beliefs about a product, service or experience before they engage with it. Confirmation\Disconfirmation where posits that individuals compare their initial expectations with their initial expectations with their actual experiences or perceptions following the interaction. Cognitive Processing, where the theory assumes that individuals engage in cognitive Processing to evaluate the level of confirmation or disconfirmation between their

expectations and actual experiences. Expectation Confirmation Theory remains one of the most influential frameworks in understanding satisfaction and post-usage behavior. Its central idea—that satisfaction results from the confirmation of expectations—has shaped decades of research across marketing, technology, and service management. By emphasizing the psychological process of expectation and experience comparison, ECT provides valuable insights for organizations seeking to enhance customer loyalty, service quality, and system adoption. The theory flexibility and adaptability ensure it is continued relevance in emerging domains, particularly digital transformation, online learning, and e-government, where user satisfaction is crucial for sustained engagement and system success.

Queuing theory by Erlang (1917) and Kendall (1953)

Queuing theory provides a mathematical framework for analyzing waiting lines and queuing systems. It can be applied to lead time management in breweries companies, where customers may experience waiting times during production processing or customer service interactions. By optimizing queuing systems and reducing waiting times, firms can enhance customer satisfaction. Queuing theory assumes that customers' or entities' arrivals follow a specific process, such as a Poisson process, where arrivals occur randomly and independently over time. Queuing theory provides a rigorous mathematical framework for analyzing waiting lines and queuing systems. It allows for developing. Queuing theory provides a rigorous mathematical framework for analyzing waiting lines and queuing systems.

It allows for developing models, equations, and formulas to quantify system performance and make predictions. Using queuing theory models, organizations can determine the optimal number of service facilities or servers required to meet desired service levels and minimize waiting times. Queuing theory enables the evaluation of various performance measures, such as average waiting times, queue lengths, server utilization, and system throughput. This information helps identify bottlenecks and efficiencies in a system and aids in decision-making decision-making for process improvement. Queuing theory helps capacity planning by assessing the impact of changes in arrival rates, service times, or system performance measures. It allows organizations to make informed decisions regarding resource allocation and system design.

Application of Expectation Confirmation Theory to the Study

These theory emphasizes managing customer expectations effectively. Organizations' communications, marketing efforts and service delivery to, create positive confirmation experiences that lead to improvement of lean management and customer satisfaction. Service quality improvement is where the theory organizations help organizations identify gaps between customer expectations and actual experiences. Organizations can make targeted improvements to their products and services to enhance customer satisfaction by understanding the factors influencing lean management confirmation or disconfirmation.

Methodology

In this study, a survey research design was adopted by the researcher because it is an accessible and efficient way for respondents to share their perspectives relative to a particular concept or topic of interest was adopted to obtain accurate data based on the opinion of the respondents. The researcher made use of primary source of data. The total population of the study was one thousand five hundred and ten (1510). Therefore, the sample size was four hundred and twenty-nine (429).

A purposive sampling and random sampling techniques was employed. The questionnaire was designed in a five (5) point Likert scale structure which consisted of closed-ended questions that was easier for the respondents to answer because of the fixed presentation of questions and responses. Each item required the respondent to indicate the frequency of his or her various opinions under Strongly Agree (SA) =5, Agree (A) =4, Undecided (UN) =3, Disagree (D) = 2 and Strongly Disagree (SD) =1. Regression model was used to test the hypotheses of the study. A total number of four hundred and twenty-nine (429) questionnaire was administer to the respondents at the selected foods and beverage firms in South-South, Nigeria seventy-one (71) questionnaire were lost with the percentage ratio of 16.6%, while three hundred and fifty eight (358) questionnaire were retrieved with the percentage ratio of 83.4% which was suitable for the study to carry out the analysis.

Data Presentation

Table 1: Determine the effect of on pull system on job satisfaction of food and beverage companies in South-South Nigeria.

N=358

Statement	SA 5	A 4	UN 3	D 2	SD 1	TOTAL	MEAN	SD
Safety measures at my workplace are adequate.	270	41	7	20	20	1595	4.5	.752
Salary and Compensation improves job satisfaction	225	76	11	21	25	1529	4.3	.885
Leadership and Supervision boost job satisfaction	126	172	17	23	20	1435	4.0	1.10
Career Growth and Development enhances job satisfaction	198	91	15	25	29	1478	4.1	1.12
Work–Life Balance increases job satisfaction	215	72	10	31	30	1485	4.1	.988
Teamwork and Relationships increases job satisfaction	112	170	24	27	25	1391	3.9	1.30
	220	72	15	23	28	1507	4.2	.989

Source; Field Survey, 2025

The result in Table 1 reveals the decision rule mean score of $\bar{x}$ 3.00 was used to take decision on all the five (5) statements aimed to determine the dependent and independent dimensions of effect of on pull on job satisfaction of food and beverage companies in South-South Nigeria. Majority of the respondents with the highest means scores of 4.5, 4.3, 43, 4.2, 4.1, 4.1 and 4.0 strongly agreed that Safety measures at my workplace are

adequate. Salary and Compensation improves job satisfaction. Leadership and Supervision boost job satisfaction. Career Growth and Development enhances job satisfaction. Work–Life Balance increases job satisfaction. Teamwork and Relationships increases job satisfaction.

Table 2: Assess the effect of value stream mapping on service delivery of food and beverage companies in South-South Nigeria.

N=358

Statement	SA 5	A 4	UN 3	D 2	SD 1	TOTAL	MEAN	SD
Understanding and Awareness of VSM improves service delivery	247	74	10	11	16	1599	4.5	.818
Identification and Elimination of Waste enhances service delivery	205	96	11	32	14	1520	4.2	1.02
Future-state maps are created to guide improvement initiatives.	220	72	15	23	28	1507	4.2	.989
Process Transparency and Visualization boost service delivery	250	71	10	11	16	1602	4.5	.818
Process Transparency and Visualization improves service delivery	162	117	24	27	28	1432	4.0	1.14
Continuous Improvement Using VSM boost service delivery	197	92	15	25	29	1477	4.1	1.12
Feedback from employees is included when updating value stream maps boosts service delivery	112	170	24	27	28	1394	3.9	1.30
The quality of service has improved due to process improvements increase service delivery	226	71	--	31	30	1520	4.2	.988

Source; Field Survey, 2025

The table above showed the effect of value stream mapping on service delivery of food and beverage companies in South-South Nigeria. Majority of the respondents with the respondents with the highest mean scores of 4.5, 4.5, 4.2, 4.2, 4.1, 4.0, 3.9 strongly agreed that Understanding and Awareness of VSM improves service deliver, Identification and Elimination of Waste enhances service delivery, Future-state maps are created to guide improvement initiatives. Process Transparency and Visualization boost service delivery. Continuous Improvement Using VSM boost service delivery. Feedback from employees is included when updating value stream maps boosts service delivery. The quality of service has improved due to process improvements increase service delivery.

Test Of Hypotheses

Ho_1: Pull system has no significant effect on job satisfaction of food and beverage companies in South-South Nigeria

Variable	Parameters	Coefficient	Std error	t – value	Sig
Constant	β_0	0.055	0.082	0.670	.005
Establish Pull System (X_1)	β_1	0.105	0.057	1.842**	.009
R-Square		0.609			
Adjusted R – Square		0.530			
F – statistics		7.788***			

Table 3: Regression analysis on establish pull system on job satisfaction
Source: Field Data, 2025

Table above shows the coefficients of pull system on job satisfaction**.** The coefficient of multiple determination (R^2) was 0.609 which implies that 60.9% of the variations in dependents variables were explained by changes in the independent variable while 29.1% were unexplained by the stochastic variable indicating a goodness of fit of the regression model adopted in this study which is statistically significant at 1% probability level.

The coefficient of pull system was statistically significant and positively related to job satisfaction at 5 percent level (1.842**). With p-value=.009< .05% significance level. This implies that pull system has a significant effect on job satisfaction of food and beverage companies in South-South Nigeria.

Ho_2: Value stream mapping has no significant effect on service delivery of food and beverage companies in South-South Nigeria.

Table 4: Regression analysis on value stream mapping on service delivery

Variable	Parameters	Coefficient	Std error	t – value	Sig
Constant	β_0	0.062	0.051	1.215	.001
Value stream mapping (X_1)	β_1	0.078	0.054	1.444**	.005
R-Square		0.681			
Adjusted R – Square		0.509			
F – statistics		7.504***			

Source: Field Data, 2025

Table above shows the coefficients of value stream mapping on service delivery. The coefficient of multiple determination (R^2) was 0.681 which implies that 68.1% of the variations in dependents were explained by changes in the independent variable while 31.9% were unexplained by the stochastic variable indicating a goodness of fit of the regression model adopted in this study which is statistically significant at 1% probability level.

The coefficient of value stream mapping was statistically significant and positively related to service delivery at 5 percent level (1.444**). With p-value=.005<.05% significance level. This implies that value stream mapping has a significant effect on service delivery of

food and beverage companies in South-South Nigeria.

Summary of Findings

i. Pull system has a significant effect on job satisfaction of food and beverage companies in South-South Nigeria (p-value=.009< .05% significance level). This implies that a unit increase in pull system leads to a unit increase in job satisfaction.

ii. Value stream mapping has a significant effect on service delivery of food and beverage companies in South-South Nigeria (p-value=.005<.05% significance level). This implies that a unit increase in value stream mapping leads to a unit increase in service delivery.

Conclusion

The results of this study confirm that the adoption of lean management practices has a significant effect on sustainable operations such as pull system and value stream mapping. More importantly, the findings of this research are in agreement with several previous studies that the adoption of lean management practices in process industry results in improvements in operational performance. Therefore, this study removes any ambiguity concerning the value of lean management in the manufacturing firms in Nigeria. From the study conducted, it was concluded that pull system and value stream mapping, are relational dimensions that can influence of food and beverage companies in South-South Nigeria.

Recommendations

i. Companies under the study should adopt a pull-based work system where tasks are assigned based on actual demand and employees' capacity. This approach prevents workload overload, reduces stress, and allows staff to work at a manageable pace.

ii. Food and beverage companies should continually use value stream mapping to identify bottlenecks and eliminate non-value-adding steps in the service process. By visually mapping the flow from order-taking to food preparation and delivery, managers can pinpoint delays, streamline tasks, and improve coordination between staff.

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