

## LEAN MANAGEMENT PRACTICE AND OPERATIONAL EFFICIENCY IN FAST-MOVING CONSUMER GOODS COMPANIES IN RIVERS STATE

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### ABSTRACT

This study examined the relationship between lean management practice and operational efficiency of fast-moving consumer goods companies in Rivers State, Nigeria. The study focused on two proxies which are waste elimination and value stream mapping which are the proxies of the independent variable (Lean management practice). The study was measured by productivity and cost efficiency which are measures of the dependent variables (operational efficiency) of fast-moving consumer goods companies. The population of the study consisted of 11 fast-moving consumer goods companies listed with the Nigeria directory in Rivers State, Nigeria with 605 respondents. The study sample size was 241 selected using Taro Yamene methods. The questionnaire was used to collect data from respondents and the data collected were tabulated and analyzed using inferential statistics. It was found that lean management practice has a very strong positive and significant influence on operational efficiency of fast-moving consumer goods companies. The study therefore recommends that Government should establish robust waste management protocols that align with lean practices. By focusing on the 5S methodology (Sort, Set in order, Shine, Standardize, Sustain), companies can effectively organize their workspace, eliminate waste, and enhance productivity. Also, they should encourage all employees to participate in continuous improvement initiatives by establishing a structured feedback mechanism..

**keywords:** lean management practice, waste management, value stream mapping, operational efficiency, productivity, cost efficiency, fast-moving consumer goods companies.

### INTRODUCTION

The increasing demand for speedy delivery of quality products at lower production cost have resulted to new trend in manufacturing which reviews the gap between input resources inventory and production output inventory. More so, creating competitive niche in the current market environment is now difficult for manufacturers than ever. Consequently, many manufacturing firms are becoming flexible to catch up with the current challenges so as to simultaneously improve quality and productivity (Bagshaw, 2018). Manufacturing firms face unique challenges that underscore the importance of lean management. The Nigerian manufacturing industry, a critical contributor to the nation's economic growth, is often plagued by inefficiencies, high operational costs, inadequate infrastructure, and unreliable power supply (Adebayo, 2020). These challenges, coupled with global competition and fluctuating economic conditions, have compelled Nigerian manufacturers to adopt lean practices as a means to improve efficiency and achieve sustainable growth (Okoro et al., 2021).

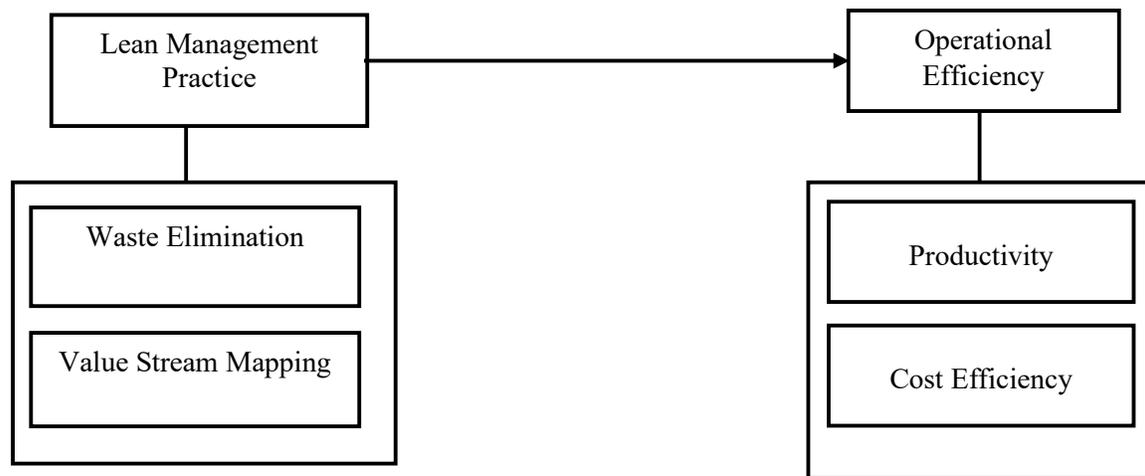
Lean management is structured around three key dimensions: waste elimination and value stream mapping. Waste elimination involves identifying and removing non-value-adding activities that cause inefficiencies and increased costs (Ohno, 1988). Value stream mapping enables businesses to analyze their operational processes, from raw material procurement to product delivery, to identify and optimize areas of improvement (Rother & Shook, 1999). Despite the potential benefits of lean practices, their implementation in Nigerian manufacturing firms is still in its infancy. Many firms struggle with challenges such as resistance to change, inadequate technical expertise, and a lack of awareness about lean principles (Agboola & Abiola, 2021). Additionally, external factors like unstable economic conditions and infrastructural deficits such as poor transportation networks and unreliable power supply, further complicate lean implementation (Olawale & Ajibade, 2019). The adoption of lean practices in Nigeria is not without challenges. These include resistance to change, lack of skilled workforce, and cultural factors that may hinder full implementation (Nwokoye & Eze, 2022). However, firms that successfully integrate lean principles into their operations have reported significant improvements in productivity, cost savings, and customer satisfaction (Agboola & Abiola, 2021).

Research on lean management practice in Nigeria indicates positive associations between these practices and enhanced operational efficiency. For instance, studies have shown that firms implementing lean practices tend to exhibit lower operational costs and greater adaptability to market changes (Akinlabi et al., 2011; Ogunlana, 2016). Nonetheless, several manufacturing firms still struggle to implement these practices effectively, pointing to a need for targeted strategies that fit their unique operational contexts (Nwokah et al., 2020). While studies have highlighted the potential benefits of lean management in developed economies, there is limited empirical research on its application and impact in the Nigerian manufacturing sector. This creates a significant research gap that this study seeks to address by exploring the relationship between lean management practice and operational efficiency of fast-moving consumer goods companies in Rivers State.

The study was designed to achieve the following specific objectives such as to:

- i. Determine the relationship between waste elimination and productivity in Fast-moving consumer goods companies in Rivers State.
- ii. Ascertain the relationship between waste elimination and cost efficiency in Fast-moving consumer goods companies in Rivers State.
- iii. Ascertain the association between value stream mapping and productivity in Fast-moving consumer goods companies in Rivers State.
- iv. Determine the relationship between value stream mapping and cost efficiency in Fast-moving consumer goods companies in Rivers State.

**Conceptual framework**



**Figure 1:** Conceptual framework of the relationship between Lean Management Practice and Operational Efficiency.

**Source:** Lean Management Practice Dimensions adopted from Bagshaw (2016); Shi et al., (2019); Zahraee et al., (2020); and Operational Efficiency Measures adopted from Dias, Daly, and Patuleia (2021); Kiran, 2022; Kumar et al., (2022); Soediantono, (2022)

**Research Questions**

Based on the objectives of the study, the following research questions were addressed:

- i. What is the relationship between waste elimination and productivity in Fast-moving consumer goods companies in Rivers State?
- ii. What is the relationship between waste elimination and cost efficiency in Fast-Moving consumer goods companies in Rivers State?
- iii. What is the relationship between value stream mapping and productivity in Fast-Moving consumer goods companies in Rivers State?
- iv. What is the relationship between value stream mapping and cost efficiency in Fast-moving consumer goods companies in Rivers State?

**1.5 Statement of hypotheses**

The following null hypotheses were formulated for the study:

- H01** There is no significant relationship between waste elimination and return on equity in Fast-moving consumer goods companies in Rivers State.
- H02** There is no significant relationship between waste elimination and return on asset in Fast-moving consumer goods companies in Rivers State.
- H03** There is no significant relationship between vendor managed inventory and productivity in Fast-moving consumer goods companies in Rivers State.
- H04** There is no significant relationship between vendor managed inventory and cost efficiency in Fast-moving consumer goods companies in Rivers State.

## LITERATURE REVIEW

### Theoretical foundation(s)

This study is on Lean Management Practice and Operational Efficiency. Therefore, in developing a theoretical foundation to study the relationship between Lean Management Practice and Operational Efficiency attention shall be drawn on the theories used by previous researchers such as; Lean Management Theory, derived from the Toyota Production System (TPS), was pioneered by Taiichi Ohno and Shigeo Shingo during the 1940s and 1950s (Ohno, 1988). The term "lean" was later popularized by John Krafcik in 1988 and Theory of Constraints (TOC) initiated by Eliyahu M. Goldratt in 1984. The essence of using the aforementioned theories is because they all underpin the objectives of the study.

### Conceptual Review

#### Concept of Lean Management Practice

Lean management is a philosophy and set of practices aimed at improving efficiency and reducing waste within an organization. Originating from the Toyota Production System (TPS), lean management seeks to optimize processes by focusing on value creation while eliminating non-value-adding activities (Womack & Jones, 2003). This concept has been widely applied across various sectors, including manufacturing, healthcare, and services, demonstrating its versatility and effectiveness. Lean management emphasizes the importance of value creation, continuous improvement, and respect for people. The fundamental principles of lean management are encapsulated in five core concepts, often cited in literature. These include specifying value, identifying the value stream, creating flow, establishing pull, and seeking perfection (Womack & Jones, 2003).

#### Waste Elimination

Waste elimination is a fundamental principle in lean manufacturing aimed at reducing non-value-adding activities within a production system. Waste elimination focuses on identifying and removing activities that do not add value to the product or service from the customer's perspective. According to Ohno (1988), the Toyota Production System (TPS) identifies seven types of waste: overproduction, waiting, unnecessary transportation, excess inventory, inefficient processes, unnecessary motion, and defects. By systematically addressing these wastes, organizations can streamline operations, reduce costs, and improve quality. For instance, overproduction leads to excess inventory, which ties up capital and storage resources, while defects result in rework and increased material costs. Eliminating such wastes enhances overall efficiency and customer satisfaction. Organizations that focus on waste elimination can

significantly improve operational efficiency, reduce costs, and enhance customer satisfaction (Liker, 2004).

### **Value Stream Mapping**

Value Stream Mapping (VSM) is a strategic tool used to analyze and optimize the flow of materials and information required to deliver a product or service. According to Rother and Shook (1999), VSM provides a visual representation of the entire production process, identifying areas of inefficiency and waste. This technique is instrumental in pinpointing bottlenecks, reducing lead times, and improving overall process efficiency (Hines & Rich, 1997). It helps organizations identify non-value-adding activities (waste), inefficiencies, and bottlenecks, making it a crucial dimension of Lean Management Practices (LMP). In fast-moving food organizations, where efficiency is critical for profitability and customer satisfaction, VSM plays a vital role in improving productivity, cost efficiency, and time efficiency (Womack & Jones, 1996).

### **Operational Efficiency**

Operational efficiency is a fundamental concept in business and management that refers to an organization's ability to deliver high-quality goods or services while minimizing waste, reducing costs, and optimizing resources (Davis & Heineke, 2021). It is a measure of how effectively a company converts inputs such as labor, materials, and capital into outputs in the form of products or services. In highly competitive industries, operational efficiency plays a crucial role in sustaining profitability, enhancing customer satisfaction, and maintaining a competitive advantage. Operational efficiency refers to the ability of an organization to deliver high-quality products or services using the least amount of resources (Davis & Heineke, 2021). It is measured by the ratio of outputs (products/services) to inputs (labor, materials, and capital) and is crucial for achieving cost-effectiveness, time optimization, and overall business success (Kaplan & Norton, 2021). The measures of operational efficiency are productivity and cost efficiency.

### **Productivity**

Productivity is a fundamental indicator of operational efficiency, reflecting an organization's ability to convert inputs into outputs effectively. High productivity signifies that a business is optimizing its resources—such as labor, materials, and technology—to maximize output while minimizing waste and costs (Slack, Brandon-Jones, & Johnston, 2020). This paper extensively discusses the concept of productivity as a measure of operational efficiency, including its definition, key types, influencing factors, and strategies for improvement. Productivity is an average measure of the efficiency of production. It can be expressed as the ratio of output to inputs used in the production process, i.e. output per unit of input. When all outputs and inputs are included in the productivity measure it is called total productivity. Outputs and inputs are defined in the total productivity measure as their economic values. The value of outputs minus the value of inputs is a measure of the income generated in a production process. It is a measure of total efficiency of a production process and as such the objective to be maximized in production process.

### **Cost Efficiency**

Cost efficiency is a key determinant of operational efficiency, as it reflects an organization's ability to minimize expenses while maintaining or improving productivity and quality.

Companies that achieve cost efficiency can optimize resource utilization, reduce waste, and improve profitability (Kaplan & Norton, 2021). In a competitive business environment, cost efficiency enables firms to sustain operations, maximize output, and enhance customer value without unnecessary expenditures. This paper explores the concept of cost efficiency, its significance, influencing factors, and strategies for achieving cost efficiency as a measure of operational efficiency. Cost efficiency refers to the ability of an organization to produce goods or deliver services at the lowest possible cost while maintaining the desired quality and performance levels (Porter, 2020). It is a fundamental aspect of operational efficiency, as cost-efficient businesses can allocate resources optimally and avoid financial waste.

### **Empirical Review**

The study by Hastono, Affandi, and Sunarsi, (2024) titled Implementation of Lean Management Principles for Operational Efficiency utilized a mixed-methods approach, combining quantitative surveys with qualitative interviews. Data were collected from 150 managers across various manufacturing industries. The study showed that the implementation of lean management principles led to a 30% reduction in waste and a 25% improvement in production efficiency. Lean management significantly enhances operational efficiency by streamlining processes and reducing waste. Organizations should adopt lean methodologies to improve efficiency and competitiveness.

Smith and Brown (2024) carried out a study titled Operational Practices for Integrating Lean and Industry 4.0. International an exploratory survey was conducted among 256 experts engaged in German manufacturing firms to explore practices related to integrating lean and Industry 4.0. The integration of lean practices with Industry 4.0 technologies resulted in enhanced operational performance and efficiency. Combining lean methodologies with advanced technologies can lead to significant improvements in manufacturing processes. Firms should consider the synergistic benefits of integrating lean practices with Industry 4.0 technologies.

Similarly, Bilal Hassan and Urooj Pasha (2023) undertook a study on Impact of Lean Manufacturing Practices on Sustainable Firm Performance: An Empirical Study Moderated by Lean Culture. The study employed a quantitative research methodology, collecting data from 240 executives, managers, and supervisors in Pakistan's leather export industry. Stratified random sampling was used to select participants. The findings indicated a significant positive impact of lean manufacturing practices, specifically total quality management and just-in-time, on firms' sustainability performance. The presence of a strong lean culture further enhanced this relationship. Implementing lean manufacturing practices, supported by a robust lean culture, leads to improved sustainable performance in firms.

### **METHODOLOGY**

This study is designed to empirically investigate lean management and operational efficiency on fast-moving consumer goods in Nigeria. The cross sectional quasi-experimental design was adopted for the study. This study considered all the 11 listed fast-moving consumer goods companies in Rivers State (Nigeria directory) with six hundred and five (605) staffs as the respondents. This study adopted the probability technique because it concerns a selection among a population. Sample Size of 241 was determined using Taro Yamene formula. Primary data was used in this study. The study used primary data to carry out the analysis. The primary data were

collected through the use of 5 point Likert scale designed questionnaire which shall sought responses from the respondent. The survey instrument was measured by means of Cronbach alpha coefficients, using the Statistical Package for Social Sciences (SPSS) version 23.0. Therefore, only the items that returned alpha values of 0.70 and above were considered. The bivariate relationship and test of hypotheses were carried out using Pearson Coefficient Correlation Analysis the Statistical Package for Social Sciences version 23.0.

### DATA ANALYSIS AND DISCUSSION OF FINDINGS

**Table 1: Range of Relationship and Descriptive Level of Association of Relationship**

Range of r values	Descriptive level of association of r
±0.80 – 1.00	Very strong
±0.60 – 0.79	Strong
±0.40 – 0.59	Moderate
±0.20 – 0.39	Weak
±0.00 – 0.19	Very weak

#### Decision Rule

*If the significant/Probability Value (PV) < 0.05 (level of Significance) = reject the null and conclude Significant Relationship. If the Significant Probability value (PV) > 0.05 (level of Significance) = Accept the null and Conclude Insignificant Relationship.*

**Table 2: Correlation Analysis on the Extent and Direction of the Relationship between Waste elimination and Productivity**

		Waste elimination	Productivity
Waste elimination	Pearson Correlation	1	.586**
	Sig. (2-tailed)		.000
	N	228	228
Productivity	Pearson Correlation	.586**	1
	Sig. (2-tailed)	.000	
	N	228	228

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 2 shows the correlation analysis on the extent and direction of the relationship between waste elimination and Productivity. The table showed a correlation coefficient of  $r = 0.586^{**}$  with a correspondent significant/probability value of 0.000, from the classification of r value in table 2, the value is moderate. Also the correlation coefficient is positive which indicate that an increase in Productivity is associated with an increase in waste elimination. Thus the analysis from table 2 shows that there is a moderate significant relationship between waste elimination and Productivity.

### Test of Hypothesis 1

**H<sub>01</sub>:** There is no significant relationship between waste elimination and Productivity in Fast-moving consumer goods companies in Rivers State

The results in Table 2 also showed the probability/significant value of 0.000 which is less than 0.05 significance level; hence the researcher rejects the null hypothesis and concludes that there is significant relationship between waste elimination and Productivity.

**Table 3: Correlation Analysis on the Extent and Direction of the Relationship between Waste Elimination and Cost Efficiency**

		Waste Elimination	Cost Efficiency
Waste Elimination	Pearson Correlation	1	.545**
	Sig. (2-tailed)		.000
	N	228	228
Cost Efficiency	Pearson Correlation	.545**	1
	Sig. (2-tailed)	.000	
	N	228	228

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 3 shows the correlation analysis on the extent and direction of the relationship between waste Elimination and Cost Efficiency. The table showed a correlation coefficient of  $r = 0.545^{**}$  with a correspondent significant/probability value of 0.000, from the classification of  $r$  value in table 3, the value is moderate. Also the correlation coefficient is positive which indicate that an increase in Cost Efficiency is associated with an increase in Waste Elimination. Thus the analysis from table 3 shows that there is a moderate relationship between Waste Elimination and Cost Efficiency.

### Test of Hypothesis 2

**H<sub>02</sub>:** There is no significant relationship between Waste Elimination and Cost Efficiency Fast-moving consumer goods companies in Rivers State.

Table 3 also showed that the probability/significant value is 0.000, < 0.05 level of significance hence the researcher rejects the null hypothesis and conclude that there is significant relationship between Waste Elimination and Cost Efficiency.

**Table 4: Correlation Analysis on the Extent and Direction of the Relationship between Value Stream Mapping and Productivity**

		Correlations	
		Value Stream Mapping	Productivity
Value Stream Mapping	Pearson Correlation	1	.595**
	Sig. (2-tailed)		.000
	N	228	228
Productivity	Pearson Correlation	.595**	1
	Sig. (2-tailed)	.000	
	N	228	228

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 4 shows the correlation analysis on the extent and direction of the relationship between Value Stream Mapping and Productivity. The table showed a correlation coefficient of  $r = 0.595^{**}$  with which indicates a moderate positive association. The correlation coefficient indicates that an increase in Productivity is associated with a moderate increase in Value Stream Mapping.

### Test of Hypothesis 3

**H<sub>03</sub>:** There is no significant relationship between Value Stream Mapping and Productivity in Fast-moving consumer goods companies in Rivers State.

Table 4 also showed that the probability/significant value is 0.000, < 0.05 level of significance hence the researcher rejects the null hypothesis and conclude that there is significant relationship between Value Stream Mapping and Productivity.

**Table 5: Correlation Analysis on the Extent and Direction of the Relationship between Value Stream Mapping and Cost Efficiency**

		Correlations	
		Value Stream Mapping	Cost Efficiency
Value Stream Mapping	Pearson Correlation	1	.535**
	Sig. (2-tailed)		.000
	N	228	228
Cost Efficiency	Pearson Correlation	.535**	1
	Sig. (2-tailed)	.000	
	N	228	228

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\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 5 shows the correlation analysis on the extent and direction of the relationship between Value Stream Mapping and Cost Efficiency. The table showed a correlation coefficient of  $r = 0.535^{**}$  with a correspondent significant/probability value of 0.000. From the classification of  $r$  value in table 5, the value is moderate. Also the correlation coefficient is positive which indicate that an increase in Cost Efficiency is associated with an increase in Value Stream Mapping. Thus the analysis from table 5 shows that there is a moderate relationship between Value Stream Mapping and Cost Efficiency.

#### Test of Hypothesis 4

**H<sub>04</sub>:** There is no significant relationship between Value Stream Mapping and Cost Efficiency in Fast-moving consumer goods companies in Rivers State.

Table 5 also showed that the probability/significant value is 0.000,  $< 0.05$  level of significance hence the researcher rejects the null hypothesis and conclude that there is significant relationship between Value Stream Mapping and Cost Efficiency.

#### Discussion of the Findings

The test of hypotheses was carried out using primary data obtained from the respondents and the extent and direction of the relationship between the predictor variables (Waste Elimination and Value Stream Mapping) and the measures of Operational Efficiency (Productivity and Cost Efficiency) and also the effect of Lean Management Practice and its predictor variables on Operational Efficiency and its measures were determined. Thus it is important to discuss the findings and relate them to the literature reviewed in chapter 2 thus:

The test of hypotheses one (H<sub>01</sub>), found that there is a positive moderate relationship between waste elimination and Productivity as shown in table 4.4 with the correlation coefficient value of  $r = 0.586^{**}$  significant at  $pv = 0.00 < 0.05$ . Hence the conclusion that there is a significant relationship between waste elimination and Productivity and also that waste elimination statistically affects Productivity. The test of hypotheses two (H<sub>02</sub>), found that there is a moderate relationship between waste elimination and Cost Efficiency as shown in table 4.5 with the correlation coefficient value of  $r = 0.545^{**}$  significant at  $pv = 0.00 < 0.05$ . Also table 4.24 showed that waste elimination statistically affects Cost Efficiency. This is in line with the study of Wang & Hsu (2019) who examined "the Impact of Waste Management Practices on Cost Efficiency in Construction Projects" It focuses on the construction industry's cost efficiency relative to waste management practices. The researchers used a case study approach, analyzing cost data and waste management practices from 10 major construction projects. The study revealed that projects with structured waste management strategies had a 15-25% reduction in overall costs due to lower material waste and recycling efforts. The authors concluded that effective waste management leads to enhanced cost efficiency, enabling construction firms to allocate resources more effectively and reduce unnecessary expenditures.

The test of hypotheses three (H<sub>03</sub>), found that there is a positive moderate relationship between Value Stream Mapping and Productivity as shown in table 4.6 with the correlation coefficient value of  $r = 0.595^{**}$  significant at  $pv = 0.00 < 0.05$ . This finding is in consonant with the study of Rother and Shook (2003) who studied, "Learning to See: Value Stream Mapping to Create Value

and Eliminate MUDA." The researchers employed case studies from the manufacturing sector, focusing on organizations that implemented VSM techniques to streamline processes. The study employed a qualitative research method, gathering data through interviews and direct observations of the implementation process. The study found that organizations that adopted VSM were able to identify waste within their processes, leading to significant improvements in productivity. By visualizing the flow of materials and information, companies could pinpoint inefficiencies and address them systematically. Rother and Shook concluded that VSM not only enhances productivity but also promotes a culture of continuous improvement within organizations.

The test of hypotheses four ( $H_{04}$ ), found that there is a moderate relationship between Value Stream Mapping and Cost Efficiency as shown in table 4.7 with the correlation coefficient value of  $r = 0.535^{**}$  significant at  $p = 0.00 < 0.05$ . This is in support of the study of Vattam et al. (2015) who studied "Improving Cost Efficiency in a Manufacturing Environment Using Value Stream Mapping," the authors explored the effectiveness of VSM in achieving cost efficiency. The research utilized a mixed methods approach, combining quantitative data analysis with qualitative insights garnered from interviews with industry professionals. The results indicated that implementing VSM led to a substantial reduction in operational costs, primarily by eliminating non-value-added activities. By mapping out the value streams, organizations were able to make informed decisions regarding resource allocation and process redesign.

### **CONCLUSION AND RECOMMENDATIONS**

From the study conducted, the paper concludes that lean management practices have substantial influence on operational efficiency in manufacturing companies. The application of lean management practices in the fast-moving consumer goods (FMCG) manufacturing sector in Rivers State has shown significant potential to enhance operational efficiency. This study highlights that by adopting lean principles such as waste management, value stream mapping, and continuous improvement, companies can achieve remarkable improvements in productivity, cost efficiency, and time efficiency. The empirical results of the study clearly underscore the following: waste management, value stream mapping and continuous improvement, are significant positive determinants of operational efficiency.

Consequently, companies that adopt these lean strategies not only improve their bottom line but also drive sustainable growth in a competitive market. In view of the findings and conclusion of this study, the following recommendations were made: FMCG companies in Rivers State should implement comprehensive training programs focused on the principles of lean management. Educating employees about waste reduction techniques, value stream mapping, and continuous improvement strategies will cultivate a company-wide ethos that prioritizes operational excellence (Mann, 2014). Finally, FMCG companies should conduct regular evaluations of lean initiatives to assess their impact on operational efficiency. Continuous review and assessment will allow companies to pivot strategies as needed and ensure that lean practices remain relevant and effective in achieving desired outcomes.

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