



EFFECT OF LEAN PRODUCTION ON ORGANISATIONAL PERFORMANCE OF LISTED FOOD AND BEVERAGE COMPANIES IN KADUNA METROPOLIS

Salisu Bala¹, Helen A. Andow², Yusuf A. Hashim³

^{1,2,3} Department of Business Administration, Kaduna State University, Kaduna

Corresponding authors' email/Mobile: [andow.helen@kasu.edu.ng/](mailto:andow.helen@kasu.edu.ng)

[+2348033298479](tel:+2348033298479), yusuf.hashim@kasu.edu.ng³

Abstract

This study examined the effect of lean production on organizational performance of the listed food and beverages companies in Kaduna metropolis. This study adopted survey and cross-sectional research designs. Primary data was used in this study. Multiple regression was used to analyze the data collected. This study found out that total productive maintenance has an effect on organizational performance of food and beverages companies in the study area. Therefore, this study concludes that there is a positive significant relationship between total productive maintenance and organizational performance of food and beverages companies in Kaduna metropolis. The study recommends that firms, management and organizations should pay greater attention to total productive maintenance, value stream mapping and automation in determining their optimal lean production.

Keywords: lean production, organizational performance, listed food and beverage companies, Kaduna Metropolis

1. Introduction

Organisational performance is one of the most important aspects of managing any company. It discusses how effectively and efficiently a company manages its day-to-day operations to achieve its goals. Organisational performance incorporates, among other organisational components, people, processes, and technology (Danica, 2023). One of the most important aspects of organisational performance is how well a company uses its resources to maximise profit or achieve its objectives (Khakim, 2022). According to Danica (2023), organisational performance measures how successfully and efficiently a company completes its internal processes in order to reach its goals. That is, it comprises monitoring and enhancing key performance indicators (KPIs) such as customer satisfaction, quality, productivity, and cost effectiveness.

Increasing customer satisfaction, reducing errors, and improving product quality can all be accomplished through optimising internal processes. The ability of a company to increase customer loyalty through organisational performance remains a key factor in determining its long-term success. Managers, entrepreneurs, and business owners must be aware of their companies' organisational performance level in order to take the appropriate action (Waal, 2021; Adam et al., 2022).

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Some manufacturing and service companies have been challenged to increase their focus on quality of products and customer satisfaction. Putting into perception the challenges of global competition, many organizations have been reduced to find ways of reducing costs, improving quality and meet the ever-changing needs of a more informed class of customers (Nachiappan, 2016). The changing circumstances and the growing demands on the part of the customers, increased pace of competition and organizations' ability to innovate and improve have made most industrial organizations think about improving their financial situation by improving their profits without increasing the sale price of their products (Bayat, 2017).

The continuous increase in demand for adopting lean strategies is difficult due to the fact that lean implementation keeps failing and rendering most business the need to examine the critical issues on how to successfully implement lean production in order to improve organizational performance (Hoyte & Greenwood, 2017). Although some studies such as Bayat and Dadashza (2017), Laureani and Antony (2012), Wickramasinghe and Wickramasinghe (2011), Worley and Doolen (2014) pointed out that many issues play an important role in the implementation of lean manufacturing, most of these issues that the researchers focused on concerned organizational issues and their role in the implementation of lean manufacturing have become obsolete in modern era of advance technology

The main objective of the study examined the effect of lean production on organizational performance of listed food and beverages companies in Kaduna metropolis. To achieve this main objective the study considered the following specific objectives:

- (i) Examine the effect of total productive maintenance on organizational performance of listed food and beverage companies in Kaduna metropolis.
- (ii) Examine the effect of value stream mapping on organizational performance of listed food and beverage companies in Kaduna metropolis.
- (iii) Examine the effect of automation on organizational performance of listed food and beverage companies in Kaduna metropolis.

Based on the objectives, the following hypotheses were formulated:

H₀₁: Total productive maintenance has no significance effect on organizational performance of listed food and beverages companies in Kaduna metropolis.

H₀₂: Value stream mapping have no significance effects on organizational performance of listed food and beverages companies in Kaduna metropolis.

H₀₃: Automation have no significance effect on organizational performance of listed food and beverages companies in Kaduna metropolis.

2. Literature Review

Conceptualisation

In this section the different concepts of this study are explained in order to provide a clear direction for the study.

Concept of Organizational Performance

Mathis and Jackson (2000) defined performance as a measure of the quantity and quality of work done considering the cost of the resource it takes to do the work. Mathis and Jackson (2000) further suggested that to measure organizational human resource performance, one has to reflect the total labour and the cost per unit of output. The authors

further stated that an individual performance depends on three factors which are; ability to do the work, the level of effort and support given to that person. The relationship of these factors, widely acknowledged in management literature, is that Performance (P) is the result of Ability (A) multiplied by Effort (E) multiplied by Support (S). Performance is diminished if any of these factors are reduced or absent. They further emphasize that quality of production must also be considered as part of performance because one alternative might be to produce more but a lower quality (Tseng, 2011).

Coetzet and Rothmann (2006) explained that performance is a human behavior the result of which is an important factor for individual work effectiveness evaluation. From this view, it could be said that organization's success or failure depends on performance of the individuals in that organization. Performance of individual productivity is both quantitative and qualitative aspects. It shows that how well a person is doing his job and extent to which the employee meeting their job duties. Coetzet and Rothmann (2006) stated that performance depends upon work settings, the atmosphere of office and social interaction. Goal setting level significantly affected different employee's performance (Pantang, 2007) as holding the same goals influenced the staff to move in the same direction leading them to be successful in the long run. As a result, it could be concluded that higher goal setting has high effect on performance.

Concept of Lean Production

This concept was introduced by a Japanese automotive company, Toyota, during the 1950s. Before then it was known as Toyota Production System (TPS) whose sole objective was to reduce costs and improve productivity by eliminating wastes and other activities that did not add value to the final product. After World War II, Toyota's president wanted to catch up with American firms in terms of productivity and quality and to support this, two major things were needed: Just-In-Time (JIT) and automation (automation with human touch). Therefore, TPS assumes that all processes are stable. Ohno (1988) does not deliver strategy to become lean if the processes of manufacturing in the organization are not stable.

According to Torstensson (2006) and Parker (2003), lean production may be considered as a synergistic set of integrated modern manufacturing management practices commonly classified under subsets of just-in-time (JIT), total quality management (TQM), total productive maintenance (TPM), and a collection of supportive human resource management practices including teamwork and employee empowerment. Lean production encompasses such practices as employee involvement in problem solving, statistical process control (SPC), reengineering setups, cellular manufacturing, supplier information sharing and partnership, supply base rationalization, pull production, worker teams, integrated product design, in-house designed technology, and customer requirements integration. Lean production is an approach to management that focuses on cutting out waste, whilst ensuring quality. This approach can be applied to all aspects of a business from design, through production to distribution (Mildenburg, 2000).

Concept of Total Productive Maintenance

Total productive maintenance (TPM) is a strategy that operates according to the idea that everyone in a facility should participate in maintenance, rather than just the maintenance team. This approach uses the skills of all employees and seeks to incorporate maintenance into the everyday performance of a facility. Management should be involved in TPM by promoting it as a corporate policy. Reliability engineers also need to be

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involved, as they can interpret the maintenance data stored in an organization's CMMS in order to find relevant metrics and generate business insights.

Total productive maintenance (TPM) is the process of using machines, equipment, employees and supporting processes to maintain and improve the integrity of production and the quality of systems. Total Productive Maintenance simply, it's the process of getting employees involved in maintaining their own equipment while emphasizing proactive and preventive maintenance techniques. Total productive maintenance strives for perfect production. Total Productive Maintenance (TPM) is the process of maximizing equipment effectiveness through the active involvement of all supporting departments. The goal of Total Productive Maintenance (TPM) is to improve overall productivity by optimizing equipment availability.

Concept of Value Stream Mapping

Value-stream mapping, also known as "material- and information-flow mapping" is a lean-management method for analyzing the current state and designing a future state for the series of events that take a product or service from the beginning of the specific process until it reaches the customer. A value stream map is a visual tool that displays all critical steps in a specific process and easily quantifies the time and volume taken at each stage. Value stream maps show the flow of both materials and information as they progress through the process.

Value stream management enables organizations to deliver higher quality software faster to their customers while reducing risk. Value stream mapping (VSM) is defined as a lean tool that employs a flowchart documenting every step in the process. Many lean practitioners see VSM as a fundamental tool to identify waste, reduce process cycle times, and implement process improvement. VSM is a workplace efficiency tool designed to combine material processing steps with information flow, along with other important related data. VSM is an essential lean tool for an organization wanting to plan, implement, and improve while on its lean journey. VSM helps users create a solid implementation plan that will maximize their available resources and help ensure that materials and time are used efficiently.

The "value stream" portion of the VSM system centers on how value can be added to a product or service by changing the market form or function to meet the customer's needs. This includes adding features and functionality to a product or service that benefit the customer without increasing wasted time and materials (also called *muda*, the Japanese term for waste) on the company's side. The Value stream mapping process allows you to create a detailed visualization of all steps in your work process. It is a representation of the flow of goods from the supplier to the customer through your organization. A value stream map displays all the important steps of your work process necessary to deliver value from start to finish. It allows you to visualize every task that your team works on and provides single glance status reports about each assignment's progress.

Concept of Automation

Automation is the creation and application of technologies to produce and deliver goods and services with minimal human intervention. The implementation of automation technologies, techniques and processes improve the efficiency, reliability, and/or speed of many tasks that were previously performed by humans (Dennis, 2016). Automation is being used in a number of areas such as manufacturing, transport, utilities, defense, facilities, operations and lately, information technology. Usually, automation is employed

to minimize labor or to substitute humans in the most menial or repetitive tasks. Automation is present in virtually all verticals and niches, although it's more prevalent in manufacturing, utilities, transportation, and security (Hoyte & Greenwood 2017).

Automation makes sure the techniques are used effectively in the delivery of products and services. However, it inherently causes many workers to become unnecessary (especially unskilled ones) and end up being displaced (Jones, 2017). Automation will certainly have substantial negative effects on employment and wages for all those occupations that do not require particular training or skills. However, many of these employees could be easily retrained in new jobs, and the impact of this technology on our society is revolutionary enough to create new opportunities for everyone. Automation describes a wide range of technologies that reduce human intervention in processes. Human intervention is reduced by predetermining decision criteria, subprocess relationships, and related actions and embodying those predeterminations in machines (Worley & Doolen, 2014).

Empirical Review

Studies related to organizational performance and the link to different business phenomena had been prominent. Several empirical studies have been conducted over decades to examine the relationship between lean production and organizational performance in both developed and developing countries. For instance, the study of Marodin et al. (2023) examined several human-related lean practices (HRLP) in the literature to determine which are most pertinent for implementing lean manufacturing successfully. There is a strong correlation between HRLP (management fostering a lean culture), HRLP (employee involvement and empowerment) of employees, and operational performance (waste reduction and flexibility) in a study done in Spain with 202 companies. The results have implications for both academia and practice, assisting managers in establishing a plan for the effective implementation of LM and boosting operational efficiency. By examining the causal relationships between variables in LM implementations, the study closes a research gap.

Similarly, Klein (2023) examined how public employees at a Brazilian higher education institution (HEI) perceive lean management practices. The findings of their study demonstrated that a number of Lean principles, including support from the leadership, employee involvement, internal customer focus, long-term planning, the value of community services, waste elimination, and continuous improvement, had a favourable effect on the HEI's performance. Through the promotion of Lean initiatives and improved management practices, the study assists HEI leaders in raising the calibre of services provided to beneficiaries.

In addition, Keramida et al. (2023) looked into how organisational performance in Greek citizen service centres (CSCs) relates to the adoption of lean principles. According to a survey conducted among employees of CSCs, it is found out that CSCs adhere to values like perfection, value streams, and customer understanding. A legitimate factor that was found to be contributing to the organisational performance of CSCs was "Lean adoption," according to the study. Managers and decision-makers can use the findings as a guide to enhance operational performance and employee and citizen satisfaction. This is the first study to assess Greek CSCs' adoption of lean methodology.

Again, Pereira, and Sachidananda, (2022) empirically demonstrate the direct correlation between the adoption of Industry 4.0 and Lean methodology, as well as the

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influence these developments have on organisational performance. The data used in the research was obtained via a survey questionnaire. Production engineers, service engineers, and sales representatives were the main respondents to the questionnaires. The study found out a correlation between Lean manufacturing and Industry 4.0 technologies. Further, Hardcopf, Liu and Shah (2021) assess the contribution of organisational culture to achieving lean operational improvements. Looking into the relationship between lean and operational performance, as determined by cost, quality, delivery, and flexibility, as well as the impact of four different organisational cultures, a hybrid culture, and a firm's capacity for cultural ambidexterity, the study discover that lean can optimise cost savings in any organisational culture; however, to optimise improvements in quality, delivery, and flexibility, an organisational culture that is supportive of lean is necessary.

Wickramasinghe and Wickramasinghe (2020) explore the structural relationships among lean production practices, human resource management (HRM) practices, operational performance, and firm performance of manufacturing firms that have adopted lean production in Sri Lanka. The relationship between HRM practices and firm performance was found to be mediated by lean production practices and operational performance. Lean duration modifies this relationship in a way that increases with the length of time, indicating a greater adoption of lean production practices. The study also, discovered that the best culture for lean is a developmental one; it performs better than any other single culture and equals or surpasses more complex cultural arrangements, like a hybrid culture or a firm's capacity for cultural ambidexterity. Given that a developmental culture is defined by adaptability and a readiness to welcome change, we suggest that these organisational characteristics unleash a sophisticated lean implementation that yields exceptional operational performance.

3. Methodology

This study used survey and cross-sectional research design in exploring the relationship between Lean production and organisational performance of food and beverages companies in Kaduna Metropolis. The population of the study comprises of all the permanent staff in the production unit of the listed food and beverages companies (Honeywell Flour mills Nigeria, Northern Noodles and Nigeria Bottling Company) in Kaduna metropolis as at 2nd April, 2021. The total population is 778, as obtained from the Human Resource Management of the various companies. To determine the sample size of this study, the Kerjcie and Morgan (1970) sample size determination formula is used. The formula is defined thus:

Sample size formula for arriving at a finite population =

$$S = \frac{x^2NP(1 - P)}{d^2 (N - 1) + x^2P(1 - P)}$$

Where; S = required sample size; X = z value (e.g. 1.96 for 95% confidence level); N = population size; P = population proportion (expressed in decimal) (assumed to be 0.5) 50%; d = degree of accuracy (5%) expressed as a portion (0.05); it is margin of error.

By computation, sample size is:

$$S = \frac{1.96^2 778 \times 0.5(1-0.5)}{0.05^2(778 - 1) + 1.96^2 0.5(1 - 0.5)} = 260$$

Therefore, the sample size of the study is 260.

The sampling technique used for this study is Proportionate Sampling techniques. The percentage of items chosen from each stratum in respect to its share of the entire population is known as proportionate stratified sampling. The ratio of each food and beverages company employees to the total number of food and beverages companies in the sampled food and beverages company's employees was used to calculate the samples of the selected food and beverages company's employees (cluster). The formula used is thus:

$$S = \frac{\text{No of food and beverages companies' employees}}{\text{Total food and beverages companies' employees}} \times \text{sample size}$$

Table 1 below gives the details of copies of questionnaire given to the sampled three companies.

Table 1

Sample Population Proportion for Sample of the Study

Companies	Proportional Sampling	Questionnaire to be Distributed
Northern Noodles	185/778*260 =61.8	62
Nigeria Bottling	331/778*260=110.6	111
Honeywell flour mills	262/778*260= 87.6	88
TOTAL		261

Source: Field Survey 2023

4. Result and Discussion of Findings

Descriptive Statistics

Table 2

Descriptive Statistics of the Variables

Variables	Min	Max	Mean	St.D	Skewness	Kurtosis
OP	1	5	2.89	0.789	-0.128	-0.035
TPM	1	5	2.86	0.850	-0.357	-0.565
VSM	1	5	2.95	0.760	-0.112	0.049
AUT	1	7	2.96	0.815	-0.264	-0.435

Source: SPSS Output, 2023

Table 2 showed that the measure of organizational performance (OP) has a minimum value of 1 and 5 as the maximum value, this indicated that 1 is the lowest value in the data set while 5 is the highest value in the data set which signifies that there is no outlier issues in the data set this is because if the data exceed the range of 1-5 then there is outliers as a result of it proportional outreach of the total number of variables for the study. The average value of the OP is 2.89 with standard deviation of 0.789, signifies that the data deviate from both side of the mean value. This implies that there is a bit dispersion of the data from the mean, because of the value of standard deviation deviate from the mean which means when the standard deviation deviated from the mean, the value does not intersect with the mean and provide imbalance data. The kurtosis value of -0.035 also suggests that majority of the data are lower than mean, as such the data meet the Gaussians distribution assumption. Similarly, the coefficient of Skewness -0.128 implies that the data

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is negatively skewed, and thus, the data did not meet the symmetrical distribution assumption.

The results from table 2 also indicate that the minimum and maximum values of the total productivity maintenance (TPM) are 1 and 5 respectively; this indicates non-existence of outliers' issues from the data set. The mean value of 2.86 and standard deviation of 0.85032 in the data implies that there is dispersion from the mean value in the sample firms because of the value of standard deviation deviate from the mean which means when the standard deviation deviated from the mean, the value does not interject with the mean and provide imbalance data. The kurtosis value of -0.565 also suggests that majority of the data are lower than mean, as such the data meet the Gaussians distribution assumption. Similarly, the coefficient of Skewness -0.357 implies that the data is negatively skewed, and thus, the data did not meet the symmetrical distribution assumption.

The descriptive statistics from Table 2 shows that conflict of interest in Value stream mapping (VSM) has no elements of outliers' issues in the data set because the minimum and maximum values in the data set are 1 and 5 respectively. On average, the VSM in the sample of Food and Beverages Companies is 2.95 with standard deviation of 0.76097. That is, the deviation from the mean is about 2.95 at best because of the value of standard deviation deviate from the mean which means when the standard deviation deviated from the mean, the value does not interject with the mean and provide imbalance data. The value of Skewness -0.112 implies that the data is negatively skewed, and therefore does not conform to the symmetrical distribution requirement. Moreover, the value of Kurtosis 0.049 also indicates that the VSM data meets the Gaussians distribution assumption.

The results in Table 2 also indicates that on average, the Automation (AUT) is 2.96 with standard deviation of 0.81477, implying that the deviation from the mean is 2.96 in the sample of Food and Beverages Companies, with minimum and maximum values of 1 and 5 respectively which did not indicate the sign of outlier issues and will not cause any problem to the inferential statistics then there is outliers as a result of it proportional outreach of the total number of variables for the study and because of the value of standard deviation deviate from the mean which means when the standard deviation deviated from the mean, the value does not interject with the mean and provide imbalance data. The skewness value -0.265 indicates that the data is negatively skewed, that is, the data meet the symmetrical distribution requirement. Similarly, the kurtosis of -0.435 implies that the Gaussians distribution is met.

Correlation Matrix

Table 3

Correlation Matrix Result

Variable	OP	TPM	VSM	AUT
OP	1			
TPM	0.333	1		
VSM	0.357	0.334	1	
AUT	0.478	0.275	0.473	1

Source: SPSS output, 2023

The correlation matrix is used to determine the degree of association between independent variables and the dependent variable. It is also used identify whether there is

a relationship between independent variables themselves, to detect the possibility of multicollinearity amongst the explanatory variables. This is necessary so that a broader picture than we could have got when regressed separately against performance would be obtained. The parameter to relate the proportional dimension of correlation matrix is when the value is from the range of 1-4 is considered weak, 5-6 is considered average, while, 7 and above is considered strong.

Organizational performance (OP) has a weak positive and significant relationship with total productive maintenance (TPM) as denoted by the value 0.333. Also, value stream mapping (VSM) has a weak positive and significant relationship with organizational performance (OP) with the value of 0.357. While, automation (AUT) has a moderate positive and significant relationship with organizational performance with the value of 0.478. Value stream mapping has a weak relationship with total productive maintenance (TPM) with value of 0.334; automation has a weak positive relationship with total productive maintenance with the value of 0.275. While, automation has a weak positive relationship with value stream mapping with the value of 0.473.

Regression Result

Table 4

Regression Result

Variable	Co-efficient	t-statistics	p-value
Co-efficient	0.964	4.871	0.000
TPM	0.177	3.486	0.001
VSM	0.123	1.986	0.048
AUT	0.358	6.303	0.000
R ²	0.283		
Adjusted R ²	0.275		
F-stat	36.029		
F-sig	0.000		
Durbin Watson	1.66		

Source: SPSS Output, 2023

Hypothesis Testing

Total Productive Maintenance and Organizational Performance

The effect of total productive maintenance (TPM) on organizational performance of Food and Beverages Companies is found to be significant and statistically has a positive effect on organizational performance of Food and Beverages Companies in Kaduna Metropolis. This can be confirmed by a coefficient value of 0.177; t-value and p-value of 3.486 and 0.001 respectively. This implies that for every increase in total productive maintenance the organizational performance of Food and Beverages Companies increases. In line with the finding, it provides evidence to reject the null hypothesis; which states that TPM has no significant effect of on organizational performance of Food and Beverages Companies in Kaduna Metropolis.

According to Contingency Theory, total productive maintenance has a positive impact on the organisational performance of food and beverage companies in Kaduna metropolis. This highlights the significance of matching maintenance strategies to the organization's unique technological, structural, strategic, and environmental contingencies.

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When properly contextualised, TPM is an effective maintenance strategy as evidenced by the increased efficiency, quality, and competitiveness that result from this alignment.

Value Stream Mapping and Organizational Performance

The effect of VSM on OP of Food and Beverages Companies in Kaduna Metropolis is found to be significant and statically has a positive effect on OP. This can be confirmed by a coefficient value 0.123; t-value of 1.986 and p-value of 0.048 which is statistically significant at 1%. This implies that for every increase in VSM the organizational performance of Food and Beverage Companies in Kaduna Metropolis will increase. In line with this it provides evidence to reject the null hypothesis; which states that VSM has no significant effect on organizational performance of Food and Beverage Companies in Kaduna Metropolis. The result is statistically significant at 76% confidence level.

The positive effects of VSM on organisational performance of food and beverage companies in Kaduna Metropolis demonstrate the tool's efficacy as a production management strategy. VSM improves quality, flexibility, cost-effectiveness, and delivery reliability by coordinating production activities with overarching strategic goals and competitive priorities. Better overall performance results from these enhancements, highlighting the significance of including VSM into the production strategy framework. The importance of VSM in creating a long-term competitive advantage in the food and beverage sector is highlighted by this theoretical alignment.

Automation and Organizational Performance

The effect of Automation on organizational performance of Food and Beverage Companies in Kaduna Metropolis is found to be significant and statistically has a positive effect on OP. This can be confirmed by coefficient value of 0.358 with a t-value and a p-value of 6.303 and 0.000 respectively. This implies that for every increase in AUT the OP of Food and Beverage Companies in Kaduna Metropolis will increase. In line with this it provides evidence to reject the null hypothesis which states that AUT has no significant effect on OP of Food and Beverage Companies. The result is statistically significant at 76% confidence level.

The significant positive effect of automation on the organisational performance of food and beverage companies in Kaduna emphasises how crucial it is to match technology initiatives with the unique challenges that the company faces. Automation is a useful tool in a regulated and competitive industry because it improves quality, responsiveness, efficiency, and quality. As per the Contingency Theory, the efficacy of automation is contingent upon its compatibility with the environmental, technological, strategic, structural, and cultural contexts of the organisation. Food and beverage companies can attain long-term competitive advantages and enhanced organisational performance by guaranteeing this alignment.

Cumulative result shows that the coefficient of determination (R^2) has a value of 0.28 (28%). This indicates that the independent variables (TPM, VSM and AUT) were able to explain the variation in the organizational performance of Food and Beverage Companies in Kaduna Metropolis. The adjusted R^2 (which adjusted for the number of variables in the model that have strong correlation and number of observations) has a value 0.275 (27.5%). This implies that TPM, VSM and AUT cumulatively play a significant role in explaining organizational performance of the Food and Beverage Companies in Kaduna Metropolis, following the results gotten from those eligible to fill the questionnaire on the demographic characteristics of the respondents. The regression result reveals fitness of the

model for having F-statistics of 36.029 and a p-value of 0.0000. The implication of this result is that the overall impact of the explanatory variables on the dependent variable is significant at 1% level, with 99% level of confidence. The Durbin Watson shows the absence of auto and serial correlation of the error term of the model; which is shown by the coefficient value of 1.66. Lastly, the study concludes that the lean production plays a significant role in explaining the organizational performance of Food and Beverage Companies in Kaduna Metropolis following the result gathered from respondents upon questionnaire returns.

5. Conclusion and Recommendations

The choice of examine lean production issues is one of the most important decisions of Food and Beverage Companies. The basic question is whether there exists an optimal management structure that minimize the issues of lean production and its influence on organizational performance of Food and Beverage Companies. The study concludes that the effect of total productive maintenance on organizational performance of Food and Beverages Companies is found to be significant and statistically has a positive effect on organizational performance of Food and Beverages Companies in Kaduna. The effect of VSM on OP of Food and Beverages Companies is found to be significant and statically has a positive effect on OP. This implies that for every increase in VSM the organizational performance of Food and Beverage Companies will increase. The effect of AUT on organizational performance of Food and Beverage Companies is found to be significant and statistically has a positive effect on organizational performance. This implies that for every increase in AUT the organizational performance of Food and Beverage Companies will increase.

Based on the findings, the following have been recommended:

- (i) The study recommend that the management of food and beverage in Kaduna metropolis should include putting in place extensive Total Plant Maintenance (TPM) programmes, funding staff engagement and training, keeping a close eye on and improving TPM operations, investing in cutting-edge tools and technologies, making sure upper management is fully committed, coordinating TPM strategies with organisational objectives, encouraging industry collaboration and benchmarking, and emphasising sustainability and safety.
- (ii) Management of food and beverage companies should use Value Stream Mapping (VSM) techniques to increase productivity and decrease waste. These consist of carrying out training sessions, offering staff development, embracing a Kaizen mentality, keeping an eye on advancements, employing technology, encouraging cross-functional cooperation, giving priority to customer value, and coordinating VSM programmes with environmental objectives.
- (iii) Food and beverage companies should use automation to their advantage by evaluating their processes, making investments in cutting-edge automation technologies, and putting continuous monitoring and optimisation into place. It is also essential that employees receive training on automation tools and multidisciplinary skills development.

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References

- Adam, S., Fuzi, N. M., Ramdan, M. R., Mat Isa, R., Ismail, A. F. M. F., Hashim, M. Y., & Ramlee, S. I. F. (2022). Entrepreneurial orientation and organizational performance of online business in Malaysia: The mediating role of the knowledge management process. *Sustainability*, 14(9), 5081.
- Bayat, H., & Dadashzadeh, T. (2017). Could lean production job design be intrinsically motivating? Contextual, configurational, and levels-of-analysis issues. *Journal of Operations Management*, 24, 99-123.
- Bayat, H. (2017). The impact of human resource and operational management practices on company productivity: A longitudinal study. *Personnel Psychology*, 61, 467-501.
- Coetzel, R., & Rothmann, H. (2006). *Operations Management*. South-Western/Thomson Learning.
- Convis, S. (2001). The effect of lean production on financial performance: the mediating role of inventory leanness. *International Journal Production Economics*, 138(2), 242-253.
- Cua, K., Thun, J.H., Drüke, M. & Grübner, A. (2001). Empowering Kanban through TPS-principles – an empirical analysis of the Toyota production system. *International Journal of Production Research*, 48 (23), 7089–7106.
- Danica, D. V. (2023). Operational performance explained: Definition, importance, example, and challenges. Retrieved from <https://accountingprofessor.org/operational-performance-explained-definition-importance-example-and-challenges/#:~:text=Operational%20performance%20measures%20how%20efficiently,customer%20satisfaction%2C%20and%20cost%20efficiency>
- Demeter, B. (2011). Performance of lean in large organisations. *Journal of Manufacturing Systems*, 31(3), 349–357.
- Dennis, R. (2016). Relationships between implementation of TQM, JIT, and TPM and manufacturing performance. *Journal of Operations Management*, 19(2), 675–694
- Hoyte, M. & Greenwood, D. (2017). Could lean production job design be intrinsically motivating? Contextual, configurational and levels of analysis. *Journal of Operations Management*, 24(2); 99-123
- Jones, L. (2017). Glean lean: how to use lean approach in service industries, *Journal of Service Research*, 6; 191-206
- Keramida, E., Psomas, E., & Gotzamani, K. (2023). The impact of lean adoption on organizational performance in a public service: the case of the Greek citizen's service centers, *International Journal of Lean Six Sigma*, 14(7); 1544-1565
- Khakim, M.A. (2022). The effect of industrial management implementation on MSME operational performance in Gresik Region. *Enrich (1-2)*; 183-200
- Klein, L.L., Vreira, K.M., Marcal, D.R. & Pereira, J.R.L. (2023). Lean management

- practices perception and their influence on organizational performance in a public higher education institution. *The TQM Journal*, 35(3); 673-697
- Nachiappan, N. (2016). An overview of continuous improvement: from the past to the present. *Management Decision*, 43(5); 761-771
- Ohno, F. (1988). *Make or Break: how manufacturers can leap from decline to revitalization*. New York: McGraw-Hill Professional
- Pantang, F. (2007). The development of a lean park homes production process using flow and simulation methods. *Journal of Manufacturing Technology Management*, 23(2); 178-197
- Parker, G. (2003). *Manufacturing Strategy: texts and cases*. Irwin, Homewood, IL
- Pereira, C., & Sachaidananda, H.K. (2022). Impact of industry 4.0 technology on lean manufacturing and organizational performance in an organization. *International Journal of Interactive Design and Manufacturing*, 16(1); 25-36
- Torstenson, H. (2006). Lean and the working environment: A review of the literature. *International Journal operation and Production Management*, 138(2); 242-253
- Tseng, F. (201). Lean production, market share and value creation in the agricultural machinery sector in Brazil, *JMTM*, 21(7); 853-871
- Wall, A.D. (2021). The high-performance organization: proposed definition and measurement of its performance. *Measuring Business Excellence*, 25(3); 300-314
- Wickramasinghe, V. & Wickramasinghe, G. L. D. (2020). Effects of HRM practices, lean production practices lean duration on performance. *The International Journal of Human Resources Management*, 31(11); 1467-1512
- Wickramasinghe, F. & Wickramasinghe, I. (2011). Operational performance and critical success factors in European food processing SMEs. *Trends in Food Science and Technology*, 31(2); 156-164.
- Worley, V. & Doolen, E. (2014). Uncertainty, flexibility, and sustained competitive advantage: Success factors, competitive advantage and competence development, *Journal of Business Research*, 57(5); 484-494.