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Effect of Process Management and Planning and Control on Customer Relations in Assessing Readiness to Deploy Lean Manufacturing Techniques within SMEs: SMART PLS-SEM Approach

Mohammed Inuwa[1*]

[1]Department of Business Administration, Bauchi State University Gadau, Nigeria

[*]**Email:** minuwa@basug.edu.ng

Abstract

Most lean initiatives failed because of poor readiness assessments of processes and planning which hinder customer relations. To mitigate such occurrences, the study analyzes the effect of process management, planning and control on customer relations within manufacturing SMEs, aimed to ensure they have the readiness to deploy lean initiatives successfully. The study applied a quantitative survey approach by collecting 300 responses from managers of manufacturing SMEs in Nigeria. The findings of the study show that a positive and significant relationship exists between process management, planning and control on customer relations. It implied that manufacturing SMEs in Nigeria plan and manage their manufacturing processes effectively which leads to enhanced customer relations. Hence, showing a high level of readiness to deploy lean and ensure waste eradication, effective scheduling and improved product quality.

Keywords

Lean readiness, customer relations, process management, planning and control

Introduction

Small and Medium scale Enterprises (SMEs) play a crucial role in the production of goods and services as well as contributing toward economic development and prosperity of nations. They serve as a foundation for startups and provide larger enterprises with raw materials/semi-finished goods. In Nigeria SMEs are seen as the key players in providing the basic needs of the populace, contributing to 50% of the nation's GDP (PWC, 2020). Also, it is posited that manufacturing firms form the larger chunk of the SMEs sector, making it imperative to ensure it continues sustenance (PWC, 2020). Hence the need to evaluate their readiness to deploy lean manufacturing initiatives like process management, planning and customer relations.

Lean manufacturing is a philosophy and practice that originates from Toyota motors of Japan (Koponen, 2019). It entails that manufacturing operations should be free of wastages and consider anything that does not add value as a waste (Womack & Jones, 2003). Lean manufacturing emphasized the need for firms to ensure that their entire processes, production planning and scheduling are geared to customers' viewpoint (Abbas & Kumari, 2021). Thus, lean

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manufacturing practices are centered on the premise that continuing process improvement, planning of production, and scheduling should lead to quality and value delivery to the customer (Sahoo, 2022). In Nigeria, SMEs in the manufacturing sector mostly manufacture customer goods like, soft drinks, furniture, garments, metal fabrication, etc. (SMEDAN/NBS, 2017). The production of most of the aforesaid items relies heavily on how effective SMEs managers design and upgrade their production processes and planning and scheduling of raw materials to deliver products as when needed by the customer. Hence, achieving just in time (JIT) which is fundamental to successful lean deployment (Hussein & Zayed, 2021).

Also, manufacturing SMEs in Nigeria are known to be facing strong competition from their foreign pairs, especially from China which affects local SMEs (Olaore et al., 2020). It is reported that most customers prefer imported items to local ones due to high quality and low price (PWC, 2020). This is mostly because most SMEs in Nigeria are not fully implementing lean practice, making their product inferior quality and high price with lots of wastages due to poor process management and lack of proper production planning. Further, it is ascertained that studies on lean readiness should be conducted in developing countries like Nigeria due to lack lean awareness and absence of change readiness evaluation before lean deployment (Maware et al., 2021). Also, it is recommended that customers relations, process management, and planning & control as crucial lean readiness should be investigated further (Prasad et al., 2023). Additionally, it is recommended that advanced statistical tools should be used to generalize findings (Antony et al., 2020). Consequently, to fill the research gap and contribute to solving the existing problem, the study aims to examine the effect of process management, planning and control and customer relations among manufacturing SMEs in Nigeria.

Literature Review and Development of Hypothesis

According to Amuna et al. (2017), customer relations is defined as a collection of tools and strategies that businesses use to attract, acquire, recognize, and assist successful clients by building enduring connections with them. Thus, in order for SMEs to compete in providing excellent customer service, it is imperative that they comprehend the worth of their consumers and concentrate on streamlining their operational procedures (Hu et al., 2015). Furthermore, prominent managerial quality practices that provide a strong foundation for the effective implementation of Lean in SMEs include customer awareness, interaction, and feedback (Alnajem et al., 2019).

Businesses using process management to communicate with customers must have a thorough understanding of their processes (Trkman et al., 2015). Similar to this, quality is improved when internal customer procedures are integrated with process management. According to Kreuzer et al. (2020), the needs of the customers should be the main focus of redesign initiatives. Similar to this, the declared purpose of enhancing internal corporate processes is to provide value to customers (Trkman et al., 2015). Process management refers to the method by which the needs of the client are translated into tangible products or services (Smart et al., 2009). Shuaib et al.'s (2021) study, which was carried out inside Nigerian manufacturing SMEs, demonstrates the considerable impact that process management innovation has on quality management methods. Udofia et al. (2021) conducted a study on manufacturing medium-sized firms in Nigeria; the

findings reveal that process management mediates the relationship between quality management techniques and performance.

Activities related to quality management and implementation are greatly impacted by planning and control (Abbas & Kumari, 2021). Typically, scheduling techniques are the focus of planning and control practices in Lean manufacturing, with the aim of managing customer demand and output (Iranmanesh et al., 2019). In terms of production process scheduling, the function of planning and control is to recognize an impending difficulty and efficiently mitigate remedies for those challenges in the future (Al-Najem et al., 2019; Aungkulanon, 2019). Additionally, quality control is a factor that significantly affects a company's ability to compete and is a continuous source of managerial concern. It is a system of roles, procedures, and tools that a company uses to maintain and align its product attributes with the expectations of both internal and external customers (Dora et al., 2016).

Planning activities that are carried out in response to customer demand and raw materials supplied on the right and exact quantity needed will save the cost of storage and transportation (Baumung & Fomin, 2018). Research conducted in a paper mill industry to assess how planning and control facilitate additive manufacturing reveals that planning and control in production increase optimization (Baumung & Fomin, 2018). The study carried out in the Sri Lankan health sector to examine the impact of quality management practices on customer satisfaction shows that planning and control have a positive and significant effect on satisfaction of customer (Daksith & Hewage, 2020). Hence, the hypothesis:

H1: There is a positive and significant relationship between process management and customer relations.
H2: Planning and control have a positive and significant effect on customer relations.

Methodology

In order to determine the degree of lean readiness among Nigerian manufacturing SMEs, the study will look at how process management, planning, and control affect customer relations. Cross-sectional quantitative survey methodology was used in the study. Cross-sectional study is selected due to time constraint of the study. Hence, used to enable data collection within a short period of time as suggested by (Sekaran & Bougie, 2016). The research tools were adopted from prior studies. Six and five questions, respectively, related to customer relations and planning and control were taken from the Al-Najem et al. (2013) study. The six process management items were taken from Uluskan et al.'s (2018) study. A 5-point Likert scale was used to operationalize each item.

The respondents were chosen from among managers of SMEs in the manufacturing sector, which was the target population. According to Soper (2020), an a priori sample size calculator for structural equation models suggests a sample size of 156. Also, addition of another 200 questionnaires were made to avoid issues of low response rate as suggested by (Sekaran & Bougie, 2016). Hence, a total of 356 questionnaires were distributed to the respondents across the six geopolitical zones in Nigeria. The study applied nonprobability sampling method through

purposive sampling technique due to absence of a complete sampling frame. A total of 321 questionnaires were retrieved, 21 were found unusable, while 300 were found usable making it above the minimum sample size (Soper, 2020). Hence accepted response rate for data analysis.

Data for the study is analyzed using Smart PLS-SEM 4 software (Ringle, Wende, & Becker2022) in assessing measurement model, structural model, and path coefficients. At this point, the reliability and validity of the measurement model were established.

Measurement Model Analysis

Given that constructs are grounded in reflective measurement, evaluating a reflective measurement model involves two primary processes: internal consistency assessment and the evaluation of convergent and discriminant validity (Hair et al., 2020).

Table 1. Measurement Model

Variables	Items	Loadings	C.A	CR	AVE
Customer Relation (CR)	CR1	0.745	0.827	0.833	0.536
	CR2	0.689			
	CR3	0.697			
	CR4	0.740			
	CR5	0.790			
	CR6	0.727			
Planning & Control (PC)	PC1	0.835	0.716	0.751	0.542
	PC2	0.670			
	PC3	0.805			
	PC4	0.613			
Process Management (PM)	PM1	0.756	0.765	0.782	0.514
	PM2	0.770			
	PM3	0.758			
	PM4	0.670			
	PM5	0.619			

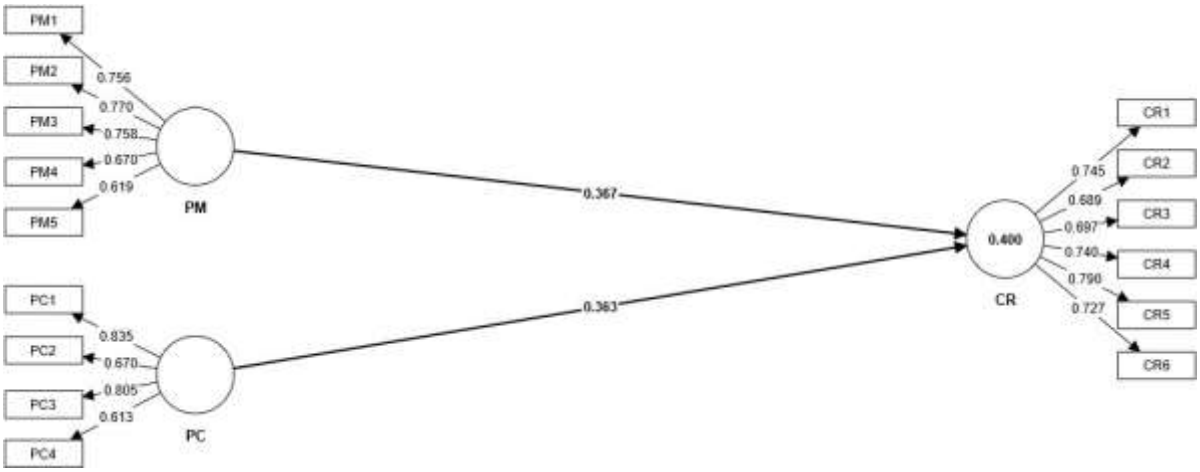


Figure1. Measurement Model

As long as the composite reliability CR thresholds of 0.50 and 0.70 and the average variance extracted (AVE) are both satisfied, indicator (items) reliability loadings larger than 0.4, 0.5, 0.6, and 0.7 are all considered acceptable (Hair et al., 2017). Items with loadings less than five were eliminated based on the standards set out by Hair et al (2014). Additionally, Cronbach Alpha (CA) guarantees that the rule of thumb should have a value of higher than 0.70. Composite reliability (CR) was used to assess internal consistency among the components (Hair et al., 2020). Each construct's AVE value needs to be more than 0.50 in order to achieve convergent validity (Hair et al., 2020). According to the study's findings, each construct's value was suitably satisfied.

Conversely, the Heterotrait-Monotrait Ratio (HTMT) criterion is used to compute the assessment of discriminating validity. According to Hair et al. (2019), there are problems with discriminant validity for all values higher than 0.90. In essence, the data below demonstrate no discriminant validity issues.

Table 2. Discriminant Validity (HTMT)

Variables	CR	PC	PM
Customer Relations (CR)			
Planning & Control (PC)	0.697		
Process Management (PM)	0.662	0.651	

Structural Model

Hair et al., (2019), suggested that variable inflation factor (VIF) values should be close to 3 and lower. The result of this study shows that process management and planning & control both stand at VIF of 1. 336. The coefficient of determination (R^2) is used in determining the predictive power of the model. The R^2 of the study stands at 0.400. Murphy & Myors, (2003) opined that an R-square at .25 is large, at .10 is medium, and at .01 is weak. Hence, accepted. Further, the effect size (f^2) is applied when measuring the significance of each variable in the model Cohen (1988) suggests that an effect size value (f^2) of 0.02, 0.15, and 0.35 is as small, moderate, and large effect size respectively. In this study, process management and planning & control have an f^2 0.165 and 0.168 respectively. Hence, presenting larger f^2.

Path Coefficients

Five thousand (5000) subsamples use the bootstrapping approach based on available literature (Hair et al., 2020). All the relationships that were theorized in the preceding section are to be tested for their substantial effects in this study. Similarly, the critical values of 1.28 for the one-tailed test are significant at the 10% significance level, and 1.65 and 2.33 at the 5% and 1% significance levels, respectively (Hair et al., 2017). In this study, directional correlations were hypothesized, and a one-tailed test was employed. According to the first hypothesis (H1), process management and customer relations have a substantial positive connection ($\beta = 0.057$, $t = 6.469$, $p = 0.000$). According to the second hypothesis (H2), there is a significant and positive association between planning and control and customer relations ($\beta = 0.062$, $t = 5.859$, $p = 0.000$).

Conclusion

The study aims to analyze lean manufacturing readiness level of SMEs in Nigeria from the perspective of process management, planning and control and customer relations. The findings reveal that SMEs in Nigeria have effective process management and planning systems that maintains good customer relations. It shows that SMEs in Nigeria should begin to implement lean tools and techniques like just in time production (JIT), pull production, use of Kanban cards, and visual stream mapping to eliminate waste, improve quality and deliver value to the customer. Findings of the study corresponds with study of (Iranmanesh et al., 2019; Shuaib et al., 2021; Udofia et al., 2021). Hence, the study concludes that manufacturing SMEs should continue to upgrade their facilities through continuous improvement initiative to actualize full lean deployment. The study focusses only on manufacturing SMEs; hence, it is recommended that future studies should conduct similar study in the service sector or larger enterprises. Also, studies in the future can include other variables like funds availability and government support.

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