

Laying Foundation for Lean Manufacturing Implementation within Small and Medium Sized Enterprises in Nigeria: An Analysis of Change Readiness

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Abstract

The study assesses lean readiness within manufacturing SMEs by examining the effect of organizational culture, leadership, employee relations, customer relations, process management and planning & control (lean readiness factors) on organizational readiness for change (change efficacy and change commitment) to ensure successful lean deployment. The study applied a quantitative research approach via the administration of survey questionnaires to three hundred SME managers within the six geopolitical zones in the Country. Data was analysed using Partial Least Square- Structural Equation Modelling (PLS-SEM) software. The findings of the study reveal organizational culture is found to have a positive and significant relationship on both change commitment and change efficacy. Positive and significant relationship was found between leadership/top management and change commitment. While leadership/top management have positive but insignificant influence on change efficacy. On the other hand, employee relations have a positive and significant influence on change commitment. The findings also shows that employee relations have a positive but insignificant influence on change efficacy. The findings reveal that planning and control have an insignificant effect on both change commitment and change efficacy respectively. Furthermore, a positive and significance relationship of process management on both change commitment and change efficacy was found. On the contrary, the effect of supplier relations on change commitment and change efficacy is found to be insignificant. While customer relations have a positive and significant effect on both change commitment and change efficacy. The findings implied that manufacturing SMEs in Nigeria need to do more in areas of employee training, supplier relations and planning and control to be able to deploy sustainable lean initiatives. It also shows that SMEs organizational culture, process management, and customer relations practices can serve as a foundation of sustainable lean deployment and successful organizational readiness for change. The study recommends SMEs managers should leverage on their strengths to implement lean practices to improve quality, minimize waste and deliver value to customer. Also, government should provide the needed technical assistance to train and empower SMEs in aspects of lean initiatives to ensure the remain competitive locally and globally.

Keywords: *Lean readiness factors, Organizational readiness for change, Manufacturing SMEs.*

1.1 Introduction

Traditional manufacturing practices are no longer viable and result-oriented for organisations to be competitive in today's market (Maware, Okwu, & Adetunji, 2021; Ekpenyong Ekpenyong Udofia, Adejare & Olaore, 2021; Vamsi, Jasti, & Kodali, 2015). This results in non-value-adding work, additional waste, and higher production costs (Maware et al., 2021; Vamsi et al., 2015). Thus, it is critical to business organisations' existence that they evaluate how ready they are for change, undergo a transformation, and become familiar with better quality methods like lean manufacturing. Lean manufacturing, also known as lean management, lean production, or lean system, is a socio-technical system that is integrated to eliminate waste while simultaneously reducing or eliminating supplier, customer, and internal variations, according to Shah & Ward (2007). Lean manufacturing has been shown to be a successful strategy and a cornerstone in the realisation of operational superiority and excellence in the manufacturing industry. This is because it helps businesses eliminate waste in the areas of labour, inventory, time to market, and manufacturing space (Shah & Ward, 2007; Womack & Jones, 1997; Womack & Jones, 2003).

After Toyota Motors of Japan successfully implemented lean manufacturing, academics and business professionals have become more interested in the topic of lean manufacturing and its potential to be successfully applied in manufacturing SMEs as well as large corporations (Al-Najem, Dhakal, Labib, & Bennett, 2013; Belhadi, Bin, Sha, Touriki, & Fezazi, 2018; Moya, Galvez, Muller, Camargo, & Moya, 2019). Nevertheless, there are still issues with lean manufacturing, as demonstrated by the high percentage of unsuccessful implementations (Schröders & Cruz-Machado, 2015), which is mostly related to a failure to evaluate the organisational readiness for the shift to lean. An inability to unfreeze their organisation to develop and evaluate their preparation and preparedness prior to putting the change into effect may be the cause of this failure (Maware et al., 2021; Yadav, Jain, Mittal, Panwar, & Lyons, 2019; Yadav, Jain, Mittal, Panwar, & Sharma, 2018).

Moreover, SMEs play a significant role in the Nigerian economy, employing 76% of the labour force and contributing 49% of the GDP (PWC, 2020). Research indicates that, in terms of total number of businesses, SMEs account for over 90% of the manufacturing and industrial sector (Ministry of Budget & National Planning, 2017; PWC, 2020). The Bank of Industry (2018) reports that most Nigeria's manufacturing SMEs are involved in simple, less complex manufacturing. The customers are often the target market for products made by SMEs in the manufacturing industry, as opposed to other companies. It is claimed that with the correct amount of economic enabling, SMEs in Nigeria have substantial unrealized development potential as well as strong export and employment potentials (Olaore et al., 2020; Oyelaran-oyeyinka, 2020).

However, Nigeria has a history of demonstrating a lack of commitment to developing a robust SME sector, even though SMEs have the potential to account for a sizable share of GDP in the near future (PWC, 2020). The sector is still beset by difficulties that eventually affect the prosperity of the country (Oyelaran-oyeyinka, 2020). When compared to other emerging economies, SMEs in nations with comparable levels of development as Nigeria contribute much more to GDP (Central Bank of Nigeria, 2019; Oyelaran-oyeyinka, 2020). Nigeria's manufacturing

SMEs make up just 1% of the country's GDP, compared to 40% in Asian nations and 50% in the US or Europe (PWC, 2020).

The country's economy depends highly on crude oil, making it a single commodity for economic activities. Crude oil is the only commodity used in economic activity in the nation because of its significant economic dependence. Manufacturing makes up less than 1% of all exports, whereas crude oil accounts for more than 95% of exports and foreign income (PwC, 2018). Additionally, Asia dominates the strong fight for Nigeria's industrial sector. Research indicates that fewer than 20% of small and medium-sized enterprises (SMEs) export their goods (Oyelaran-oyeyinka, 2020; World Bank Group, 2020). According to recent World Bank data, Nigeria's manufacturing value added as a percentage of GDP is just 13%, less than that of China and Malaysia, which have respective GDPs of 26% and 22% (World Bank Group, 2020). This may be mainly due to poor adoption of quality skills, lack of effective production strategy, lack of human resources training, flawed process, ineffective inventory management and harsh business environment, which brings about the high rate of enterprise mortality (Anastasia, Chika et al., 2018). The paucity of relevant and effective training and leadership development remains (Olaore et al., 2020). The Nigerian business environment presents several operational challenges and failures, leaving SME leadership and senior managers to fend for themselves. SME leadership/ top managers are often left to search for a way to survive amid many operational difficulties and setbacks in the Nigerian business environment.

According to the researcher, one major reason for the underperformance in the sector and Nigeria's incapacity to produce high-quality goods in comparison to its international competitors is the lack of research on lean manufacturing inside SMEs in the country. According to a study that supports the claim, manufacturing SMEs struggle with staff performance, supplier relations, customer relations, and process management, all of which have a detrimental effect on the achievement of quality objectives (PWC, 2020; Udofia et al., 2021). In the same vein, it becomes imperative that they evaluate their organisational preparedness for the shift to Lean. Additionally, a study by Umude-Igbru & Price (2015) and Ogah et al., 2020 suggests that more knowledge and understanding of the adoption of Lean quality approaches in Nigerian SMEs is required. Similar to this, Antony et al. (2020) & Maware et al. (2021) suggest that to fully comprehend readiness factors, the analysis should concentrate on the Lean pre-implementation stage.

2.1 Literature Review

2.1.1 Organizational Readiness for Change

Change readiness and ready for change are terms that are commonly used interchangeably with organisational readiness for change (Timings et al., 2014). It is a multifaceted construct that is described as the collective determination of organisational members to carry out a change (called change commitment) and their collective conviction in their combined ability to do so (called change efficacy) (Shea et al., 2014). Change efficacy is the degree to which one believes that individuals within an organisation can or will not carry out the responsibilities and activities related to future change (Holt et al., 2009). On the other hand, change commitment is understood as an organisational member's collective decision to observe and follow through on the course of action

necessary to bring about change. (Weiner, 2009). Change commitment and efficacy are regarded as organizational readiness for change dimensions that can give a clearer understanding of preparedness or otherwise of an organization before implementing change. The exact dimensions were also used in other studies, e.g., (Helfrich et al., 2018; Shea et al., 2014; Uluskan et al., 2018; Weiner, 2009).

Broad literature emphasizing the importance of organizational readiness for change and its approach is an ever-growing need. However, very little evidence has been offered to promote change management strategies within SMEs (Budhiraja, 2019). Research regarding change management typically concentrates on large-scale enterprises, i.e., high-tech and multinational firms, due to the researcher's easy accessibility to data regarding processes and could quickly clarify the peculiarities (Ceptureanu, 2015). Studies focusing on organizational readiness for change to Lean within SMEs are lacking despite its implication to push SMEs toward constant growth that will lead to continuous improvement, innovativeness, and sustainability in businesses. (By & Dale, 2008).

2.1.2 Lean Readiness Factors

Timely and effective Lean readiness evaluation can ensure that SMEs are more informed of their competencies; it will make them (SMEs) well-equipped for Lean implementation and more consistent in their process (Rymaszewska, 2014). According to Antony (2014), Lean readiness factors are considered significant elements capable of increasing the chances of realizing any Lean initiative before investing in financial and workforce resources heavily on the initiative. Lean readiness factors include leadership and vision, management commitment and resources, linking Lean-to strategy, selecting the right people, and customer focus (Antony, 2014). Similarly, readiness factors are characterized as any practice supporting an organizational change by removing or annulling likely factors that may inhibit successful transition or providing the capabilities and knowledge needed to establish change (Al-Balushi et al., 2014) successfully.

Alnajem et al. (2019) propose top management and leadership, human resources, patient relations, supplier relations, processes, and continuous improvement readiness factors for Lean. Organizational culture, management commitment, leadership, lean six sigma impact, customer focus, selection of candidates for belt training, and project optimization were identified by Sreedharan et al. (2019) as factors determining Lean readiness. In a study by Moya et al. (2019), readiness factors for Lean before deployment includes; External relations, human resource management, project management, strategy, and process management. Vaishnavi & Suresh (2020) also outline management factors, organizational factors, employee factors, LSS implementation factors, and external environmental factors as determinants for Lean readiness. In a recent study by Rodgers et al. (2021), leadership, Empowerment, training and development, and employee involvement were considered as factors that determine readiness for Lean deployment within an organization

Based on the definition of Lean readiness factors and their dimensions by previous studies, it has shown that they have one common feature: assessment of readiness to deploy Lean. Hence, this study adopts organizational culture, leadership, employee relations, customer relations, process

management, and planning and control as lean readiness factors. All the Lean readiness factors listed appear to require a less complex system, making them achievable by small manufacturers as much as by their larger counterparts without significant impediments (Lee, 2006).

2.2 Hypothesis Development

2.2.1 Organizational Culture and Organizational Readiness for Change

Shuaib & He (2021) examined the impact of organizational culture on quality management and innovation practices among manufacturing SMEs in Nigeria and concluded that adopting an excellent organizational culture could lead SMEs to more substantial innovation and quality management performance. A study by Eniola et al. (2019) assesses the relationship between organizational culture and quality management in manufacturing SMEs in Nigeria and finds that organizational culture is significantly related to SMEs' performance and total quality management practices. Oluwa & Ibrahim (2021) also conducted a study within Nigerian SMEs to examine the influence of organizational culture on performance; the study reveals that organizational culture significantly impacts performance. In the same vein, Anthony (2021) finds that organizational culture enhances the performance of manufacturing SMEs in Nigeria. With a recommendation from scholars like Danese et al. (2018) on the need to further investigate the role of organizational culture in Lean manufacturing. The study, therefore, proposes to examine the relationship between organizational culture and organizational readiness to change in manufacturing SMEs.

H1: There is a positive and significant relationship between organizational culture and change commitment among manufacturing SMEs.

H2: There is a positive and significant relationship between organizational culture and change efficacy among manufacturing SMEs.

2.2.2 Leadership/top management and Organizational Readiness for Change

The study conducted within Kuwaiti SMEs finds leadership and total quality management practices significantly impact organizational performance (Awad et al., 2020). Research in which data were collected from the middle and senior managers working in small and medium enterprises of the Thai manufacturing industry; reveals that leadership is positively and significantly related to Lean manufacturing and sustainability performance (Burawat, 2019). Leadership substantially impacts SMEs' flexibility in the study conducted on Ghanaian SMEs (Anning-Dorson, 2021). leadership top management support strongly predicts supply chain resilience within the manufacturing sector (Mandal, 2020). In Nigeria, however, it was found that leadership does not mediate the relationship between quality management and organizational performance of medium-sized manufacturing SMEs (Udofia et al., 2021). At the same time, Ogah et al. (2020) reveal that top management commitment is positively and significantly related to Lean manufacturing implementation within Nigerian manufacturing firms. Empirical research on leadership and change readiness is still scarce (Yawar & Seuring, 2020). Hence the need to further investigate,

H3: There is a positive and significant relationship between leadership/top management support and change commitment among manufacturing SMEs.

H4: There is a positive and significant relationship between leadership/top management support and change efficacy among manufacturing SMEs.

2.2.3 Employee Relations and Organizational Readiness for Change

A study conducted within Spanish manufacturing firms to examine the role of lean practices on operation performance reveals that effective employee involvement is critical to lean practices that improves operational performance (Hernandez-matias et al., 2020). Human resource involvement and supplier relationship management were found to positively and significantly affect lean readiness assessment by mediating organizational culture in humanitarian organizations (Shafiq & Soratana, 2020). Similarly, a study carried out within Kuwaiti manufacturing SMEs to identify the level of lean readiness finds that human resources and supplier relations practices are not effectively deployed, hampered enthusiasm for lean (Al-Najem, Garza-Reyes, & ElMelegy, 2019). Research conducted within the United Arab Emirates to identify critical drivers for lean deployment in SMEs reveals that employee relations are essential drivers for successful lean deployment (Alefari, Almanei, & Saloniitis, 2020).

In Nigeria, a study was carried out to examine the pains and gains of manufacturing SMEs; the study's finding reveals poor employee training and development is a significant barrier to SMEs' success (Olaore et al., 2020). Similarly, a survey conducted within Nigerian SMEs to investigate the role of servant leadership and the work climate created by the leader in reducing employee turnover; discovered that a high employee turnover rate is among the significant challenges SMEs face (Amah, 2020). In the same vein, it was found that employee management is among the key factors hindering the performance of SMEs in Nigeria (Adewale, Henry, 2021; Udofia et al., 2021). Hence, the hypothesis.

H5: There is a positive and significant relationship between employee relations and change commitment among manufacturing SMEs.

H6: There is a positive and significant relationship between employee relations and change efficacy among manufacturing SMEs.

2.2.4 Planning & Control and Organizational Readiness for Change

An effective planning and control system capable of improving overall organization efficiency through stable forecasting and scheduling is the basis for implementing Lean manufacturing (Al-Najem et al., 2019). Activities that involve planning & control are undertaken based on demand in the market, and good supplier relations will facilitate raw materials supply at the right time. Also, Junaidi et al. (2020) researched planning and control systems to improve manufacturing organization production processes. Planning and control activities significantly impact industrial production (Baumung & Fomin, 2018). Planning and control positively and substantially affect Lean readiness assessment through the indirect effect of organizational culture among humanitarian organizations (Shafiq & Soratana, 2020).

Furthermore, a study conducted in Nigeria on manufacturing SMEs finds a positive and significant relationship between production planning and control and operational efficiency (Emanuel,

Aziegbe & Worlu, 2021). Also, Onwughalu (2017) examined the effect of Lean production among selected manufacturing organizations in Nigeria finds that Lean practices had a significant relationship with minimized variations associated with suppliers, processing time, and demand. Additionally, it was found that production planning & control significantly reduces operational cost among manufacturing firms in Nigeria (Ilamosi, 2019).

H7: There is a positive and significant relationship between planning & control and change commitment among manufacturing SMEs.

H8: There is a positive and significant relationship between planning & control and change efficacy among manufacturing SMEs.

2.2.5 Process Management and Organizational Readiness for Change

Uluskan et al. (2018) conducted a study within American manufacturing firms to assess organizational readiness for change due to implementing Lean six sigma; the study's findings show that process management has a significant and positive effect on customer relations. The study conducted within the Yemeni petroleum sector to examine the impact of total quality management on individual readiness for change also reveals that process management significantly impacts readiness for change (Qais Ahmed, et-al 2017). The study conducted within Nigerian manufacturing SMEs to assess the influence of quality management tools on customer satisfaction shows that process management has a positive and significant impact on customer satisfaction (Udofia, 2019). Also, a recent study conducted within manufacturing SMEs in Nigeria by Shuaib et al. (2021) shows that quality management practices significantly impact process management innovation. Moreover, 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.

H9: There is a positive and significant relationship between process management and change commitment among manufacturing SMEs.

H10: There is a positive and significant relationship between process management and change efficacy among manufacturing SMEs.

2.2.6 Supplier Relations and Organizational Readiness for Change

Research conducted within manufacturing SMEs in Kuwait to assess Lean readiness by Al-Najem et al. (2019) reveals that supplier relations are crucial to having adequate readiness for change to Lean manufacturing. Similarly, research conducted within European pharmaceutical SMEs productions firms also finds that supplier relations are a critical readiness factor for the deployment of Lean initiatives successfully (Garza-Reyes et al., 2018). Also, research conducted among Indian manufacturing SMEs to identify essential barriers and enablers for Lean deployment concludes that supplier engagement is one of the significant enablers for successful Lean deployment and implementation (Dora et al., 2016; Patel et al., 2021). Supplier relations through collaboration significantly impact the just-in-time material delivery in research carried out within Indian manufacturing SMEs (Antosz & Stadnicka, 2017). Also, in South Africa, Makhitha (2019)

conducted a study among SMEs to examine supplier relationships and performance; the findings reveal that information sharing with suppliers, collaborative relationships, and transactional relationships influence performance.

In the Nigerian context, a study conducted with quoted food and beverages manufacturing firms finds that supplier relationship management through supplier appraisal, supplier development, and supplier involvement positively and significantly affects firm performance (Ajayi et al., 2021). Also, a study carried out in Nigeria to estimate how supply chain activities of manufacturing firms influence their firm performance concludes that supplier management substantially impacts performance (Amole et al., 2021). Additionally, Adebisi, Adediran, Shodiya, & Olusola (2021) studied manufacturing firms in Nigeria and found that supplier partnerships significantly positively impact the firm's performance.

H11: There is a positive and significant relationship between supplier relations and change commitment among manufacturing SMEs.

H12: There is a positive and significant relationship between supplier relations and change efficacy among manufacturing SMEs.

2.2.7 Customer Relations and Organizational Readiness for Change

Research conducted among textile manufacturing firms in the United States to examine the impact of quality management practices on organizational readiness for change finds that customer relations strongly impact change efficacy (Uluskan et al., 2018). In Yemen, a study was conducted to analyse the role of total quality management on individual readiness for change in the petroleum sector; the study reveals that customer relations significantly impact organizational readiness for change (Ahmed et al., 2017). Customer relations were among the Lean readiness factors for successful Lean deployment within the Turkish automotive sector (Garza-Reyes et al., 2015). The study conducted within Hongkong manufacturing firms to assess the Lean readiness level found that customer relationship management is instrumental to Lean readiness (Garza-Reyes et al., 2016). A study among Nigerian SMEs finds that customer relations management measured by customer orientation, service quality, and personalized services significantly influence SMEs' performance. In the survey, customer satisfaction and performance were found to have a positive and meaningful relationship among Nigerian SMEs (Ahmed & Umar, 2021).

H13: There is a positive and significant relationship between customer relations and change commitment among manufacturing SMEs.

H14: There is a positive and significant relationship between customer relations and change efficacy among manufacturing SMEs.

2.3 Research Framework

Based on the review of related literature, the research framework is presented below. It shows the direct relationship between the independent variables and the dependent variables. The independent variables include the seven lean readiness factors and two dimensions of

organizational readiness for change comprising change commitment and efficacy as the dependent variables.

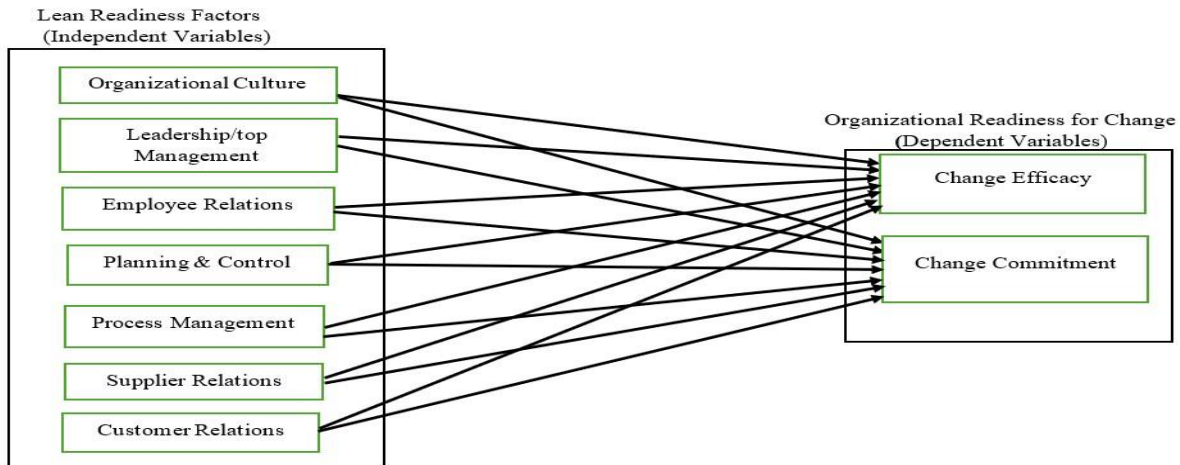


Figure 2. 1 Research framework

3.0 Materials and Methods

Based on the research objectives and hypotheses, the current research adopts the quantitative method to examine the relationship between independent and dependent variables. Other than the above reasons, the researcher chooses the quantitative research approach based on the following reasons: first and foremost, to get a satisfactory level of confidence and statistical significance, there is a need for sufficient samples (Hopkins, 2000); hence quantitative approach gives the researcher the ability to gather adequate data. The population of the study cut across manufacturing SMEs in Nigeria. As contained in a survey report by SMEDAN/NBS (2017), there are 17,094 manufacturing SMEs in Nigeria. The choosing population is based on the definition of manufacturing (Champagne 2019) as a set of processes and activities used to transform raw materials or components into a part or finished product.

Additionally, the study context is concerned with manufacturing SMEs in Nigeria. Manufacturing SMEs were selected because the manufacturing sector in Nigeria is dominated by small and medium enterprises (SMEs). The industry creates 5.3 million jobs, making up 11% of the total workforce in the country (Ministry of Budget & National Planning, 2017). Manufacturing SMEs (organizations) are the unit of analysis in which SMEs Managers serve as representatives, considering managers' roles and responsibilities for daily decision-making within their respective firms. Nonprobability sampling using convenience sampling technique was used for sampling in the study. Selecting non-probability sampling for the study results from the absence of a well-documented list of manufacturing SMEs in Nigeria. The only available document is the SMEDAN/NBS (2017) survey report on SMEs.

Moreover, the aggregate number of 17,094 manufacturing SMEs in Nigeria, as contained in a survey report by SMEDAN/NBS (2017), as the population to determine the sample size. Therefore,

in line with the study of Krejcie & Morgan (1970), a sample size of 375 is accepted to represent the population. Further, as Hair, Jr (2015) suggested, a sample can be increased by a certain percentage to handle the possible occurrence of a low response rate during data collection. In addition, Adomi, Ayo and Nakpodia (2007) study shows that Nigerians are reluctant to complete and return questionnaires. Hence, 10% of 375 samples was added, which makes 414 questionnaires administered to ensure that we have the required responses for data analysis at the end of the day. Items were adapted/adopted from previously validated empirical studies related to this study. In the present study, we have three categories of variables. They include independent variables, dependent variables, and demographic variables. The independent variable labelled; Lean readiness factors has seven dimensions: organizational culture leadership/management commitment, employee relations, customer relations, supplier relations, process management, and planning & control. The dependent variable is organizational readiness for change (change efficacy and change commitment). Therefore, a total number of 9 variables were examined using 55 scale items to measure the constructs and nine categorical demographic questions, making 64 as presented below.

Table 3-1 Summary of Constructs, Number of Items, and their Sources

Variable	No. of Items	Cronbach Alpha	Question type	Source
Independent variables				
Organizational culture	09	0.81	Likert Scale	Tenji & Foley (2019)
Leadership & Top Management	05	0.92	Likert Scale	Al-Najem, et.al, (2013)
Employee relations	04	0.90	Likert Scale	Uluskan, et.al, (2018)
Supplier relations	08	0.92	Likert Scale	Al-Najem, et.al, (2013)
Customer relations	06	0.92	Likert Scale	Al-Najem, et.al, (2013)
Planning & Control	05	0.92	Likert Scale	Al-Najem, et.al, (2013)
Process Management	06	0.89	Likert Scale	Uluskan, et.al, (2018)
Dependent variable:				
Organizational readiness for change			Likert Scale	
Change efficacy	05	0.92		(Shea et al., 2014)
Change commitment	07	0.88		(Shea et al., 2014)

Further, a total number of 337 (81%) questionnaires were retrieved by the researcher from the respondents, while 77 (19%) were not unretrievable. In Bauchi State 62 (89%), Kano 55 (79%), Plateau 54 (78%), Imo 52 (75%), Rivers 56 (81%) and Osun 58 (84%) were retrieved from the respondents. The main reason for the high response rate is the researcher's ability to personally retrieve the questionnaires and follow up to ensure the required rate is realized. From the 337 retrieved questionnaires, about 36 of them were not correctly or wholly answered, as most of the questionnaires responded to less than 75% of the items. Hence, the reason for their exclusion in the analysis. Therefore, 301 usable questionnaires were used, representing about 72%, were the valid responses used for the data analysis in this study. As Baruch (1999) asserts, research in social and management sciences has an average response rate of 55.6%.

4.1 Analysis of Data

At the initial stage of the research, a conceptual framework has been developed that needs to be examined and assessed based on the formulated hypotheses. Thus, this section completed such a task and presented the full results and findings of the study. Firstly, issues concerning outliers, missing values, demographic variables were reported. The second aspect of the data analysis for the research deals with assessing measurement and structural model. At this point, the reliability and validity of the measurement model were well established. Also, the result of the hypotheses tested was realized using the Smart PLS 3.2.8 version.

4.2 Data Screening

Further, in this study, upon the return of responses, the researcher conducts a procedure of detecting and substituting the missing values of the data collected. Five randomly missing interval scales values (Likert scale) were identified to be randomly dispersed in the data matrix (OC3,1; EM2, EM1; SR8,2; CE5,1). Hence, missing columns were replaced with series mean values in SPSS (Kline, 2011; Tabachnick, & Fidell, 2010). Secondly, it is essential to check extreme cases that can alter the statistical estimation, inflate the sum of the square, affect significance value, and create erroneous conclusions by mean of assessing univariate and multivariate outliers (Tabachnick & Fidell, 2013). Hence, one univariate outlier was detected and removed based on the recommendation of (Tabachnick and Fidell 2013). On the other hand, the multivariate outlier was examined through Mahalanobis Distance (D^2) with chi-square values. Mahalanobis Distance is the distance between a case centroid (Tabachnick & Fidell, 2013). This signifies the absence of multivariate outliers. Therefore, after deleting the univariate outlier, the remaining 300 questionnaires were used for further descriptive and inferential statistics.

4.3 Demographic Profile of Respondents

Specific characteristics of the respondents were also collected through the questionnaire instrument. The respondents were requested to give input based on the category they belong to identify them. Nine demographic variables were used in this study to determine the respondents. They include age, gender, nature of employment, years of working experience, years of firm's existence, education qualification, number of employees, business category, and nature of business. The statistics show that from the 300 participants, 285 (86%) are male, while the female figure stands at 42 (14%). A report by PWC, (2020), shows similar findings that the majority of the SMEs owners/ managers in Nigeria are male, representing 77% while females 23%. The factor of male dominance is mostly due to the social stigma associated with culture and difficulty having access to funding by females (PWC, 2020).

In terms of the nature of business organizations, the study found that agro processing has the largest number of SMEs, with 59 (19.7%) SMEs. Followed by food processing with 53 (17.7%) of the SMEs belonging to the said sub-sector. The high number of agro-processing industries is due to government policy promoting agriculture through the anchor-borrower program (Central Bank of Nigeria, 2019). Wood/ furniture has 44 (14.7%) SMEs, followed by soft drinks producers with 43 (14.3%). Textile and garment manufacturers stand at 33, making 11% of the total respondents,

while metal fabrication has 30 (10%) of the total respondents. Others stand at 17 (5.7%), mostly in the bricks and ceramics.

4.4 Measurement Model Evaluation

Hair et al. (2017, 2014) suggested that dual stages are involved in examining a model using PLS-SEM. The first stage deals with the measurement model assessment, while the second stage comprises structural model assessment. All constructs are based on reflective measurement; thus, assessing a reflective measurement model encompasses two main procedures known as internal consistency assessment and convergent validity and discriminant validity assessment. The indicator (items) reliability is expected to have an outer loading of 0.708 or higher. Conversely, loadings greater than 0.4, 0.5, 0.6, and 0.7 are all acceptable provided that the average variance extracted (AVE) and composite reliability CR threshold 0.50 and 0.70 are all satisfied. Using the Hair et al. (2014) criteria, items with loadings lower than five were deleted. The result in Table 4.4 shows that individual indicator loadings for all items were between the range of 0.512 and 0.868. It is well above the 0.5 widely recommended in the literature (Bagozzi, Yi, & Phillips, 1991; Hair et al., 2010).

Table 1. Internal Consistency and Convergent Validity

Constructs	Items	Loadings	CA	CR	AVE
Change Commitment (CC)	CC1	0.822	0.764	0.838	0.512
	CC2	0.794			
	CC3	0.669			
	CC4	0.666			
	CC5	0.603			
Change Efficacy (CE)	CE1	0.780	0.832	0.877	0.544
	CE2	0.765			
	CE3	0.783			
	CE4	0.735			
	CE5	0.698			
	CE6	0.656			
Customer Relations (CR)	CR1	0.743	0.827	0.873	0.535
	CR2	0.668			
	CR3	0.701			
	CR4	0.726			
	CR5	0.808			
	CR6	0.734			
Employee Relations (EM)	EM1	0.805	0.733	0.834	0.559
	EM2	0.776			
	EM3	0.769			

	EM4	0.627			
Leadership/top Mgt. (LM)	LM1	0.868	0.733	0.817	0.536
	LM2	0.768			
	LM3	0.733			
	LM4	0.512			
Organizational Culture (OC)	OC1	0.794	0.715	0.823	0.538
	OC2	0.709			
	OC3	0.718			
	OC5	0.709			
Planning & Control (PC)	PC1	0.858	0.716	0.819	0.538
	PC2	0.665			
	PC3	0.818			
	PC4	0.549			
Process Management (PM)	PM1	0.757	0.765	0.840	0.513
	PM2	0.722			
	PM3	0.790			
	PM4	0.654			
	PM5	0.649			
Supplier Relations (SR)	SR1	0.795	0.702	0.818	0.529
	SR2	0.732			
	SR3	0.705			
	SR7	0.673			

Also, internal consistency among the constructs was evaluated using composite reliability (CR). The CR ensures that the rule of thumb for CR should have a value of higher than 0.70 (Hair et al., 2014, 2011; Wong, 2013). From the result of the study, the CR value for all the constructs adequately satisfied such requirement as the values lies between 0.877 and 0.817. Finally, to conclude the convergent validity assessment of the measurement model, AVE was also assessed. The AVE stands as the squared loadings' grand mean of all items related to a construct (Hair et al., 2017). For convergent validity to be attained, the AVE value for each construct must be above 0.50 (50%) (Hair, Hult, Ringle, & Sarstedt, 2014; Hair et al., 2017). The result in Table 1 indicates that the AVE values were within the range of 0.513 and 0.559, above the rules of thumb. Hence, with item loadings above 0.50, CR that is above 0.70, and AVE also above the threshold of 0.50, the measurement model of this study has sufficiently met the requirement, and the model has suitable convergent validity.

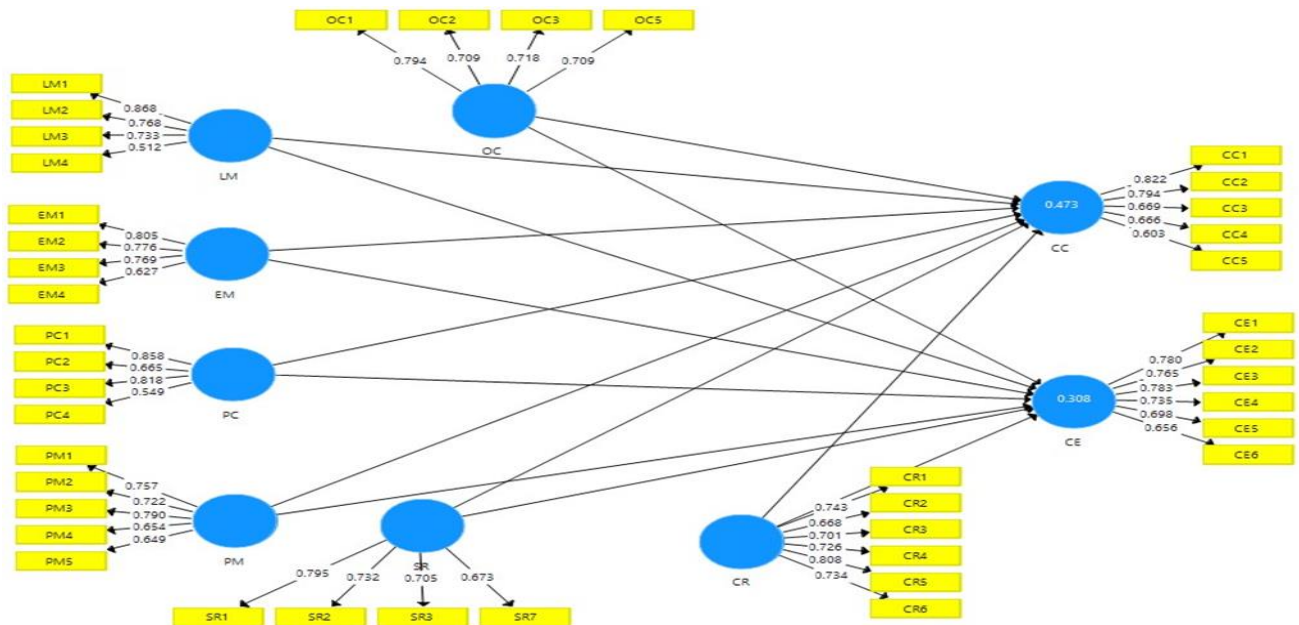


Figure 2. Measurement Model

4.4.1 Discriminant Validity – Heterotrait-Monotrait Ratio (HTMT) Criterion

Henseler et al. (2015) assert that all the values above 0.90 depict discriminant validity issues. It is also the position of Gold, Malhotra, and Segars (2001). Similarly, Kline (2011) suggests that a value that is not above 0.85 also indicates the absence of discriminant validity. However, if the constructs are conceptually similar, a higher, less conservative threshold value of 0.90 can be used (Hair et al., 2020; Hair, Risher, Sarstedt, & Ringle, 2019). Consequently, in this study, an HTMT value of 0.879 was found between change commitment and change efficacy due to their conceptual similarities as they represent dimensions for organizational readiness for change.

Table 2. Heterotrait-Monotrait Ratio (HTMT)

Constructs	CC	CE	CR	EM	LM	OC	PC	PM	SR
Change Commitment									
Change Efficacy	0.879								
Customer Relations	0.650	0.525							
Employee Relations	0.593	0.422	0.640						
Leadership/top Mgt.	0.375	0.441	0.704	0.656					
Org. Culture	0.665	0.470	0.552	0.595	0.620				
Planning & Control	0.454	0.360	0.697	0.850	0.653	0.535			
Process Management	0.699	0.607	0.662	0.795	0.647	0.631	0.651		
Supplier Relations	0.563	0.447	0.639	0.629	0.508	0.556	0.602	0.802	

4.5 Assessment of Structural Model

In the process of examining the structural model aimed at confirming the research model empirically. Some fundamental analyses must be performed in the model, which includes VIF, collinearity assessment, assessing the significance of the path coefficients, the coefficient of determination (R^2) values, the effect size (f^2) as well as PLSpredict (Q^2 predict). In the same way, all the hypothesize hypotheses direct relationships were tested and confirmed here using the bootstrapping process.

4.5.1 Variance Inflation Factor

As posited by Hair et al. (2017), VIF referred to degree which standard error of construct has been increased as a result of the existence of collinearity. Further, Hair et al., (2019), suggested that VIF values should be close to 3 and lower. The result below shows the result of the multi-collinearity assessment. It shows that the VIF values among all the constructs lie between 2.191 and 1.898 which shows an absence of collinearity amongst the constructs of this study.

Table 3. Variance Inflation Factor

Constructs	Change Commitment (CC) VIF Values	Change Efficacy (CE) VIF Values
Customer Relations (CR)	1.898	1.898
Employee Relations (EM)	2.110	2.110
Leadership/top Mgt. (LM)	1.913	1.913
Organizational Culture (OC)	1.546	1.546
Planning & Control (PC)	1.967	1.967
Process Management (PM)	2.191	2.191
Supplier Relations (SR)	1.683	1.683

4.5.2 Coefficient of Determination Assessment (R^2)

The coefficient of determination signifies the magnitude of variance in the dependent variable explained by all the constructs directly predicting it (Rigdon, 2012; Sarstedt et al., 2014). Murphy & Myers, (2003) opined that an R-square at .25 is large, at .10 is medium, and at .01 is weak. In this study, two constructs (change efficacy and change commitment) with predicting variables directly linked to them. The result revealed that change efficacy and change commitment have an R^2 of 0.308 and 0.407 respectively. Hence, indicating a larger R^2 of the combined effect of the independent variables on the dependent variables.

4.5.3 Assessing the Effect Size (f^2)

The effect size (f^2) presents the degree of the influence of each exogenous variable on an endogenous construct. Additionally, Cohen (1988) suggests that an effect size value (f^2) of 0.02, 0.15, and 0.35 as small, moderate, and large effect size respectively. Any predicting construct having an effect size (f^2) value lower than 0.02 is considered to not affect the related endogenous construct in the model. The result shows the level of effect size (f^2) for all the direct relationships among the constructs in the model. It shows that all the independent variables for the study show small effect size except for employee relations which show no effect as presented in the table below.

Table 4. Effect Size

Constructs	Change Commitment	Change Efficacy (CE)
Customer Relations	0.100	0.038
Employee Relations	0.014	0.001
Leadership/top Mgt.	0.039	0.002
Org. Culture	0.113	0.012
Planning & Control	0.004	0.002
Process Management	0.074	0.073
Supplier Relations (SR)	0.001	0.000

4.5.4 PLSpredict (Q^2 predict)

According to Shmueli et al., (2019), if the PLS-SEM analysis (compared to the LM) yields lower prediction errors in terms of RMSE for all (high predictive power), the majority (medium predictive power), the minority (low predictive power), or none of the indicators (lack of predictive power). With regards to this study, it can be said that the Q^2 predict has shown a higher predictive power. Thus, the hold-out sample indicates high predictive power. Also, as shown in the table there is a small divergence between the actual and predicted out-of-sample case values (PLS-SEM – LM) RMSE. According to Shmueli et al., (2019) and (Hair et al., (2020) it suggests that the model has high predictive power. The result of the comparison shows that all the indicators in the PLS-SEM analysis have lower RMSE values compared to the naïve LM benchmark as presented in the table below.

Table 5. PLSpredict

Items	PLS-SEM RMSE	Q ² predict	LM RMSE	PLS-SEM – LM (RMSE)
CC2	1.419	0.201	1.447	-0.028
CC4	1.199	0.105	1.245	-0.046
CC5	1.294	0.072	1.349	-0.055
CC1	1.468	0.242	1.536	-0.068
CC3	1.252	0.098	1.260	-0.008
CE6	1.228	0.073	1.276	-0.048
CE5	1.244	0.081	1.305	-0.061
CE4	1.299	0.110	1.329	-0.086
CE1	1.372	0.142	1.385	-0.013
CE3	1.299	0.155	1.356	-0.057
CE2	1.279	0.130	1.325	-0.046
CR5	1.401	0.280	1.444	-0.034
CR2	1.577	0.177	1.620	-0.043
CR6	1.457	0.226	1.512	-0.055
CR4	1.586	0.179	1.621	-0.035
CR1	1.434	0.325	1.436	-0.002
CR3	1.535	0.186	1.592	-0.057
SR7	1.344	0.168	1.386	-0.042
SR1	1.348	0.266	1.394	-0.046
SR2	1.501	0.181	1.553	-0.052
SR3	1.529	0.150	1.626	-0.097

4.6 Significance Effect of Direct Path Coefficients

The structural model was assessed using the bootstrapping technique to run the multiple regression analysis for the three hundred valid samples used in this study. Five thousand (5000) subsamples were used to run the bootstrapping procedure as widely suggested in the literature (Hair et al., 2017; Wong, 2013). The essence of this analysis is to test the significant effect of all the direct relationships hypothesize in the previous chapter. All the direct relationships hypothesize in this study are directional, and therefore, the one-tailed test was used to assess the t-values and the significant effect of all the path coefficients. Therefore, the path with values from 1.65 and above was significant using the 5% significance level, and the hypotheses are accepted. However, the path coefficient with t-values lower than 1.65, the hypotheses are rejected as presented below.

Table 6. Path Coefficients

Hypothesis	Relationship	Standard beta	T Statistic	P Values	Decision
H1	OC -> CC	0.058	5.216	0.000	Accepted
H2	OC -> CE	0.066	1.777	0.045	Accepted
H3	LM -> CC	0.055	3.426	0.000	Accepted
H4	LM -> CE	0.065	0.786	0.199	Rejected
H5	EM -> CC	0.062	1.809	0.022	Accepted
H6	EM -> CE	0.085	0.323	0.361	Rejected
H7	PC -> CC	0.065	0.966	0.176	Rejected
H8	PC -> CE	0.073	0.692	0.246	Rejected
H9	PM -> CC	0.062	4.118	0.000	Accepted
H10	PM -> CE	0.077	4.422	0.000	Accepted
H11	SR -> CC	0.057	0.571	0.296	Rejected
H12	SR -> CE	0.078	0.113	0.457	Rejected
H13	CR -> CC	0.064	5.053	0.000	Accepted
H14	CR -> CE	0.068	3.188	0.001	Accepted

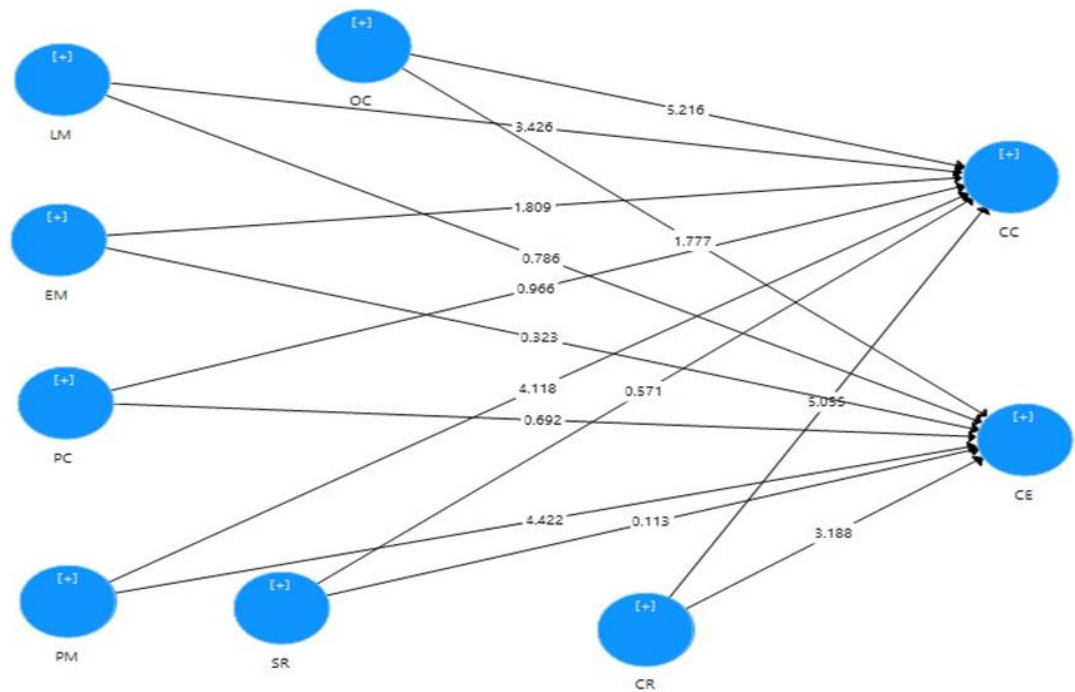


Figure 3 Structural Model

5.0 Discussion

The findings of H1 and H2 reveals an existence of positive and significant relationship between organizational culture on both change commitment and change efficacy of manufacturing SMEs in Nigeria. It indicates that SMEs in Nigeria have organizational practices that are compatible with lean initiatives, hence indicating high commitment to deploy lean practices. This may be because of SMEs nature in terms of size which made them have flexible organizational culture and flexible structure when compared to larger organizations with multiple and complex cultures. The findings of the study align with the study conducted by Shuaib & He (2021) to examine the impact of organizational culture on quality management and innovation practices among manufacturing SMEs in Nigeria that reveals adopting an excellent organizational culture could lead SMEs to more substantial innovation and quality management performance.

The findings of H3 reveals that a positive and significant relationship exist between leadership/top management and change commitment, indicating that SMEs managers have high level of commitment to adopt and implement sustainable lean practices. The findings may be due to SMEs managers commitment to reduce wastages, cut production cost, and improve quality. Also, as a result of SMEs meagre resource, the managers may be committed to be ready to change to lean organization so as to effectively manage this meagre resource and achieve quality and efficiency to compete with foreign counterparts. The findings corroborates with the study of Anning-Dorson, (2021) that reveals leadership substantially impacts SMEs' flexibility in the study conducted on Ghanaian SMEs. The findings also aligns with the study of Mandal, (2020) that shows leadership top management support strongly predicts resilience within the manufacturing sector.

H4, on the other hand reveals that positive and insignificant relationship exist between leadership/top management and change efficacy. The findings indicates that SMEs managers lack confidence when it comes to readiness for changing to lean organization. This may be because SMEs owing to their nature in terms of limited resources both in terms of trained manpower and finances which dampens the leadership efficacy to change to lean organization. The finding of H4 associates with the study of Udofia et al. (2021), while testing the mediating effect of leadership on total quality management practice and organizational performance of medium-sized manufacturing firms in Nigeria, finds that leadership does not mediate the relationship between quality practices and organizational performance.

H5 findings posits that employee relations have a positive and significant effect on change commitment within manufacturing SMEs in Nigeria. Like the findings of H4, the findings clearly shows that within SMEs in Nigerian manufacturing sector, both employees and SMEs managers have shown high level change commitment regarding readiness to deploy lean. It clearly shows that employees are encouraged to make suggestion that will reduce waste and enhance quality which is salient for successful deployment of lean initiatives. The findings corroborates with the study conducted within Spanish manufacturing firms that examined the role of lean practices on operation performance which reveals that effective employee involvement is critical to lean practices that improves operational performance (Hernandez-matias et al., 2020).

Conversely, the effect of employee relations has an insignificant effect on change efficacy as the findings of H6 reveals. The findings contradict the study conducted within the United Arab Emirates within SMEs reveals that employee relations are essential drivers for successful lean deployment (Alefari, Almani, & Saloni, 2020). The insignificant effect is possible due to lack of expertise and technical know-how of SMEs employees related to lean tools and techniques. Most SMEs in Nigeria lack the resources to develop and train their manpower. Hence, the major reason for low efficacy to be ready to change to lean organization. This may be connected to related findings by Olaore et al., (2020) that examined the pains and gains of manufacturing SMEs; the study's finding reveals poor employee training and development is a significant barrier to SMEs' success.

The findings of both H7 and H8 shows that the effect of planning & control on change commitment and change efficacy are not significant within manufacturing SMEs in Nigeria. The findings contradicts other previous study that postulated planning and control systems improves manufacturing organization production processes (Junaidi et al. 2020). It also contradicts the findings of Baumung & Fomin, (2018) that reveals planning and control activities significantly impact industrial production. The possible reason for the insignificant relations may be because of the nature of production planning and forecasting of SMEs in Nigeria, as most SMEs lack the knowledge of scheduling and effective production planning which is a major hinderance to readiness for sustainable lean practices deployment. It can be said that low level of knowledge, lack of expertise, and financial resources is one of major challenge facing Nigerian SMEs.

The effect of process management on change commitment and change efficacy (H9&H10) are found positive and significant among manufacturing SMEs in Nigeria. The findings connote that manufacturing SMEs in Nigeria design and manage the production process to ensure that non-value-added activities are removed, and value is delivered to customers timely. SMEs due to their nature of small size and fewer customers have simple and flexible process that can be manage and redesign based on customer preferences. The findings further show that in terms of process management, SMEs in Nigeria have shown high level of organizational readiness to deploy lean tools and techniques successfully. The findings corresponded with study conducted by Uluskan et al. (2018) within American manufacturing firms to assess organizational readiness for change due to implementing Lean six sigma; the study's findings show that process management has a significant and positive effect on customer relations. It also aligns with study conducted within the Yemeni petroleum sector to examine the impact of total quality management on individual readiness for change also reveals that process management significantly impacts readiness for change (Qais Ahmed,et-al 2017).

Hypotheses 11 and 12 reveal that the effect of supplier relations is not significant on change efficacy and change commitment within manufacturing SMEs in Nigeria. The findings contradict the study conducted within European pharmaceutical SMEs productions firms also finds that supplier relations are a critical readiness factor for the deployment of Lean initiatives successfully (Garza-Reyes et al., 2018). Also, it contradicts research conducted among Indian manufacturing SMEs to identify essential barriers and enablers for Lean deployment concludes that supplier engagement is one of the significant enablers for successful Lean deployment and implementation

(Dora et al., 2016; Patel et al., 2021). The possible reason for such findings is that leadership of manufacturing SMEs in Nigeria lacks the knowledge and basic skills to align themselves with their external suppliers; as shown in the demographic profile, most of the managers don't have bachelor's degrees with less than five years working experiences. Also, limited financial resources pay for the supply of materials bought on credit hinder SMEs leadership from readiness to change effectively.

The study finds that customer relations are positively and significantly related to organizational readiness for change (change efficacy and change commitment). The findings may not come as a surprise. It postulated that SMEs have better advantages of building good customer relations due to their size, giving them easy proximity to customers, and interacting more often. The findings are not new as Uluskan et al. (2018) find a positive and significant relationship between customer relations on both change efficacy and change commitment. Also, similar findings were made in the study of Ahmed et al. (2017) in the Yemen petroleum sector.

It was found that customer satisfaction and supplier partnership positively impact organizational readiness for change. Additionally, a study conducted by Shafiq & Soratana (2020), aimed at assessing readiness for Lean in the humanitarian organization, found that customer and supplier relationships are positive and significant to Lean readiness assessment. In Nigeria, a study has revealed that customer relations and engagement significantly impact enterprise performance (Omelogo, 2019).

5.2 Research Implication

Theoretically, the study has contributed to further and better understanding of organizational readiness for change to lean within manufacturing SMEs. The research has also, contributed to theoretical development of Lewin's change theory by emphasizing on the unfreezing stage (organizational readiness for change) through ensuring that SMEs in manufacturing sector needs to unfreeze and ensure they have high efficacy and commitment to change. The application of structural equation modeling offered a methodological contribution by the study as Pearce & Pons (2019) argued on lack of quantitative analysis via structural equation modeling in Lean research. Hence, this study applies SEM methodology via PLS-SEM, making it one of few studies that apply PLS-SEM in assessing organizational readiness for change to Lean. Another significant methodological contribution of the study is applying PLSpredict to assess out-of-sample model predictive power. It is posited that most studies using PLS-SEM and regression-based methods, in general, have typically overlook assessment of a model's out-of-sample predictive power (Chin et al., 2020; Hair et al., 2020).

The research has provided a new insight to business managers in SMEs on the significance of integrating customer and supplier relations so that firms can jointly integrated and synergize all Lean readiness factors to realize successful organizational readiness to change to Lean. It is shown that all units and departments within an organization must synergize to have a good foundation for Lean. The study has exposed the strengths and weaknesses and opportunities and threats within manufacturing SMEs regarding organizational readiness for change to Lean. Government agencies like Standard Organization of Nigeria, Small and Medium-Sized Development Agency of Nigeria,

National Board for Technology Incubation and Bank of Industry, and other relevant government agencies saddled with business growth and industrialization will benefit from the study. The study's findings will give them a clear picture of the level of manufacturing SMEs' organizational readiness to deploy Lean and offer them technical assistance and expert advice where and when needed.

Overall, it can be concluded that this research has tremendously contributed both theoretically and practically. It has revealed how both lean readiness factors play direct role in assessing organizational readiness to change to Lean. Hence, providing a guide and avenue for all stakeholders, particularly SME managers, to evaluate and examine organizational readiness to change to Lean that will go a long way in realizing successful Lean deployment and tackling issues of high implementation failure rate.

Additionally, future studies concerning Lean readiness assessment should consider other salient variables as moderators since studies on Lean readiness assessment that apply moderating effect are hard to come by. Variables like government support policy and capital availability should be used as possible moderators. They will further examine how government policies support Lean initiative within SMEs and explain the crucial role of finance in Lean deployment.

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