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Indirect Effect of Customer Relations on Leadership/Top Management, Employee Relations and Process Management in Examining the Readiness of SMEs to Implement Lean Initiatives

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Abstract

Before deployment of lean initiative, it is of great significance to examine the readiness of manufacturing SMEs to ensure they have the prerequisite for successful implementation. Consequently, in order to determine how prepared Nigerian manufacturing SMEs are to successfully adopt lean initiatives, the study measures the indirect effects of customer relations on leadership/top management, employee relations, and process management. Data for the study was collected from manufacturing SMEs and analyzed using Smart PLS-SEM 4.1. The study's conclusions demonstrate the substantial indirect effects that customer relationships have on employee relations, leadership/top management, and process management. Additionally, a positive correlation between employee relations and leadership/top management and process management is indicated by the direct effect findings. The study reiterates the imperatives of customers at the center of lean philosophy and emphasizes the need for synergy between leadership and employees in effective process management. The study also provides a new insight into the indirect effect of customer relations and the need for top management and employee relations in assessing the manufacturing SMEs' preparedness to implement lean initiatives for the actualization of quality and continuous improvement.

Keywords: Lean readiness, Process management, Leadership/top management, Employee relations

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1.0 Introduction

Small and medium-scale enterprises (SMEs), by their nature, are constrained by a lack of resources to produce quality products and deliver value to their customers (Olaore et al., 2020). Despite their importance to economic development and a foundation for new businesses, SMEs find it challenging to deploy lean initiatives within their businesses (Yadav et al., 2019). Such lack of resources has made it a necessity for small businesses to adopt lean initiatives within their business processes to minimize waste, improve quality and deliver value to the customer. Studies have shown that the role of leadership/top management and employee relations are pivotal to the actualization of effective process management that can be geared towards delivering value to the customer and removal of any non-adding value activities, which is the fundamental principle of lean philosophy (Knapic et al., 2022; Nagamani Subramanian & Suresh, 2023).

It is argued that most lean initiatives within SMEs failed as a result of a lack of leadership and employee readiness (Lameijer et al., 2022). Most SME managers lack the expertise to involve employees in any change initiatives, while the employees lack the skills and technical know-how to implement lean on the shop floor (Bouranta et al., 2021). Though other scholars have posited that SMEs have what it takes to implement lean initiatives due to their flexibility, like fewer employees, fewer customers and simple processes when compared to the complexities of the larger enterprise, a high rate of lean deployment failure is still on the rise within SMEs (Inuwa & AbdulRahim, 2020; Kumar & Kajal, 2015; Rose et al., 2011). The high rate of unsuccessful lean implementation is mainly associated with the inability of SMEs to assess their level of lean readiness before implementation properly (Al-Najem et al., 2013; Prasad et al., 2023)

In Nigeria, SMEs constitute a more significant part of the economy by contributing a GDP of 50% (PWC, 2020; SMEDAN/NBS, 2017). It also serves as a source of job creation and mainly engages in the production of consumer goods like shoes, garments, furniture, soft drinks, and electronics. However, the SMEs mentioned above face stiff competition from imported goods due to their inability to provide value at lower prices to the customers (Bank of Industry, 2018). Most of the customers prefer imported products due to quality and low price when compared to local manufacturers. Such a challenge is negatively affecting the survival of small manufacturers in Nigeria (Oyelaran-oyeyinka, 2020). Thus, a need for SMEs to deploy lean initiatives within their business to eradicate waste, improve quality, reduce

cost, deliver value to customers and further compete with their global counterparts.

Therefore, in order to successfully implement lean initiatives and reduce implementation failure, the study intends to investigate the level of readiness for lean implementation among Nigerian manufacturing SMEs, with a focus on leadership/top management, employee relations, process management, and customer relations.(Knapic et al., 2022; Prasad et al., 2023; Shafiq & Soratana, 2020). Based on the recommendations of scholars on the need for future studies regarding lean to be conducted in developing countries with an emphasis on leadership/ top management and employee relations(Antony et al., 2020; Rodgers et al., 2021). Also, Mutingi, (2018) recommends that future research on lean should focus on SMEs' aspects of customer relations and process design.

2.0 Literature Review

The section gives an insight on the conceptual and empirical reviews of the research variables which led to the formulation of the research hypothesis.

2.1 Customer Relations

An organization's primary goal is its customers, thus developing a solid relationship with them cannot be overstated (Abbas & Kumari, 2021). Being friendly with them is also essential, as one of the main objectives of the Lean effort is to provide value to consumers (Womack & Jones, 2003). This can only be accomplished by developing a positive and friendly relationship with them. Also, prior research has highlighted the critical role that customer interactions played as a determinant for Lean preparedness in manufacturing SMEs (Al-Najem et al., 2013; Garza-Reyes et al., 2018; Salem, Musharavati, Hamouda, & Al-Khalifa, 2016; Saumyaranjan & Yadav, 2018; Yadav et al., 2018). Customers are more likely to be satisfied and become loyal when they are included in the product creation process and given the opportunity to offer suggestions for improvements (Nyadzayo & Khajehzadeh, 2016). Additionally, it enables businesses to react to client demand, which is crucial for overall operational success (Tehseen & Ramayah, 2015).

Furthermore, anything that does not provide value to a client is waste, according to a

number of academics (Lander & Liker, 2007; Rentzsch, 2014; Womack & Jones, 2003). Delivering value to the client with little to no waste is also one of the key tenets of lean manufacturing (Antosz & Stadnicka, 2017; Khan, Kaviani, Galli, & Ishtiaq, 2019). Customer relations are therefore essential to an organization's readiness for Lean, as the goal of all organisational actions is to guarantee customer satisfaction, which is best accomplished through friendly customer relations. Research has consistently demonstrated how crucial it is to have positive customer relations before implementing Lean (Antony, 2014; Galvão et al., 2018; Gurumurthy et al., 2014; Laureani & Antony, 2012; Moya et al., 2019).

2.2 Process Management

Within Lean Manufacturing Management, the process management construct concentrates on operational activities that lead to the finished product or service by enhancing methods, increasing throughput, reducing operating costs and cycle times, and raising the overall quality of the organization's operations (Abbas & Kumari, 2021). Process management pertains to a collection of interconnected internal organizational operations aimed at achieving a shared objective and generating a certain result based on particular inputs (Alinejad & Anvari, 2019). Using tools and strategies to improve quality is part of process management, which focuses on applying quality management to achieve high performance in business activities and processes (Oliveira et al., 2019). By integrating quality into the manufacturing process, process management seeks to minimize process variance (Sinha & Dhall, 2020). Effectiveness and efficiency of processes are crucial indicators of lean success (Ng et al., 2022).

2.3 Leadership/top Management and Process Management

The readiness elements for a successful Lean deployment among manufacturing SMEs include top management and leadership commitment to quality practices and initiatives, such as shop floor monitoring, placing the right people in the right places, offering job security, investing in consulting and expert advice, and providing training (Prasad et al., 2023) The foundation for implementing Lean and transformation in a business is the support provided by the management and leadership. Leadership implications during periods of organizational

transition and transformation have been documented in a number of works. (Boston Consulting Group, 2020; Yadav, Jain, Mittal, Panwar, & Lyons, 2019). According to a study conducted in the manufacturing industry by Vega et al. (2023) on essential success criteria of lean six sigma, top management has a role in the success of lean projects.

H1: Leadership/top management has a positive and significant relationship with process management.

2.4 Employee Relations and Process Management

According to Almani et al. (2017) and Antony, Psomas, Garza-Reyes, et al. (2020), SMEs may effectively implement Lean and be change-ready by empowering and motivating their staff through motivation, teamwork, rewards, and recognition. Godinho, Miller, Ganga, and Gunasekaran (2016) state that in SMEs, staff members' involvement in quality initiatives is better valued when they participate in critical problem-solving teams and are receptive to suggestions for improvement and multitasking duties. Organizational performance in manufacturing SMEs is enhanced by employee improvement routines at different phases of Lean practice implementation, according to Knol, Slomp, Schouteten, Lauche, Knol, et al. (2018). Several studies reveal that employee relations play a critical role in the effective application of lean in SMEs firms (Alexander et al., 2019; Knapic et al., 2022; Qureshi et al., 2022)

H2: Employee relations have a positive and significant effect on process management.

2.5 Indirect Effect of Customer Relations between Leadership/Top Management and Employee Relations on Process Management

Since the customer is an organization's primary aim of lean philosophy, the significance of developing a solid relationship with them cannot be overstated (Abbas & Kumari, 2021). Due to the fact that delivering value to consumers is one of the main objectives of the Lean endeavour (Womack & Jones, 2003), a positive and amicable relationship with customers is therefore essential. Furthermore, prior research has highlighted the critical role that customer interactions played as a determinant for Lean preparedness in manufacturing SMEs (Garza-

Reyes et al., 2018; Salem, Musharavati, Hamouda & Al-Khalifa, 2016). Simultaneously, providing value to the consumer with little to no waste is one of the fundamental ideas of lean manufacturing (Antosz & Stadnicka, 2017; Khan, Kaviani, Galli, & Ishtiaq, 2019). Customer relations are therefore essential to an organization's readiness for Lean, as the goal of all organizational actions is to guarantee customer satisfaction, which is best done through friendly customer relations. Research has consistently shown how crucial it is to have positive customer relations as a prerequisite for implementing Lean (Antony, 2014; Galvão et al., 2018; Gurusurthy et al., 2014; Laureani & Antony, 2012; Moya et al., 2019).

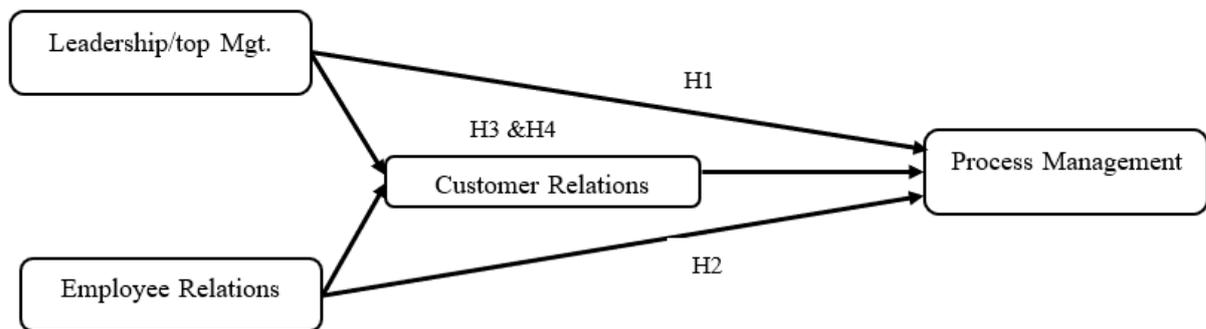
When implementing Lean initiatives, it is suggested that businesses incorporate commitment from top management, quality information and analysis, supplier relationship management, customer relationship management, and process management (Patyal et al., 2020; Vega et al., 2023). Premeditated management of supplier-customer relations is a serious consideration for the actualization of greater market performance, as established by scholarly and expert literature. Therefore, industries must appraise their investment choices vis-à-vis supplier-customer processes (Nwachukwu & Hieu, 2021). Through alliance with customers, the organization can better understand the impact of workable customer relations management and mobilize resources to expand production processes by aligning technical and management capacity and contextualizing customer needs with product and market innovation (Das & Hassan, 2021).

H3: Customer relations have an indirect significant effect on leadership/top management and process management.

H4: Customer relations have an indirect significant effect on employee relations and process management.

2.6 Research Framework

The research framework for the study is given below, and it is based on the formation of the hypothesis and the evaluation of the literature.

Figure 1: Research Framework

3.0 Methodology

The paper examines the indirect effects of customer relations on leadership/top management, employee's relations, and process management in order to assess the level of lean readiness among Nigerian manufacturing SMEs. The study used a deductive research methodology to examine the variables in the framework's causal effect relationships. The measurement instruments were drawn from earlier similar research where the variables were operationally characterized as lean readiness factors, and the assessments evaluated the lean readiness level of manufacturing SMEs and organisational readiness to convert to lean within manufacturing enterprises (Al-Najem et al., 2013; Uluskan et al., 2018). Using a five-point Likert scale, six items were taken from the Uluskan et al. (2018) study to assess process management. Five items from the Al-Najem et al. (2013) study was used as the basis for the leadership/top management assessments. An operationalized 5-point Likert scale, with points ranging from 1 to 5, was used for the items. Four-item assessments for employee relations were taken from the Uluskan et al. (2018) study. Six measures of customer relations were also taken from Al-Najem et al. (2013), using a five-point Likert scale. See Appendix 1 for the questionnaire. To guarantee the authenticity and reliability of the items, the questionnaire underwent pretesting. 17,094 manufacturing SMEs in Nigeria make up the study's population (SMEDAN/NBS, 2017). According to Krejcie & Morgan (1970), the study's total sample size of 375 is deemed representative of the population. Furthermore, in order to address the potential occurrence of a low response rate during data collection, a sample can be enlarged by a specific percentage, as suggested by Hair, Jr. (2015). Furthermore, Adomi, Ayo, and Nakpodia's 2007 study demonstrates that Nigerians are hesitant to complete and return questionnaires. Therefore,

10% of the 375 samples were added, resulting in 414 questionnaires being distributed to ensure the needed responses are collected for data analysis.

The responders are given the questionnaire by the researcher in person. According to Sekaran and Bougie (2016), giving research questionnaires to respondents in person fosters a positive relationship with them and allows for the prompt provision of any explanation they may need. Before distributing the questionnaire, the researcher used the managers to inquire about the organisations' status as either pre-Lean or practising Lean manufacturing, to make sure that the participating organisations were at this stage and not earlier. The inquiry enables the researcher to make sure that only manufacturing SMEs in the pre-Lean stage answer to the survey before they complete it. In order to guarantee ethical data collecting, the researcher also took all ethical considerations into account during the exercise.

Purposive sampling was thus used to deliver 414 questionnaires to SMEs via their various managers throughout Nigeria's six geographical zones. Because they are in charge of overseeing clients and procedures to guarantee seamless operations, SMEs managers were specifically chosen as the respondents. After 337 questionnaires were obtained, approximately 37 of them had incomplete or incorrect answers since the majority of the questionnaires only had responses to less than 75% of the items. For this reason, they were left out of the analysis. As a result, 300 valid questionnaires—or roughly 72% of the total—were utilized to collect the data for this study's research. According to Baruch (1999), the average response rate for social and management science research is 55.6%.

4.0 Data Analysis

To make sure the data was clean, missing values and outliers were evaluated once usable questionnaires were retrieved for the study. As a result, the data contained no outliers or missing values. Smart PLS- SEM version 4.0 by Ringle, Wende, and Becker (2022) assisted in the data analysis. The study evaluated the structural model (variable inflation factor, coefficient of determination, effect size, and path model) and measurement model (construct validity and reliability, outer loadings, and discriminant validity), as advised by Hair et al. (2019), as detailed and illustrated below.

4.1 Measurement Model

Since reflective measurement is a prerequisite for all notions, evaluating a reflective measurement model entails two main procedures: assessing internal consistency and convergent and discriminant validity. For the dependability of the indication (items), an outer loading of 0.70 or higher is anticipated. On the other hand, loadings over 0.4, 0.5, 0.6, and 0.7 are all acceptable as long as the composite reliability CR thresholds of 0.50 and 0.70 are met as well as the average variance extracted (AVE). Items with loadings less than five were eliminated based on the standards set out by Hair et al (2014).

Additionally, Cronbach Alpha and composite reliability (CR) were used to assess internal consistency among the components (CA). As a rule of thumb, the CR makes sure that the value is greater than 0.70 (Hair et al., 2014, 2011; Wong, 2013). Based on the study's findings, all of the constructs' CR and CA values sufficiently complied with these requirements. Lastly, an evaluation of AVE was conducted to wrap up the measurement model's convergent validity study. The AVE is an acronym for the grand mean of the squared loadings of all elements associated with a construct (Hair et al., 2017). The AVE value for each concept must be greater than 0.50 (50%) in order to achieve convergent validity (Hair, Hult, Ringle, & Sarstedt, 2014; Hair et al., 2017), as seen in the table below.

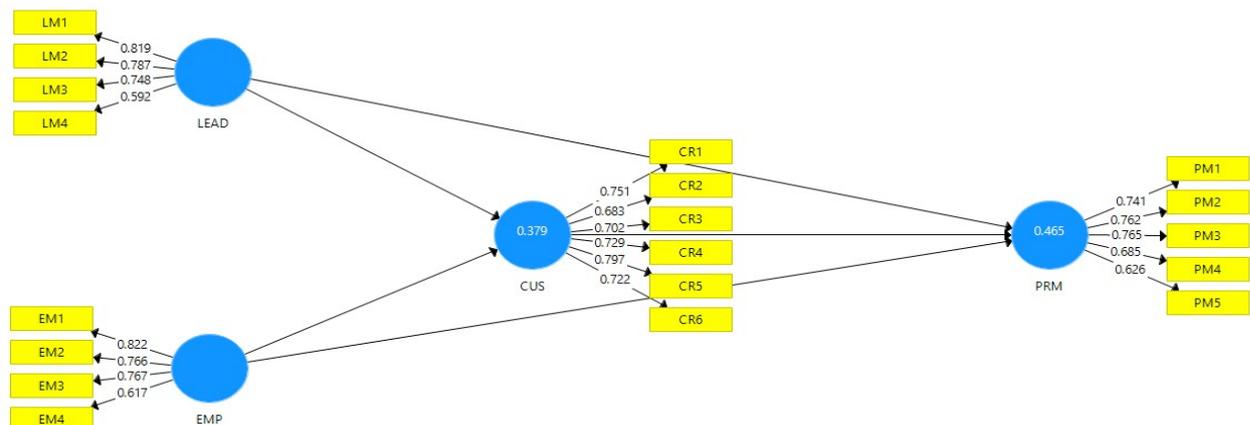
Table 1: Convergent Validity

Constructs	Items	Loadings	CA	CR	AVE
Customer Relations (CUS)	CUS1	0.751	0.827	0.873	0.535
	CUS2	0.683			
	CUS3	0.702			
	CUS4	0.729			
	CUS5	0.797			
	CUS6	0.722			
Employee Relations (EMP)	EMP1	0.822	0.733	0.833	0.558
	EMP2	0.766			
	EMP3	0.767			
	EMP4	0.617			

Leadership/top Mgt. (LEAD)	LEAD1	0.819	0.733	0.828	0.550
	LEAD2	0.787			
	LEAD3	0.748			
	LEAD4	0.592			
Process Management (PRM)	PRM1	0.741	0.765	0.841	0.515
	PRM2	0.762			
	PRM3	0.765			
	PRM4	0.685			
	PRM5	0.626			

The preceding table indicates that, in terms of internal consistency and outer loadings, the constructs and their corresponding indicators have demonstrated appropriate threshold values, as recommended by Hair et al. (2017, 2019). Presented below is the measurement model image extracted from PLS-SEM software.

Figure 2: Measurement Model



In the second stage of measuring model assessment, Henseler et al. (2015) suggested using the Heterotrait-Monotrait Ratio (HTMT) criterion to evaluate discriminant validity. According to Henseler et al. (2015), discriminant validity problems are shown by all values more than 0.90. Additionally, Gold, Malhotra, and Segars (2001) have this position. In a

similar vein, Kline (2011) proposes that a score below 0.85 also demonstrates the lack of discriminant validity. As shown in the table below, all HTMT values in this study fall below the necessary thresholds, showing that there are no problems with discriminant validity within the investigated domains.

Table 2: Heterotrait-Monotrait Ratio (HTMT)

Constructs	CUS	EMP	LEAD	PRM
Customer Relations (CUS)				
Employee Relations (EMP)	0.640			
Leadership/top Mgt. (LEAD)	0.704	0.656		
Process Management (PRM)	0.662	0.795	0.647	

4.2 Structural Model Assessment

The structural model, which is employed in the second stage of the PLS-SEM analysis, is utilized to assess the data's robustness and quality by assessing the variable inflation factor (VIF), coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). In order to evaluate multicollinearity among the constructs being studied, the variance inflation factor (VIF) was employed; VIF values are recommended to be around or below 3.00. As a result, the VIF values for customer interactions, process management, and leadership/top management are within the established standard at 1.638, 1.497, and 1.621, respectively. The standard is met by leadership/top management, process management, and customer relations, with respective scores of 1.638, 1.497, and 1.621. 1.621, respectively, which are within the recognized range. The dependent variable's degree of variation explained by all the constructs that directly predict it is shown by the coefficient of determination (R^2) (Hair et al., 2019). An R-square at .25 is large, at .10 is medium, and at .01 is weak, according to Murphy and Myers (2003). As a result, the study's strong coefficient of determination (R^2) of 0.465 shows that the independent factors' combined effect on the dependent variable is 46%.

According to Hair et al. (2019), the impact size shows how much each external variable influences an endogenous construct. According to Cohen (1988), a small, moderate, and large effect size would possess a value for effect size. (f^2) of 0.02, 0.15, and 0.35,

respectively. Any predictive construct in the model that has an impact size (f^2) value less than 0.02 is deemed to have no effect on the associated endogenous construct. A substantial effect size is indicated by the effect sizes for customer relations, leadership/top management, and staff relations, which are 0.041, 0.815, and 0.071, respectively. The predictive relevance Q^2 value is ascertained by applying the blindfolding procedure in smart PLS. The blindfolding process in smart PLS is used to determine the predictive relevance (Q^2) value. According to Hair et al. (2017), the blindfolding process is regarded as a sample reuse strategy that eliminated certain data and estimated using the remaining data in the goal criterion construct. A Q^2 value greater than zero (0) indicates that the predicting constructs have a reasonable and acceptable predictive significance for the target endogenous variable (Hair et al., 2017; Hair et al., 2011). High predictive relevance is indicated by the model's predictive relevance in this study, which is 0.233, which is more than 0.

4.3 Significant Effect of Path Coefficient

For each of the three hundred valid samples used in this investigation, a multiple regression analysis was conducted using the bootstrapping technique to evaluate the structural model. The bootstrapping process was carried out using five thousand (5000) subsamples, as recommended by the literature (Hair et al., 2017; Wong, 2013). Testing the major impact of each of the direct and indirect linkages is the main goal of this investigation. Since all of the relationships in this study's hypotheses are directional, the t-values and significant effects of each route coefficient were evaluated using the one-tailed test (Hair et al., 2017).

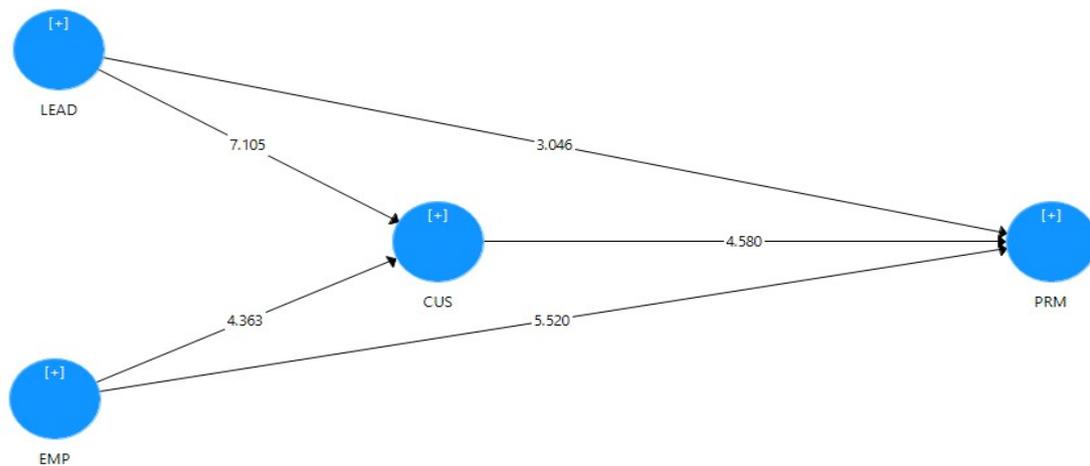
Consequently, the H1 result indicates a positive and significant effect of leadership/top management on process management ($\beta = 0.064$, $t = 3.046$, $p = 0.001$). H2 reveals a positive and significant connection between employee relations and process management ($\beta = 0.069$, $t = 5.520$, $p = 0.000$). To test for the indirect effect, the sample distribution was bootstrapped. (Hair et al., 2017). Also, bootstrapping is said to be perfectly suited for the PLS-SEM method in testing indirect effects (Hair, Hult, Ringle, & Sarstedt, 2013). Hence, the result of the indirect effects H3 and H4 reveals a positive and substantial mediating effect of customer relations on leadership/top management and employee relations at ($\beta = 0.025$, $t = 4.152$, $p = 0.000$) and ($\beta = 0.025$, $t = 2.900$, $p = 0.002$) respectively, indicating complementary mediation (Hair et al., 2017). Below is the summary of path coefficients of

the direct and indirect effect with the image of the structural model.

Table 3: Summary of Path Coefficients

	Hypothesis	Original Sample	Sample Mean	STDEV	T Statistics	P Values	Decision
H1	LEAD -> PRM	0.194	0.194	0.064	3.046	0.001	Accepted
H2	EMP -> PRM	0.383	0.386	0.069	5.520	0.000	Accepted
H3	EMP -> CUS -> PRM	0.072	0.073	0.025	2.900	0.002	Accepted
H4	LEAD -> CUS -> PRM	0.102	0.103	0.025	4.152	0.000	Accepted

Figure 3: Structural Model



5.0 Discussion

By examining the indirect effects of customer relations on the relationship between employee

relations, leadership/top management, and process management, this study seeks to determine how ready Nigerian manufacturing SMEs are to implement lean initiatives. The findings of the H1 reveal a positive and significant effect between leadership/top management and process management in Nigerian manufacturing SMEs. The findings reveal that despite challenges faced by SMEs regarding managing and designing processes, managers of SMEs remain committed to managing their business processes to deliver value to customers.

The findings show that manufacturing SMEs have a high level of lean readiness, hence the need to begin to deploy lean initiatives like total preventive maintenance, Kaizen, 5s, and visual stream mapping to ensure they upgrade and sanitize the process, eradicate waste and deliver value to customers. The findings of the study corroborate with the studies of Vega et al., (2023) and Yadav et al., (2018). Also, H2 shows a positive and significant relationship between employee relations and process management. The findings indicate that SMEs involve employees at the shopfloor in designing processes that are innovative and can lead to enhanced performance. This shows a high level of readiness to implement lean tools and techniques, like error-proofing kaizen, that will facilitate waste identification and elimination. The findings align with the studies of Alexander et al., (2019), Knapic et al., (2022), and Qureshi et al., (2022).

H3 and H4 reveal a positive and significant indirect effect of customer relations on leadership/top management, employee relations, and process management. The findings show that SMEs leadership and employees are committed to building customer relations by involving customers in process design and personalization. The findings indicate that due to SME's nature of fewer customers and simple processes, SMEs can easily customize processes based on customer needs and ensure products of value are delivered within the appropriate lead times. The findings are in relation to the studies of Patyal et al., (2020) and Vega et al. (2023).

5.1 Research Implication

Business managers in SMEs have gained new insight from the research regarding the importance of integrating customer relations, leadership, employee, and process management. This will enable firms to successfully integrate and synergize key lean readiness factors and achieve organisational readiness for lean transformation. Additionally, the survey will help

business owners gain a better knowledge of their readiness for Lean, which is crucial for business success as it enables SMEs to achieve their quality management goals and deliver value to the end-user.

The study would be helpful to government organisations dealing with company growth and industrialization, such as the Standard Organisation of Nigeria, Small and Medium-Sized Enterprises Development Agency of Nigeria, National Board for Technology Incubation, and Bank of Industry. The results of the study will paint a clear picture of how prepared manufacturing SMEs are organizationally to apply lean, and they will provide them with the technical support and professional guidance they need when it comes to ensuring effective implementation and minimising failure.

The research also makes a theoretical contribution on mediating role of customer relations on the relationship between leadership and process management in determining SMEs' preparedness to implement lean initiatives. Studies are still few, even though process management and customer relations management are critical to achieving Lean readiness, which emphasises the requirement for technical and environmental synergy. As a result, the study will offer fresh perspective on the significance of SMEs' leadership commitment in creating lean processes that ensure consumers receive value on time.

5.2 Conclusion and Recommendation for Future Research

The study reiterates the importance of putting customers at the centre of lean readiness before the deployment of lean initiatives. It implied that the success of readiness assessment of SMEs to implement lean has to be collaborative; SME managers must understand customer pain points and ensure value is delivered. Also, in the design of processes, managers must carry employees along and ensure they give them autonomy to fix problems or give suggestions on how to improve the quality of processes to ensure customers' needs are met timely. Further, the study focuses only on manufacturing SMEs; future studies can conduct similar research in other specific sectors. Also, variables like supplier relations access to technology should be studied as integral lean readiness factors.

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References

- Abbas, J., & Kumari, K. (2021). Examining the relationship between total quality management and knowledge management and their impact on organizational performance: a dimensional analysis. *Journal of Economic and Administrative Sciences, ahead-of-p*(ahead-of-print). <https://doi.org/10.1108/JEAS-03-2021-0046>
- Adomi, E. E., Ayo, B. T., & Nakpodia, E. D. (2007). A better response rate for questionnaires: Attitudes of librarians in Nigerian University Libraries. *Library Philosophy and Practice*.
- Al-Najem, M., Dhakal, H., Labib, A., & Bennett, N. (2013). Lean readiness level within Kuwaiti manufacturing industries. *International Journal of Lean Six Sigma, 4*(3), 280–320. <https://doi.org/10.1108/IJLSS-05-2013-0027>
- Alexander, P., Antony, J., Rodgers, B., Alexander, P., Antony, J., & Rodgers, B. (2019). Lean Six Sigma for small- and medium-sized manufacturing international Journal of Quality & Reliability Managementterprises : a systematic review. *International Journal of Quality & Reliability Management, 36*(3), 378–397. [https://doi.org/10.1108/IJQRM-03-2018-0074\(3\), 378–397](https://doi.org/10.1108/IJQRM-03-2018-0074(3), 378–397). <https://doi.org/10.1108/IJQRM-03-2018-0074>
- Alinejad, S., & Anvari, A. (2019). *The Mediating Effect of Collaborative Structure and Competitive Intensity on the Relationship between Process Management and Organizational Performance*. *12*(1), 149–174. <https://doi.org/10.22059/ijms.2018.259810.673169>
- Almanei, M., Salonitis, K., & Xu, Y. (2017). Lean implementation frameworks : the challenges for SMEs. *The 50th CIRP Conference on Manufacturing Systems Lean, 63*, 750–755. <https://doi.org/10.1016/j.procir.2017.03.170>
- Antony, J. (2014). Readiness factors for the Lean Six Sigma journey in the higher education sector. *International Journal of Productivity and Performance Management, 63*(2), 257–264. <https://doi.org/10.1108/IJPPM-04-2013-0077>
- Antony, J., Psomas, E., Garza-Reyes, J. A., & Hines, P. (2020). Practical implications and future research agenda of lean manufacturing: a systematic literature review. *Production Planning and Control, 0*(0), 1–37. <https://doi.org/10.1080/09537287.2020.1776410>

- Antony, J., Psomas, E., Garza-reyes, J. A., Hines, P., Antony, J., Psomas, E., Garza-reyes, J. A., & Hines, P. (2020). The Management of Operations Practical implications and future research agenda of lean manufacturing : a systematic literature review. *Production Planning & Control*, 0(0), 1–37. <https://doi.org/10.1080/09537287.2020.1776410>
- Antosz, K., & Stadnicka, D. (2017). Lean Philosophy Implementation in SMEs - Study Results. *Procedia Engineering*, 182, 25–32. <https://doi.org/10.1016/j.proeng.2017.03.107>
- Bank of Industry. (2018). *Bank of Industry: Propelling Growth for a Sustainable Future*. <https://www.boi.ng/annual-report/>
- Boston Consulting Group. (2020). *Are You Ready To Transform?*
- Bouranta, N., Psomas, E., & Antony, J. (2021). Human factors involved in lean management: a systematic literature review. *Total Quality Management & Business Excellence*, 0(0), 1–33. <https://doi.org/10.1080/14783363.2021.1936481>
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Lawrence Erlbaum, Hillsdale, NJ.
- Das, S., & Hassan, H. M. K. (2021). Impact of sustainable supply chain management and customer relationship management on organizational performance. *International Journal of Productivity and Performance Management*. <https://doi.org/10.1108/IJPPM-08-2020-0441>
- Galvão, M. B., de Carvalho, R. C., Oliveira, L. A. B. de, & Medeiros, D. D. de. (2018). Customer loyalty approach based on CRM for SMEs. *Journal of Business and Industrial Marketing*. <https://doi.org/10.1108/JBIM-07-2017-0166>
- Garza-Reyes, J. A., Betsis, I. E., Kumar, V., & Radwan Al-Shboul, M. A. (2018). Lean readiness – the case of the European pharmaceutical manufacturing industry. *International Journal of Productivity and Performance Management*, 67(1), 20–44. <https://doi.org/10.1108/IJPPM-04-2016-0083>
- Godinho, M., Miller, G., Ganga, D., & Gunasekaran, A. (2016). Lean manufacturing in Brazilian small and medium enterprises : implementation and effect on performance. *International Journal of Production Research*, 54(24), 7523–7545.

<https://doi.org/http://dx.doi.org/10.1080/00207543.2016.1201606> Lean

- Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems*. <https://doi.org/10.1080/07421222.2001.11045669>
- Gurumurthy, A., Mazumdar, P., & Muthusubramanian, S. (2014). Graph theoretic approach for analysing the readiness of an organisation for adapting lean thinking: A case study. *International Journal of Organizational Analysis*, 21(3), 396–427. <https://doi.org/10.1108/IJOA-04-2013-0652>
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2013). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). *Sage*.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2014). Partial least squares structural equation modeling (PLS-SEM). *Sage Publisher*.
- Hair, J. F., Hult, G. T. M., Ringle, C. M. & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Thousand Oaks, CA: Sage.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*. <https://doi.org/10.2753/MTP1069-6679190202>
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Inuwa, M., & AbdulRahim, S. (2020). Lean readiness factors and organizational readiness for change in manufacturing SMEs: The role of organizational culture. *Journal of Critical Reviews*, 7(5), 56–67. <https://doi.org/10.31838/jcr.07.05.10>
- Khan, S. A., Kaviani, M. A., J. Galli, B., & Ishtiaq, P. (2019). Application of continuous improvement techniques to improve organization performance: A case study. *International Journal of Lean Six Sigma*, 10(2), 542–565. <https://doi.org/10.1108/IJLSS->

05-2017-0048

- Kline, R. B. (2011). *Principles and practice of structural equation modeling*. Guilford Press.
- Knapic, V., Rusjan, B., & Božic, K. (2022). Importance of first-line employees in lean implementation in SMEs : a systematic literature review employees. *International Journal of Lean Six Sigma*, 2040–4166. <https://doi.org/10.1108/IJLSS-08-2021-0141>
- Knol, W. H., Slomp, J., Schouteten, R. L. J., Lauche, K., Knol, W. H., Slomp, J., Schouteten, R. L. J., & Lauche, K. (2018). Implementing lean practices in manufacturing SMEs : testing 'critical success factors' using Necessary Condition Analysis. *International Journal of Production Research*, 7543, 1–19. <https://doi.org/10.1080/00207543.2017.1419583>
- Krejcie, R. V., & Morgan, D. W. (1970). Determining Sample Size for Research Activities. *Educational and Psychological Measurement*. <https://doi.org/10.1177/001316447003000308>
- Kumar, P., & Kajal, S. (2015). Implementation of Lean Manufacturing in a Small-Scale Industry. *IUP Journal of Operations Management*, 14(2), 25–33. <http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=108447130&site=ehost-live>
- Lameijer, B. A., Antony, J., Borgman, H. P., & Linderman, K. (2022). Process improvement project failure : a systematic literature review and future research agenda. *International Journal of Lean Six Sigma*, 13(1), 8–32. <https://doi.org/10.1108/IJLSS-02-2020-0022>
- Lander, E., & Liker, J. K. (2007). The Toyota Production System and art: Making highly customized and creative products the Toyota way. *International Journal of Production Research*, 45(16), 3681–3698. <https://doi.org/10.1080/00207540701223519>
- Laureani, A., & Antony, J. (2012). Critical success factors for the effective implementation of Lean Sigma. *International Journal of Lean Six Sigma*, 3(4), 274–283. <https://doi.org/10.1108/20401461211284743>
- Moya, C. A., Galvez, D., Muller, L., Camargo, M., & Moya, C. A. (2019). A new framework to support Lean Six Sigma deployment in SMEs. *International Journal of Lean Six*

Sigma, 10(1), 58–80. <https://doi.org/10.1108/IJLSS-01-2018-0001>

Murphy, K. R., & Myers, B. (2003). Statistical power analysis: A simple and general model for traditional and modern hypothesis tests: Second edition. In *Statistical Power Analysis: A Simple and General Model for Traditional and Modern Hypothesis Tests: Second Edition*. <https://doi.org/10.4324/9781410609267>

Mutingi, M. (2018). Quality Management Practices in Namibian SMEs : An Empirical Investigation. *Global Business Review*, 1–15. <https://doi.org/10.1177/0972150918811706>

Nagamani, S., Suresh, & M, J. W. A. (2023). Modeling Critical Success Factors of Lean Strategy in the Manufacturing Industry. *Nankai Business Review International*, 1.

Ng, C., Morella, P., Carlos, J., Enrique, M., & Korner, H. (2022). Developing and Implementing a Lean Performance Indicator : Overall Process Effectiveness to Measure the Effectiveness in an Operation Process. *Machines*, 10(33).

Nwachukwu, C., & Hieu, V. (2021). *Assessing Supplier-Customer Relationship Management Practice and Business Performance*. <https://doi.org/10.4108/eai.7-6-2021.2308605>

Nyadzayo, M. W., & Khajehzadeh, S. (2016). Journal of Retailing and Consumer Services The antecedents of customer loyalty : A moderated mediation model of customer relationship management quality and brand image. *Journal of Retailing and Consumer Services*, 30, 262–270. <https://doi.org/10.1016/j.jretconser.2016.02.002>

Olaore, G. O., Bimbo, A. O., & Udofia, E. E. (2020). The gains and pains of small and medium-scale enterprises (SMEs): the way forward for entrepreneurship development in Nigeria. *Rajagiri Management Journal*, 15(1), 53–68. <https://doi.org/10.1108/RAMJ-09-2020-0056>

Oliveira, G. S., Corrêa, J. E., Balestrassi, P. P., Martins, R. A., & Turrioni, J. B. (2019). Investigation of TQM implementation: empirical study in Brazilian ISO 9001-registered SMEs. *Total Quality Management and Business Excellence*, 30(5–6), 641–659. <https://doi.org/10.1080/14783363.2017.1328273>

Oyelaran-oyeyinka. (2020). *SME: Issues, Challenges and Prospects*.

- Patyal, V. S., Ambekar, S., Prakash, A., Roy, D., & Hiray, A. (2020). Assessment of cultural fit between buyers and suppliers. *International Journal of Quality and Reliability Management*, 37(4), 635–658. <https://doi.org/10.1108/IJQRM-12-2018-0338>
- Prasad, K. V., Vasugi, V., Antony, J., Garza-Reyes, J. A., & Venkatesan, R. (2023). Lean readiness of organizations—A systematic scientometric review. *Total Quality Management and Business Excellence*, 1–33. <https://doi.org/10.1080/14783363.2023.2232736>
- PWC. (2020). PwC' s MSME Survey 2020 (Vol. 1, Issue 1). (Vol. 1, Issue 1).
- Qureshi, K. M., Mewada, B. G., Alghamdi, S. Y., Almakayeel, N., Qureshi, M. R. N., & Mansour, M. (2022). Accomplishing Sustainability in Manufacturing System for Small and Medium-Sized Enterprises (SMEs) through Lean Implementation. *Sustainability (Switzerland)*, 14(15). <https://doi.org/10.3390/su14159732>
- Rentzsch, H.-P. (2014). Creating Customer Value. *H&V Journal*. <https://doi.org/10.1365/s35824-014-0745-5>
- Ringle, C. M., Wende, S., & Becker, J. M. (2022). (n.d.). SmartPLS 4. Oststeinbek: SmartPLS GmbH. *S J. Appl. Struct. Equ. Model*.
- Rodgers, B., Anthony, J., & Cudney, E. A. (2021). A critical evaluation of organizational readiness for continuous improvement within a UK public utility company. *Public Money and Management*, 1–9. <https://doi.org/10.1080/09540962.2020.1868127>
- Rose, A. M. N., Deros, B. M., Rahman, M. N. A., & Nordin, N. (2011). Lean manufacturing best practices in SMEs. *International Conference on Industrial Engineering and Operation Management*, 1(1), 872–877.
- Salem, R., Musharavati, F., Hamouda, A. M., & Al-Khalifa, K. N. (2016). An empirical study on lean awareness and potential for lean implementations in Qatar industries. *International Journal of Advanced Manufacturing Technology*, 82(9–12), 1607–1625. <https://doi.org/10.1007/s00170-015-7421-7>
- Saumyaranjan, S., & Yadav, S. (2018). *of Indian manufacturing firms Lean implementation in small- and medium-sized enterprises An empirical study of Indian manufacturing firms*.

25(4), 1121–1147. <https://doi.org/10.1108/BIJ-02-2017-0033>

Shafiq, M., & Soratana, K. (2020). Lean readiness assessment model – a tool for Humanitarian Organizations' social and economic sustainability. *Journal of Humanitarian Logistics and Supply Chain Management*. <https://doi.org/10.1108/JHLSCM-01-2019-0002>.
<https://doi.org/10.1108/JHLSCM-01-2019-0002>

Sinha, N., & Dhall, N. (2020). Mediating effect of TQM on relationship between organisational culture and performance: evidence from Indian SMEs. *Total Quality Management and Business Excellence*, 31(15–16), 1841–1865.
<https://doi.org/10.1080/14783363.2018.1511372>

SMEDAN/NBS. (2017). *NATIONAL SURVEY OF MICRO SMALL & MEDIUM ENTERPRISES (MSMEs) 2017*.

Tehseen, S., & Ramayah, T. (2015). Entrepreneurial Competencies and SMEs Business Success: The Contingent Role of External Integration. *Mediterranean Journal of Social Sciences*, 6(1), 50–61. <https://doi.org/10.5901/mjss.2015.v6n1p50>

Uluskan, M., McCreery, J. K., & Rothenberg, L. (2018). Impact of quality management practices on change readiness due to new quality implementations. *International Journal of Lean Six Sigma*, 9(3), 351–373. <https://doi.org/10.1108/IJLSS-05-2017-0049>

Vega, M. De, Macias-velasquez, S., Baez-lopez, Y., Limon-romero, J., Tlapa, D., & Armando, E. (2023). Modeling Critical Success Factors of Lean Strategy in the Manufacturing Industry. *Systems*, 11(10), 490.

Womack, P., & Jones, D. (2003). *Lean Thinking: Banish waste and create wealth in your Corporation (Revised Edition)* (Second). Free Press Inc. (Second). Free Press Inc.

Wong, K. K. K. (2013). Partial least squares structural equation modeling (PLS-SEM) techniques using SmartPLS. *Marketing Bulletin*, 24(1), 1–32.

Yadav, O. P., Rahaman, M., & Lal, V. (2017). Lean Implementation and Organizational Transformation: A Literature Review. *Engineering Management Journal*, 29(1), 1–16.
<https://doi.org/10.1080/10429247.2016.1263914>

Yadav, V., Jain, R., Mittal, M. L., Panwar, A., & Lyons, A. C. (2019). The propagation of lean

thinking in SMEs. *Production Planning and Control*, 30(10–12), 854–865.
<https://doi.org/10.1080/09537287.2019.1582094>

Yadav, V., Jain, R., Mittal, M. L., Panwar, A., & Sharma, M. K. (2018). An appraisal on barriers to implement lean in SMEs. *Journal of Manufacturing Technology Management*.
<https://doi.org/10.1108/JMTM-12-2017-0262>

Appendix 1: Measurement Instrument

Process management		SD	D	N	A	SA
PM1	Our processes are designed to minimize the chances of errors.	1	2	3	4	5
PM2	Our company has a regular maintenance schedule.	1	2	3	4	5
PM3	Preventive actions are more important than corrective ones during processes.	1	2	3	4	5
PM4	We have standardized processes and instructions in place.	1	2	3	4	5
PM5	We have clean and well-organized facilities.	1	2	3	4	5
PM6	We have automated manufacturing.	1	2	3	4	5
Leadership/top Management		SD	D	N	A	SA
LM1	Top management encourages and coaches' workers by visiting the workplace on a regular basis.	1	2	3	4	5
LM2	We locate our workers where they can use their skills, qualifications, and experience	1	2	3	4	5
LM3	People have job security and workers as regularly promoted to managerial positions.	1	2	3	4	5
LM4	The company invests in training programs and encourages cross-job training.	1	2	3	4	5
LM5	The company uses external experts on a regular basis to evaluate the overall company performance.	1	2	3	4	5
Employee Relations		SD	D	N	A	SA
EM1	Our employees are responsible for continuous improvement.	1	2	3	4	5
EM2	Our employees are provided with feedback on their quality performance.	1	2	3	4	5
EM3	Our employees are encouraged to participate in continuous improvement decisions.	1	2	3	4	5

EM4	Our employees are rewarded for the best quality performance.	1	2	3	4	5
Customer Relations		SD	D	N	A	SA
CR1	There is an awareness of what product features customers value and are willing to pay for.	1	2	3	4	5
CR2	Surveys/meetings are often held with customers to generate feedback to improve product design and quality, and service.	1	2	3	4	5
CR3	Customers participate in the initial design process.	1	2	3	4	5
CR4	Valued customers are brought in to visit the plant to give them some ideas about quality control that the company can follow.	1	2	3	4	5
CR5	Customers help the company by providing information about their future demands.	1	2	3	4	5
CR6	There is a system in place for collecting customer complaints.	1	2	3	4	5