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Article

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MANAGEMENT | RESEARCH ARTICLE

Lean management and performance of telecommunication firms: The mediating role of workplace structure

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Abstract: The need to improve the performance of the telecommunication sector in Nigeria was the major motivation for this study. The study relied on requisite literature to provide a relative understanding of the concepts. Survey design was used and a sample of 299 employees across 6 state offices of selected telecommunication firms was used. Stratified sampling technique was adopted for selecting participants for the study. Partial least square SEM was used for data analysis with the aid of Smartpls3.9. The study found that lean management practices have a significant effect on performance of telecommunication firms. The study also found that workplace structure mediates the relationship between lean management practices and performance in the telecommunication sector. The study recommends the need for structuring the workplace to allow for smooth implementation and practising of lean activities, as it is beneficial towards improving the performance of the telecommunication firms.

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PUBLIC INTEREST STATEMENT

Lean management is a management philosophy that is concerned with managing organisation activities in the most optimal manner, thereby reducing waste, service disruption, and customer complaints, thus, leading to overall improvement in organisational outcomes. Lean activities are directed towards sustaining and achieving the over strategic objective of an organisation. This research approach the concept of lean management from the service sector, though not the first but it joins the growing literature that seeks to show that the concept is practical and applicable to the service sector. The telecommunication sector was used as the focus of the research and attention was directed towards assessing how workplace structure mediates the relationship between lean management and performance, given the inconsistent result on lean management and organisational performance relationship.

Keywords: Lean management; workplace structure; performance and telecommunication

1. Introduction

The telecommunication sector is one of the major service sectors that has played a pivotal role in globalization, market development and favourable economic outlook (Adebayo & Ekejiuba, 2016). The sector is one of the major service sector required for ease in human living and existence. The sector has contributed largely to economic development of developed economies and has made the ease of doing business more attractive (Inegbedion & Obadiaru, 2019).

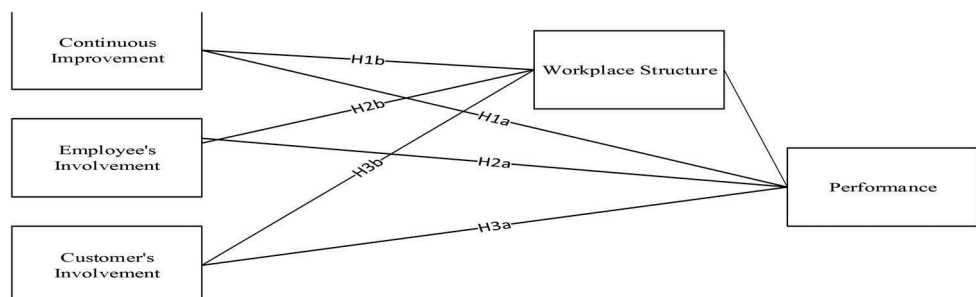
However, this reality is not evident in most developing economies, especially Nigeria, as the telecommunication sector has not been able to attract increased investment/funding in the last decade, which could explain their ability to expand their reach and coverage, coupled with an antecedent declining contribution to the country’s GDP. Also, the sector is faced with increasing complains of poor service delivery such as poor call quality, automatic subscription for unrequested services, inefficient complaint feedback mechanism, and long waiting period for over the phone complains, among others.

Further, the continuous cycle of inefficiency of the telecom sector in Nigeria could be as a result of the lack of established understanding of customer’s expectations, how to meet them, measure the success, and continuously evaluating customer’s preference to identify the need for improvement (Akanbi et al., 2015). Hence, demanding that there is a change in processes, as it will be beneficial to their overall performance.

Several studies have suggested the application of lean management in the service sector (Bonaccorsi et al., 2011; Burgess, 2012; David & Federico, 2014). This is because lean management allows for a change in processes that allows for efficiently managing organizations resources towards achieving favourably organisational outcome (Marin-Garcia & Bonavia, 2014). Holtskog (2013) stated that lean management is an improvement technique for any business that is in dire need of change in their operational and functional performance. Lean allows for identifying the critical areas of attention that will help identify areas that constitute waste and little or no value to the business and their customers (Vinodh & Joy, 2012).

The concept of lean management has attracted diverse researches (Martínez Sánchez & Pérez Pérez, 2001; Rymaszewska, 2014; Shah & Ward, 2003), which have led to adopting different methodologies to further explore and understand the application of the concept. Lean management practices now cut across various industries away from the automobile manufacturing setting where its application was first reported (Pearce & Pons 2019). The concept of lean management is basically about identifying measures towards reducing or removing waste in the organizations process, on-time delivery, overall cost reduction and enhancing the quality of the organisation’s output that are beneficial to both organizations and its customers (Fullerton, Kennedy, & Widener, 2014; Jackson & Mullarkey, 2000).

Figure 1. Conceptual model showing the hypothesized relationship between lean management practices, workplace structure and performance of firms in the telecommunication sector.



Despite the array of literature on the benefit of lean management in both the production and service rendering organization, there have been arguments on the success of lean implementation (Bortolotti et al., 2014; Pearce & Pons, 2013), as some studies have questioned its usefulness in reality, given that the implementation has failed in some instances (Achanga et al., 2006; Bortolotti et al., 2014) and several studies have shown that lean does not necessarily lead to increased performance (Hines et al., 2004), while some have shown it does lead to increased performance (Das & Jayaram, 2003; Jun et al., 2006); thus, making the relationship unclear. Therefore, given the divergent findings, there are possibly other factors that could account for lean management and performance relationship and understanding this factor could explain the criticism of lean management, which is a major gap that this study seeks to close.

Further, while there have been studies that have addressed TQM implementation and workplace structure (Owlia & Aspinwall, 1996), however, there are limited studies that have considered workplace structure influence on lean management and performance. Also, the number of quantitative studies that have assessed lean management as a multidimensional construct from the service sector are limited, as there are more qualitative studies to quantitative, this study made attempt to close this gap.

Pearce and Pons (2019) made a proposal having identified gaps in the number of studies that have adopted variance based partial least square structural equation model (PLS-SEM) as a data analysis technique for survey instrument designed towards assessing lean management practices in firms, this study is a response to that call. This has become necessary due to the need to address the ever-increasing models on lean management practices without any empirical validation, most especially from developing economies perspective, as there remain no one specific model or even definition that is generally acceptable in understanding lean management.

2. Theoretical framework and hypothesis development

The theory utilized for this study is the system theory. In system theory, the organization is seen as a system made up of components constantly interfacing with the environment. There is a constant input, output and feedback cycle between the organization and its environment, the organization receive input (ideas, preferences, regulations etc.) from the environment, the information received is then actively acted upon by the organization which leads to the release of an output (product, service), the environment receive the output, then, gives feedback to the organization which then kick start the process all over again. In this theory, the effectiveness of an organization is based on the extent an organization can meet the demands of persons and corporations affected by its operation. In relation to this study, the structure of an organization is made of units, closely linked to ensure performance. The type of structure in an organization is an important ingredient to the success of an organization as it determines the level of effectiveness and responsiveness to the demands of the environment. Meanwhile, the environment is constantly and rapidly changing, organizations are also devising means to adapt, survive and continually thrive regarding the changes in the environment resulting to setting up a system, introducing practices that aid collection and interpretation impulses from the environment, process this information then respond in such a way that guarantees performance.

3. Lean management

The concept of lean originated from the practice of “just in time“ introduced by Tai-ichi Ohno of Toyota Company around 1950 while Krafcik in 1988 was the first to use the word “lean production“. However, the concept was promoted and got much needed attention after the research carried out by Womack, Jones and Ross (1990) which was later published in a book titled “The Machine that Changed the World“ (Grzelczak & Werner-Lewandowska, 2016). Lean management is a philosophy guiding work process to ensure there is a constant decrease in the cost of production, increase excellence so as to ensure customer satisfaction and improve the organizational capability to adjust to changes through the removal of excesses (Pawłowski et al., 2010).

Organizations in modern times are endlessly exploring practices that will enhance proficiency in their business activities (Michłowicz & Smolińska, 2015). The term “lean” means thinness and its idea of lean are seen as a strategy for corporate excellence through the removal of excesses and potential damage in every activity of the corporation. Wolniak (2013) opined that to organizations, “lean” is seen as the system of narrowing administrative or manufacturing process in the area of methods of sourcing for materials, preservation of the final product and plants usage and maintenance. Therefore, in cases of potential damage and excesses, the best response is to determine its source and eradicate it. (Chomątowska & Żarczyńska-Dobiesz, 2014). According to Worley and Doolen (2006), Lean is the strategic elimination of excesses by every personnel of a corporation (Pozo et al., 2017). This definition emphasized that lean management is not the sole responsibility of the manager, every worker in an organization is responsible for ensuring its effective operation.

Karim and Arif-Uz-Zaman (2013) explained that the lean process is a unified method and its goal is to remove excesses through curtailing buyer, consumer, and organizational inconsistencies. The lean culture aims at curtailing excesses, ensure efficient use of resources and create a system to ensure consumer fulfilment. The culture of lean is a culture of reduced schedule, conservation of worker’s energy, reduced harm, expenses and errors. From this one can deduce that lean management both immediate and future merits with gains guaranteed at each level of production as agreed by (Rymaszewska, 2014).

Arbjorn et al. (2011) are of the opinion that lean management is highly regarded as it focuses on curtailing excesses and promotes consumer satisfaction. It encompasses values, ethics, machinery and methodology. He further identified the principles of lean management to include: determine worth from consumer’s point of view, not from the personnel, highlights the relevant process to plan and manufacture the good, carry out those processes devoid of disruptions and deviation, create base on consumer needs and going all out to ensure excellence and keep eliminating excesses.

However, despite the positive attribution to the concept, it is notable that the steps to executing and maintaining the practices are quite tiresome and monotonous as it has a lot to do with schedule, expenses, attentiveness and participation. Invariably. There is an impediment to its successful implementation among which are: the age bracket of the workforce, deficiency of dedicated managers and poor communication (Sim & Rogers, 2008). However, Bhasin (2012) stated that the magnitude of the corporation and tradition or socio-cultural beliefs play an essential role in its effectiveness or otherwise.

4. Continuous improvement

Organizations are not established for occasional successes, the aim of every organization is to sustain performance regardless of rapidly changing environment, hence the focus on continuous improvement. Continuous improvement is the development of a system that ensures constant progress. According to Hough (2017), organizations usually achieve accelerated progress whenever there is an improvement in processes and products, however, the current norm of progress cannot be easily maintained except with continuous improvement. He went further to state that it as an advancement in result necessitating constant work.

Organizations focusing on ensuring constant advancement and progress need to create a conducive and self-motivated environment that encourages collective work, measurable and logical system while reaping from the resourcefulness and skill of its workforce (Holtskog, 2013). Continuous improvement hinges on inventiveness and additional modification, hence the need to ensure that personnel are motivated to be innovative, self-driven to contributed needed effort for the accomplished of desired targets. Importance of the concept of continuous improvement cannot be overemphasized as it is a core dimension of lean management and total quality management that promotes innovations, creativity, ensures organizations have a competitive

edge over their competitors and rivals while ultimately resulting to customer's satisfaction (Kovach & Fredendall, 2013).

5. Employees involvement

Unlike former practices where decision making is the sole function of managers, currently, employees are involved in the process for effective coordination and cooperation. Moreover, increased employee involvement exposes and promote tapping from the expertise of the entire workforce in implementing lean management (Hewitt, 2002). According to Gennard et al. (2010), employee involvement includes all tactics employed to get the support and input of workers towards organizational goals and performance. Involvement is when workers are given the liberty to contribute, while employee involvement has to do with equipping and allowing workers to contribute ideas that will enhance the success of the corporation and workers (Sofijanovna & Zabijakin-Chatleska, 2013).

Further, Kingir and Mesci (2010) state that the need to involve employees is for them to comprehend the act of being resourceful and to instil a positive work attitude. It makes an employee to easily fit into the system while ensuring a conducive environment for both employees and managers to operate (Noah, 2008). He further classified the level of employees' involvement into two, namely: Low degree of involvement and a high degree of involvement. In the former, selected employees are allowed to be involved to a very limited extent while in the latter all the workers are given the opportunity to a greater extent. It can be deduced that employee involvement will enhance workers 'outputs, resourcefulness, satisfaction, loyalty, cordial relationship between employees and management, boost organizational image and success and lower expenditure.

Powell (2011) opined that organization practice employee involvement by involving them in major decision making of the organization, training them on leadership and through motivations. Andriotis (2017) argued that to maintain employee involvement, organization must adopt the "bottom up" approach to leadership which is a system of encouraging decision making rises from below the ladder of the hierarchy of the organization to the top executives, management should be seen as being sensitive and responding, allow employees to air their opinions and showcase their skills, set up a medium where employees can freely raise concerns and also receive response, design their training in line with their preferences and encourage team making. By so doing, organizations can maximize the benefits of employee involvement in the lean implementation process.

6. Customer involvement

Klioutch and Leker (2011) held that the feature of the current popular corporate prototype is to assign more responsibilities to consumers. Current practices in the corporate world are to involve customers at every stage of production of a good or service, resulting to increased connection/cooperation which has proven to be beneficial to organizations and consumers (Carbonell et al., 2009). Chien and Chen (2010) stated that involving the consumer in business activities will form a connection useful in product evolution and gives the organization a competitive edge over other organizations. Customer involvement can be seen as an interface between the customers and representative of a corporation before the creation of a good or service in order to ensure its profitability. Customer involvement covers every contribution of a consumer to all stages of developing a good or service (Fang et al., 2015). It is about creating a platform where consumers can be engaged at different levels of production such as creation, planning, advertising and so on.

Hence, consumer involvement, as lean management practice is being practised to determine the extent of involvement and establish the medium through which customers can be on board. Through customer involvement management, an organization is able to influence customer's continuous patronage of their products by making them part of the process and ensuring the products are in accordance with the desire of the customers. (Plankey, 2012). The minor way of engaging consumers is through their reaction and by giving opinions to the corporation while the

major way of engagement is by contributing materially, expert opinion and funding towards product creation and marketing. (Iruka & Ateke, 2014). Pinegar (2000) stated that customer involvement is in four categories: the customers only give their opinions, the customers are integrated into all the process, the customer gives counsel and lastly, he or she responds after using product or service which may be to praise, criticize, or give a pointer on how to improve on the product. Despite the merits associated with its practices, there are limitations affecting its practice. According to Menguc et al. (2014), customer involvement can obstruct drastic innovations in the creation of goods and services and lead to just producing conventional goods and services. This means it can impede creativity and innovations.

7. Workplace structure

Workplace structure is popularly known as organizational structure. The way corporate functions are classified, arranged and synchronized. Organizations through workplace structure reduce conflicts over work prospects, it also helps to organize work processes by classifying and assigning specific functions to workers (Rezayian, 2005). The structure of an organization can also be seen as the connection between the individual units and the full system of an organization. Workplace structure serves an outline for arranging official association, useful in identifying and illustrating levels of accountability, power and answerability. According to Monavarian et al. (2007), workplace structure serves as an outline showing the link on work, methods, functions, individual and team contribute to accomplish objectives. Isichei & Ayandele (2017) observed that workplace structure is a framework that design how tasks are coordinated with the purpose of accomplishing corporate objectives.

Hence, no organization operate without a structure as it ensures the channel of authority, the flow of information at every level of work is easily noted, functions are allocated and activities are properly integrated to ensure performance. Workplace structure, shows the organizational pyramid, clearly state functions of every worker while expertly integrating their activities with the main objective of the organization thereby improving proficiency. It can be categorized into line, line and staff and committee organizational structure (Hao et al., 2012). In a line organization, the functions of every employee are clearly defined with every activity linked to organizational performance. The merit of this system of organization is that there is a clear division of labour, however, every decision making lie solely on the Executives which may overwork these executive and impede organization's responsiveness. The line and staff organizational structure is an upgrade to the line structure in the sense that expert staff are given the autonomy to help the decision making system in the organization, with this, the managers are relieved from minor decision making process while they tackle the major ones (Mehrabi et al., 2013). The committee structure can either be permanent or temporal, the committee is usually set up to help the line and staff organization to proffer solution for a definite problem.

Johatch (2014) stated that workplace structure can be simple, functional, multidivisional structure, matrix structure, hybrid and network. The simple structure is the most basic, simple and relatable structure. Although the line of authority is clear, there is collaboration and collective decision making in this type of structure. There is little or no formality in this system and most popular with small organizations. Kanten et al. (2015) held that the functional structure allows for increased formality, compared to the simple although it is quite basic. The structure of the organization is based on relatedness of activities. These identified activities are based on their contributions towards the achievement of the set-out goals of the organization. The multidivisional structure focuses on the activities necessary for the achievement of the organization goal and when that is achieved the next stage is to create a system to reduce the burden on top executives by ensuring each activity are headed by the specific office who has the expertise to handle such activities. Instead of everyone reporting to a specific office, the division of labour is adopted at the managerial position to facilitate quick decision making and responsiveness (Hao et al., 2012). The matrix structure is a modification on functional structure, the focus of matrix structure is to ensure proficiency with the inclusion of is created with the aim of creating a type of structure composed of functional and multidivisional structures. Hybrid structure is a combination of two different structures, the reason for this is to

benefit from the gains of both structure type. Network structures are set up in response to changes in the business environment (Mehrabi et al., 2013).

8. Performance

Didier Noyé (2002) opined that performance encompasses accomplishing the objectives in line with the overall goal of the organization. Performance is not about the result alone but how consistent it is with the goal of the organization. Folan et al. (2007) stated that performance should be determined by and within the ambit of its operation, based on aims and goals set by the organization and on essential and detectable context.

Similarly, Chai (2009) held that performance is linked to value and productivity that is an organization can only boast of performance when all the activities of the workforce were able to achieve the desired result at a relatively low cost after eliminating waste and errors. It can also be seen as composite activities that combine expertise and ideas resulting in a desirable end. Invariably, a successful organization is a performing organization, the success of any organization lies in the capability and ability to continually achieve targeted goals of the organization.

Organizational performance can link to proficiency, value, wastage elimination, fairness and effect. The standard for measuring performance include proficiency, effectiveness, value, originality, and worth of product and cost effectiveness (Chai, 2009). In line with the proposition of Bartoli and Blatrix's opinion (Bartoli & Blatrix, 2015) that performance ought to be accomplished through assessment, directing, value and worth.

According to Nadeau (2016), organizational performance can be measured in two ways, which are the objective and the subjective. The objective is a function of the financial and accounting ratios at the end of the financial year of an organisation, while the subjective measure is based on the perception of members that took an active part in the operation of the organisation on the level of outcome based on their observation (Isichei et al., 2020). The financial is best where there are published reports on the organisations, however, where there are none, the subjective is most appropriate (Almatrooshi et al., 2016). This study relied on the subjective as most telecommunication does not have a published financial of their performance.

9. Relationship between continuous improvement and performance

Continuous improvement centres on deliberate organisations actions that are directed towards changes in their process that will result in improved performance. Yuen et al. (2016) found that continuous improvement leads to increased business performance, and it moderates the relationship between corporate social responsibility and business performance. In addition, the study of Chang (2005) found that continuous improvement has a direct relationship to performance. Continuous improvement as a dimension of lean management has its root from the total quality management theory (Coyle-Shapiro, 2002; Kanji et al., 1999), and it is directed towards ensuring that all human and material resources in the organization are coordinated towards reinventing new processes or modifying existing ones towards improving the overall bottom line of the organisations. Hence, we state that:

H_{1a}: Continuous improvement has a significant positive influence on performance

Continuous improvement is an organisational wide approach aimed at gaining increased performance through providing improvement in services in line with customer's changing preference. The inherent workplace structure has been linked to predict the way organisations change programmes are achieved (Gupta, 2015; Král & Králová, 2016), and continuous improvement have been described as a change programme that is directed towards consistently revamping the organisation's approach towards identifying customers changing preference, measuring them, satisfying them. Hence, we propose that:

H_{1b}: Workplace structure mediates the relationship between continuous improvement and performance in the telecommunication sector.

10. Relationship between Employees Involvement and Performance

The concept of employee's involvement has attracted diverse views, most especially as it applies to lean management and performance (Coyle-Shapiro, 2002; Das & Jayaram, 2003; Marin-Garcia & Medina-López 2013). Butali and Njoroge (2018) found that employee's involvement has a significant influence on performance in their study. Similarly, the study of Qi and Wang (2016) also found that employee's involvement has a direct effect on performance, despite the study was carried out using the public sector. Employees involvement have been identified as a key element in the LM practices and implementation (Nordin et al., 2011), as such, there is need for a high degree of employee's involvement in the management practices and implementation if it will yield the expected result. We thus propose that:

H_{2a}: Employee's Involvement has a significant positive influence on performance

The structure of the organisation is crucial in determining the nature and extent of involvement of employees. A workplace structure defines the extent employees will be involved in the implementation of its programmes (Ravichandran & Rai, 2000). There have been calls for including employee's involvement in the LM model, which has led to a number of studies closing that gap, however, some studies have responded (Cua et al., 2001; Flynn & Sakakibara, 1995). There seems to be a limited focus on what way the structure of the organisation could mediate the relationship between employee's involvement and performance, given that employee involvement is a measure of lean management. We thus suggest that:

H_{2b}: Employee's involvement and performance relationship are positively and significantly mediated by workplace structure.

11. Relationship between customer involvement and performance

Lean implementation requires that customers are an active part of the process since they are the end-users most especially for service firms (Van Assen, 2018). Customers involvement clearly provides the organisation the direction allows them makes strategic decisions that help them reduce waste, gain competitive advantage and reduce overall cost, which are fundamental pillars of lean management (Shah & Ward, 2003). Anning-Dorson et al. (2018) found that for service firm's customer involvement is critical for increased innovativeness. Similarly, the study of Feng et al. (2016) also showed that customer involvement has a direct effect on performance, though it is moderated by the nature of the market and technology adopted by the organisation. In addition, Ateke and Iruka (2015) found that customer's involvement essentially contributes to increased performance from their study of selected manufacturing and marketing firms. Thus, this study proposes that:

H_{3a}: Customer Involvement has a positive and significant influence on performance.

The structure of an organization can influence its lean management practices, most especially when it is not customer-centric, that is a workplace structure that allows the organisation to actively involve their customer's in the product planning, design, innovation and new product creation (Van Assen, 2018). The extent that the organization would allow for customer's involvement would be largely influenced by the structural flow of activities in the organization. The need to know customer's preference and monitor their expectations is the basis for their involvement, as this helps saves the organisation cost and reduce waste, as a supportive workplace structure is required to determine what stage are customer's involvement required, as this is effective for lean implementation (Chang & Sinclair, 2003). The structure allows for a balance that is required for practices to ensure increased performance. Hence, we propose that:

H_{3b}: Workplace structure mediates the relationship between customer involvement and performance

12. Material and method

A survey design was adopted using a questionnaire for the collection of data for the study. This approach was most useful based on the nature of the problem statement and the need to have an empirical perspective to the study problem. Population were employees from the six telecommunication firms in Nigeria. The sample cuts across internet service providing firms and the GSM telecom operating firms. The criteria for the selection of the firms were based on their number of years of operation set at a minimum of 5 years, willingness to take part in the survey, registration with national telecommunication commission. The study sample was 318 employees, and we ensured that the respondents cuts across the core functional units in the selected firms. Sample size sufficiency was assessed and the result showed that a sample of 127 is required at 0.05 level of significance to get a statistical power of 95%. Thus, given the study sample is 318 and it is above the suggested from the G-power analysis, it thus indicates that data sample size sufficiency criteria have been fulfilled (Ali et al., 2018; Andrei et al., 2017). The sample was determined using Taro Yamane formula. Stratified sampling technique was adopted in selecting the respondents, given the need to cover employees not just in their headquarters in Lagos, but also in states within the six geopolitical zones for representativeness of the sample. Research instrument reliability was done with internal consistency approach and was validated using construct and criterion approach. Partial least square structural equation model (PLS-SEM) with the aid of SmartPLSv3.9 was used for data analysis. The choice of this variance based SEM technique is because of its suitability for likert scale instrument and its ability to provide both a measurement model and structural path model test on the constructs of study.

13. Measures

Lean management practise was used as a multidimensional construct in this study (Shah & Ward, 2007). However, three variables were used to measure the construct (employee's involvement, customer's involvement and continuous improvement). This study selected these measures to operationalise lean management in the telecommunication sector because it a service industry and the variables best describes lean management practices from a service sector perspective. Scale for continuous improvement was self-designed, however, we adapted items from Martínez Sánchez and Pérez Pérez (2001) and Shah and Ward, (2007). The instrument has six items, designed using a 4 point Likert scale format. We adapted the study of Cua et al. (2001) and Marin-Garcia and Bonavia (2014) in framing the items in the scale for employee's involvement. The scale for employee's involvement has seven items designed in a 4 point Likert scale format. Similar scale format was used for the development of customer's involvement instrument with eight items, and questions were adapted from the study of Shah and Ward, (2007) and Van Assen (2018). The study relied on the study of Král and Králová (2016) in designing the scale for workplace structure. The scale had five items that was self-designed but reflective of current literature perspective of workplace structure. Performance was measured using a subjective approach due to inability to access published financial result of the telecommunication. The study of Lawler et al. (2001) was adapted in designing the scale for performance with six items. A pilot test was conducted with 50 samples and factor analysis was conducted using principal axis factoring. The result showed the KMO and Sphericity test to be significant (0.719, <0.003) (Yong & Pearce, 2013). The result confirms the multidimensionality of lean management practices, as five items loaded for continuous improvement, six items loaded for employee's involvement, five factors loaded for customer involvement, workplace structure and five loaded for performance. Harman single factor test was conducted to assess for common method variance in the data since the dependent and independent variable data were obtained from the same respondents. The result showed none of the variables had variance explained above 50%, thus, indicating that the data were free of compromise (Chang et al., 2010).

14. Result and discussions

Sequel to the study sample size, three hundred and eighteen (318) questionnaires were distributed across the six state offices of the telecommunication firms, one per state. However, a total of two hundred and ninety-nine (299), which is 94% of the total distributed sample instrument were retrieved and found suitable for further analysis. The demographic distribution of the respondents showed male respondents were 167(56%) and female is 132(44%). Work experience of the respondents showed 1–5 years were 97(32%), 6–10 years were 142(47%), 11–15 years were 38(14%), and 16 years and above are 22(7%). The age bracket from the data shows respondents between 18 and 30 years are 159(53%), 31–40 years are 89 (30%), 41–50 years are 41(14%) and 51 years and above are 10(3%). Chi-square test for difference was done to determine if there was non-response bias, given the unreturned questionnaire, the result showed there was no significant difference.

15. Measurement model

The measurement of the models was first assessed and the result showed the items had a factor value above .70 as Khan et al. (2019) and Latan and Noonan (2017) recommended, indicating that the factors loaded sufficiently (Nitzl, 2016). However, one item was dropped from the scale of continuous improvement, customer's involvement and performance, while two items were dropped in the scale for employee's involvement and none of the items were dropped for workplace structure (See Table 1). The PLS algorithm converged after iteration five in the study model. The Cronbach alpha, rho_A, Composite reliability result and Average Variance Extracted (AVE) were within threshold recommended by scholars (Hair et al., 2019; Khan et al., 2019). The result for convergent and discriminant validity was determined using Fornell–Larcker Criterion (Latan & Noonan, 2017). Discriminant Validity was justified as the AVE was greater than the correlations (Peng & Lai, 2012) and HTMT inference ratio was less than 1 (Henseler et al., 2015). The variance inflation factor (VIF) was used for multicollinearity assessment, and the result showed it was not violated as such, no collinearity problem, because they are all less than 5 (Hair et al., 2019).

16. Structural path model

Figure 2 indicates the path coefficients on the model. The result shows that lean management is positively related to performance and that there is a positive relationship between lean management practices, workplace structure and performance. Customers involvement has the least beta ($\beta = 0.213$) in explaining performance in telecommunication sector. Workplace structure to organizational performance made the most effect ($\beta = 0.608$), this implies that workplace structure is a good mediator of lean management practices and performance relationship in the telecommunication sector. The path values are above 0.2 for all the variables, which indicates the suggestion of Hair et al. (2019) were satisfied to claim that the relationship is a strong relationship.

Also, Figure 2 shows the R-squares values. This study followed the recommendation of Henseler and Chin (2010) to interpret the result (R-squares values of 0.75-strong, 0.50-moderate and 0.25-weak). Given, the r-square value for workplace is 0.470, it implies that it is moderate and 0.636 for performance is strong. Thus, it implies that the coefficient of determination of performance is 0.636 when lean management practices and workplace structure are in the model, that is changes lean management practices and workplace structure accounts for 63.6% changes in performance in the telecommunication sector. Lean management practices account for about 47% changes in the workplace structure, which leads to a 63.6% change in performance.

Table 2 and Figure 3 shows the result on the significance of the path. The study used the t-value for assessing the significance of a model. The result indicates that all the paths are significant, given the t-values are greater than 1.96 with the corresponding p-values less than 0.05. Continuous improvement to performance has a t-value of (2.164, p-value (0.004) <0.05), customer's involvement to performance (1.981, p-value (0.003) <0.05), and employee's involvement to performance has a t-value of (3.896, p-value (0.000) <0.05). Therefore, it implies continuous improvement, customer's involvement and employee's involvement as lean dimensions

Table 1. Measurement result

Constructs	Loadings	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)	VIF
Continuous Improvement		0.744	0.756	0.836	0.561	
COI1	0.762					1.628
COI2	0.720					1.454
COI3	0.753					1.477
COI4	0.761					1.270
Customer's Involvement		0.779	0.784	0.858	0.602	
CUI1	0.811					1.713
CUI2	0.752					1.499
CUI3	0.804					1.618
CUI4	0.735					1.490
Employee's Involvement		0.752	0.754	0.843	0.573	
EMI1	0.755					1.367
EMI2	0.755					1.531
EMI3	0.759					1.544
EMI4	0.759					1.414
Performance		0.819	0.824	0.882	0.652	
PEF1	0.718					1.392
PEF2	0.848					2.528
PEF3	0.880					2.817
PEF4	0.774					1.555
Workplace Structure		0.865	0.871	0.904	0.653	
WPS1	0.850					2.316

(Continued)

Table 1. (Continued)

Constructs	Loadings	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)	VIF
WPS2	0.843					2.456
WPS3	0.763					1.977
WPS4	0.868					2.554
WPS5	0.705					1.502

Source: Author's computation, 2020

Figure 2. Structural Path on the relationship between lean management practices, workplace structure and performance of telecommunications firms.

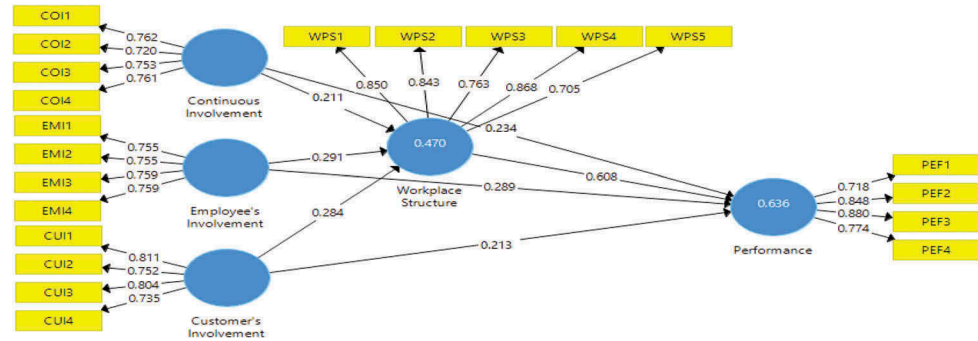


Table 2. Direct significance on the relationship between lean management practices, workplace structure and performance of telecommunications firms

	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values	Hypothesis Decision
Continuous Improvement -> Performance	0.052	2.164	0.004	Accept H_{1α}
Customer's Involvement -> Performance	0.071	1.981	0.003	Accept H_{2α}
Employee's Involvement -> Performance	0.074	3.896	0.000	Accept H_{3α}

Source: Author's Computation, 2020

significantly predict the performance of telecommunication firms. Thus, lean management practice is a good predictor increased performance.

The result in Table 3 shows that workplace structure significantly influences the relationship between lean management practices and performance in the telecommunication sector. The result shows that all the relationship were significant for the three hypotheses, as the t-values were greater than 1.96 as Hair et al. (2019) recommended for test of path significance. The p-values are also less than 0.05 indicating that workplace structure is a good predictor of lean management practices and performance in the telecommunication sector.

Finally, the model was assessed for goodness of fit and the study used chi-square as Hair et al. (2019) recommended as one of the methods for model fit assessment. Sequel to the result

Figure 3. Significance Model on the relationship between lean management practices, workplace structure and performance of telecommunications firms.

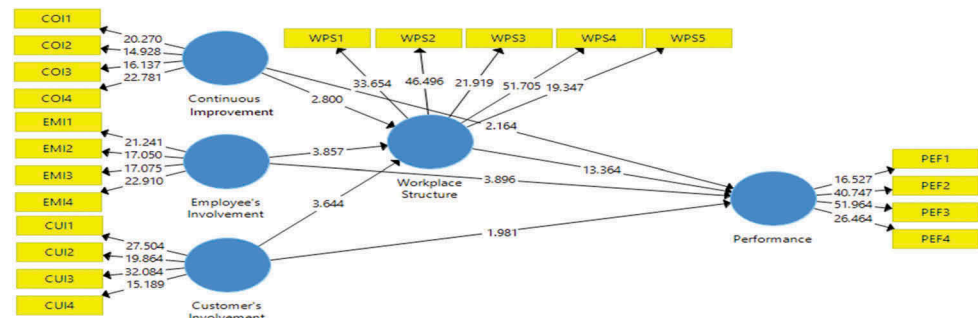


Table 3. Result on the significance of the mediating effect of workplace structure on the relationship between lean management practices, workplace structure and performance of telecommunications firms

	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values	Hypothesis Decision
Continuous Involvement -> Workplace Structure -> Performance	0.042	2.752	0.006	Accept H _{1b}
Customer's Involvement -> Workplace Structure -> Performance	0.050	3.449	0.001	Accept H _{2b}
Employee's Involvement -> Workplace Structure -> Performance	0.047	3.768	0.000	Accept H _{3b}

Source: Author's Computation, 2020

obtained from the analysis, it is worthy to state that the model is fit, as the chi-square value (862.723) is greater than 0.05 as Benitez et al. (2019) recommended.

17. Discussion

The central objective of this study was assessing the mediating effect of workplace structure on lean management and performance in the telecommunication sector. Responses from two hundred and ninety-nine sample were analysed and descriptive analysis of the data showed a relative balance in the respondents that took part in the survey, thus, indicating that responses from the samples can be relied on.

The result showed that lean management affects the performance of firms in the telecommunication sector. This result agrees with the study of Hernandez-Matias et al. (2019) and Möldner et al. (2018) that also found that components of lean management have a direct link to organisations performance. Similarly, the result illustrated the relevance of lean management in the service sector, which is consistent with the views of Andrés-López et al. (2015), Barraza and Pujol (2010), and Ritchie and Angelis (2009) that empirically confirmed the applicability of lean management in the service sector. Bhasin (2008) views that measuring lean as a multidimensional construct is most suitable gaining full insight to its value towards improving organisational outcome. This is also consistent with the views of Möldner et al. (2018).

Also, the result showed that continuous improvement has a significant positive influence on performance. This result is consistent with the study of Maletič et al. (2012) that found continuous improvement to significantly relates to performance. Similarly, the study of Chang (2005) that also found a direct link between continuous improvement and performance is further supported with the finding that affirms that ensuring increasing continuous improvement would lead to increasing level of organizational performance. The result is in agreement with the findings and recommendations of Karim and Arif-Uz-Zaman (2013) that continuous improvement is useful for increased lean performance.

Further, the result indicated that employee's involvement as a dimension of lean management affect organizational performance. The study of Butali and Njoroge (2018) and Nordin et al. (2011) are further strengthened with the finding that employee's involvement as a dimension of lean

practices has significant positive influence on performance. Similarly, the result agrees with the finding of Amah and Ahiauzu (2013) that also assessed employees' involvement on organizational effectiveness. The position of Neirotti (2018) is further strengthened with the finding of this study when it held that critical to lean implementation failures is the inability of the organization to incorporate its human resources into the implementation process, as creating a missing gap that accounts for lean failure.

The result from the analysis showed that customer involvement affects organizational performance and this is consistent with the study of Van Assen (2018) that also found in their study that customer involvement is critical to drive increased organizational performance. Similarly, the result is in consonance with the views of Satolo et al., (2020) that stated that lean management successful implementation demands some level of customer involvement in the implementation process, as it helps the organization critically design its production and service operations in such a way that the expected needs of the consumers are what are offered to the market at a given time. Furthermore, the result that customer's involvement is positively related agrees with the study of Anning-Dorson et al. (2018) that also found a significant relationship between both concepts despite using different sectors.

The result also showed that workplace structure is a good mediator of the relationship between lean management and performance. The result confirms the views of Král and Králová (2016) that workplace structure mediates the relationship continuous improvement and performance in the telecommunication sector. Also, the finding is consistent with the views of Cua et al. (2001) that expressed that employee's involvement and performance relationship is positive and significantly mediated by workplace structure. In addition, this result agrees with Van Assen (2018) that workplace structure mediates the relationship between customer involvement and performance.

18. Conclusion and recommendations

The study assessed the mediating effect of workplace structure on lean management and performance in the telecommunication industry. The study relied on relevant literature that provided justification for the need for the study. Based on the findings, we conclude that lean management affects organizational performance in the telecommunication sector. The study also concludes that lean management and organizational performance relationship is mediated by the workplace structure inherent in an organization. The study concludes that lean management is practical and it is a multidimensional construct that is applicable in the service sector. The study validates the system theory, as it provided theoretical underpinning for this study, which is a contribution to knowledge. The following recommendations are suggested based on the result.

- (i) The practices of lean in the telecommunication sector would be better enhanced when appropriate attention is paid towards ensuring continuous improvement in the quality of service rendered to customers such as call quality, internet and even quick response to complaints and feedback, and the STRUCTURE of the organization should be designed to support continuous improvement.
- (ii) The adoption of lean should take into cognizance employees involvement in the process, as it is necessary to improve performance and this can be best achieved with the right workplace structure that supports employee's involvement.
- (iii) There is need for greater attention on customer's involvement in having a proper understanding of what they want, how they want it and when they want it, and this is best done when the organization have a structure that supports it, as this will be beneficial to their overall performance.

19. Managerial implication and limitations

The reality of modern business organization places greater demand on managers to continually develop new methods towards improving performance and meeting shareholder's needs. Our

study on mediating role of workplace structure on lean management and performance is centered to provide managers with requisite information on the value of the workplace as a precursory for increased performance. The challenges encountered in implementing measures that will facilitate waste reduction, improved customer satisfaction and over all attainment of organization objectives and goals could be better managed with the existence of workplace structure that supports change and improvement in organizational processes and operation.

The study is limited to a survey design and performance was measured using a subjective approach using a likert scale questionnaire instrument. Further, the study is limited to the telecommunication sector, as such other authors could replicate this study in other service sectors. The study was limited to one developing economy which is Nigeria, there are possibility that the result could differ in other developed economies and developing economies.

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Competing Interest

The authors hereby declare that there are no conflict of interest on this work.

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