

Awareness and Willingness to Adopt Lean Technology among Micro Small Medium Enterprises in Nigeria

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Abstract

The purpose of this study is to measure the level of awareness of lean technology among micro small medium enterprises (MSME) operating in Nigeria and evaluate their willingness to adopt it. Micro small medium enterprises for many decades have proven to be the strength of Nigeria economy, as it constitutes over 90% of the existing enterprises while creating millions of jobs. As important as micro small medium enterprises are to Nigeria economy, they have very high mortality rate ranking globally, their inability to perform, deliver can be attributed to harsh, unstable business environment. The numerous challenges facing Micro small medium enterprises can be defeated, if the right management tools are deployed. Reduction of systematic waste associated with doing business in Nigeria, by introduction of lean technology to Micro small medium enterprise, will greatly enhance their operational efficiency and improve their performance; thereby cutting to large extent their high mortality rate. For micro small medium enterprises to understand and embrace lean technology there must be high level of awareness and willingness to adopt it. Quantitative research method was used in analyzing valid data from 137 respondents spread across different regions and who identified as micro small medium enterprises. The finding shows that micro small medium enterprises operators in Nigeria are not aware of the existence of lean technology, therefore are not willing to adopt it in operating their businesses.

Keywords

Lean Technology, Micro Small Medium Enterprises, Willingness to Adopt Lean, Awareness of Lean, Nigeria

1. Introduction

Lean technology is a business management that incorporates a collection of principles, tools and techniques into the business process to optimize time, human resources, assets and productivity, while improving the quality level of products and services to the customers. The whole set of lean production leads companies to high performance due to the synergistic effect among Lean production practices (Schroeder & Flynn, 2001). Lean is applicable to every enterprise (micro, small and medium).

In Nigeria Micro Small Medium enterprises (MSME) are business with assets base of not more than 500 million naira excluding (land and building) and less than 250 employees.

It represents 90% of the manufacturing/industrial sector in terms of enterprises (SMEDAN & NBS, 2017).

Enterprises in Nigeria are faced with numerous challenges, which have contributed to high business mortality rate. Micro Small medium enterprises in Nigeria have been characterized by high mortality, within their first five years of existence; only about five to ten percent survives, thrive and grow to maturity (Etim et al., 2022).

Nigeria Enterprises always attributes their inability to deliver to harsh business environment, but a close look at some of their operations reveals high presence of waste that could be eliminated, reduced by lean technique.

Further (Ogunro, 2014) posit that the environment in which business operates is multifaceted, multicenter and dynamic and has a sweeping impact on such organization.

In Nigeria the environment determines the success & longevity of the business (Ogunro, 2014). The doing business 2017 report, conducted under the international finance corporation and world bank rank Nigeria 169 out of 190 economies for overall ease of doing business, up 1 place from its 2016 report, Because the most critical infrastructure needed to drive the economy is conspicuously absent.

The performance and survival of MSMEs depends on the favorable policy that can drive and develop the MSME sector in Nigeria, which currently do not exist as a result poor government policy. The plights of MSMEs in Nigeria have to do with key variables and challenges that characterize the nation's economy.

According to 2010 survey report on SMEs in Nigeria by NBS and SMEDAN the SMEs sectors is strategically positioned to absorb up to 80% of the jobs, improve per capita income, increase value addition to raw material supply, improve export earnings, enhance capacity utilization in key industries and unlock economic expansion and GDP growth.

Weakened economic fundamentals led the country's persistent inflation to reach a 17-year high of 25.8% in August 2023, which, in combination with sluggish growth, is leaving millions of Nigerians in poverty (World Bank, 2023).

Micro Small and Medium Enterprises play a crucial role in Nigeria's economy,

driving innovation, job creation, and economic growth. However, these MSMEs face numerous challenges that hinder their progress and sustainability.

MSMEs have the potential to promote social and economic development, but they are hindered by macroeconomic issues, making it difficult to reduce unemployment and poverty (Mokuolu & Oluwaleye, 2023).

MSMEs are often ignored by researchers as far as the adoption of lean is concerned in comparison to large enterprises (LEs). Therefore, the literature regarding lean implementation in MSMEs is not conspicuous and many MSMEs have only a limited understanding and awareness of lean (Zhou, 2012).

Lean management practices (LMP) help Micro small and medium-sized enterprises (SMEs) to be efficient.

In the changing environment, manufacturing firms are changing their operations rapidly for continuous improvement together with improved quality, flexibility, and timely customer responses (Panigrahi et al., 2023).

To reduce the challenges facing MSMEs in Nigeria, the waste associated with doing business in Nigeria must be cut off for improve performance and sustainability. This can be achieved by introducing lean technology to MSMEs operators and managers.

Research Significance

Over 90% of enterprises in Nigeria are SMEs compared to 53% in USA, 65% in Europe. As important as it is less than 20% of these SMEs survives more than 5 years and grow to maturity (UNIDO, 2017) as a result of difficult Nigeria business environment, which has caused more waste in the production chain system. By eliminating waste, quality is enhanced and production time and cost are compressed because the core of lean is minimizing waste to improve productivity that will translate into profit, secured and growth of investment above all the survival of the SMEs.

This research is intended to explore and unravel a business survival strategy “LEAN TECHNIQUE “which has worked for a few thriving SMEs. Lean technique which has been proven globally as an effective strategy geared towards increasing customer value perception, efficiency, and productivity, profit and general reduction of non-value-added waste. MSMEs sector in Nigeria is grossly under researched, so therefore the outcome of this paper will add a new dimension to the little existing body of knowledge in this sector. This paper will raise awareness on lean as the alternative solution to overcome many challenges faced by Nigeria MSME.

2. Literature Review

2.1. Nigeria MSME Awareness of Lean Technique

Assessment of awareness and adoption of lean practice in Nigeria building industry (Babalola et al., 2018); suggests that although several studies have examined various aspects of lean practices in different countries, studies on the

adoption of lean principles and practices in Nigeria are grossly underrepresented in the research literature. There is a clear dearth in research of Lean implementation for MSMEs in developing countries (Hu et al., 2015). There is no clear research direction focusing on lean technique level of awareness Among MSMEs in Nigeria. Though there exist some few literatures, focusing on lean techniques in building, construction industries. According to research, the level of awareness of lean construction among stakeholders in the building industry was low (Oladiran, 2018). In another research, result indicates that the level of awareness of lean construction technology use is still at a moderate level (Amade et al., 2021).

From the paper “review of awareness and implementation within Nigeria MSMEs (Abioye & Bello, 2012) posit that the awareness and implementation levels of 5s, kaizan, kaban, pull system and value stream mapping are very low, whereas teamwork, staff training and visual management are extremely known therefore their implementation levels are high.

Like other research, this also fail to state categorically the level of awareness in general among MSMEs in Nigeria, the question raise by this paper is not about which tools of lean are mostly used by MSMEs, rather it is about if Nigeria SMEs are aware of existence of lean technique and to what level are they using lean.

2.2. Nigeria MSMEs Willingness to Adopt Lean

Globally, numerous manufacturing and service organizations are incorporating lean techniques to identify waste, eliminate non-value-added activities and increase efficiency (Deranek et al., 2017). Optimization, quality enhancement and elimination of waste and cost reduction are key drivers for the adoption of lean techniques among these enterprises (Womack & Jones, 2003). The core of lean is minimizing waste to improve productivity that will result into profits, secured investment, growth and survival of the MSME. Various researchers have tried to study lean implementation in different manufacturing environments all around the world (Odeyinka et al., 2018).

In Nigeria Micro Small and medium size enterprises have been slower to adopt lean technique. Literature review on the lean technique adoption shows that there are few articles with focus on lean technique adoption by MSME in Nigeria. So, it is difficult to evaluate the level of willingness to adopt lean technique.

2.3. Lean Technique Effect on Enterprise Performance

For MSME to reach its potential while adopting lean, lean must be adopted as a holistic business strategy, rather than an activity isolated in operation (Fullerton et al., 2014). Lean lead to increase sales, low stock level, low production cost (Keitany & Riwo-Abudho, 2014).

A large number of publications have studied the relationship between lean manufacturing adoption and organizational performance, most of the studies showed a positive relationship between the adoption of lean practices and performance (Negrão et al., 2020).

Lean technique has in the last two decades unarguably been the most prominent methodology for improving the operational performance in manufacturing company (Holweg, 2007). Most organizations pursue lean in response to their need to fundamentally improve business competitiveness by reducing cost, while increasing quality and customer responsiveness, including meeting delivery time.

Lean technique in business can lead to reduction in production costs, low cycle time, low supervision cost, customer responsiveness, increased sales, increased investment and increased profit margins (Keitany & Riwo-Abudho, 2014). The whole set of lean production leads companies to high performance due to the synergistic effects among lean production practices (Schroeder & Flynn, 2001).

Also (Belekoukias et al., 2014) showed evidence suggesting that lean methods and tools have helped manufacturing organizations to improve their operation and process, their paper showed that JIT and automation have the strongest significance on operational performance, while kaizan, TPM and VSM seem to have lesser effect.

Also (Abiodun, 2014; Inuwa & Rahim, 2020) developed a model, in order to measure the impact that the implementation of lean practices has on the operational performance in manufacturing organizations, they found that all the 3 (JIT, waste minimization and Flow management) have a significant impact on their operational performance.

Organizations can gain competitive advantage from lean production practices (Agnieszka & Karolina, 2016); such practices enable the organizations to gain superior performance through reduction of waste and other related costs (Hallam et al., 2018). According to (Dora et al., 2014) productivity and quality showed the highest improvement due to implementation of lean.

Also (Sohal & Eggleston, 1994) suggest that two thirds of the companies said that a strategic advantage have been generated with the greatest improvements stemming from market competitive positioning, customer relationships and quality constraints.

2.4. Barrier to Lean Technique Adoption

Barrier could be something material that blocks or is intended to block, hinder passage, movement, action, occurrence of an event. The barrier can be attributed to different perspectives depending on their field of influence like economic, Technical and organizational perspective. The central idea is the implementation of lean practices will reduce different types of unnecessary wastes (Chan et al., 2019).

From this paper the most visible barrier to adoption is lack of awareness; lack of knowledge of benefit of lean concept to MSME. The traditional believe that lean is meant for large corporation only has caused apathy towards lean. Also (Chan et al., 2019) states major barrier as workers attitude and resistance, financial constraints, weak leadership, low workers skill and cultures, unavailability of resources such as material, people, machine with advance technology, time and expert guidance. While exploring barriers to lean construction in construction

industry (Al Balkhy et al., 2021) also named the absence of Support from the top management, low awareness toward LC, lack of training, and the absence of transparency are amongst the most serious factors that hinder the adoption of lean.

Some of the barriers to lean implementation include: lack of proper communication channels, inflexibilities in protocols and Communication hierarchies, industry/organization culture, failing to clearly explain the lean benefits to managers, supervisors and employees, and failing to realize that lean implementation is continuous and not a onetime offering (Salem et al., 2016).

While these barriers are visible regardless of country, industry and company size. A gap in current research is the limited focus on identifying how different groups at different hierarchical levels in an organization perceive barriers to lean implementation. Unless the opinions of different groups are considered, efforts to overcome the barriers may be misguided (Lodgaard et al., 2016). Listed below are major Barriers to lean adoption.

Economic barriers

Although barriers can be attributing to various perspectives, economic perspective is the most common. While it is generally believed that lean adoption is suitable for large company, reason being that they can afford the financial requirement needed to effect lean. Lean applies to every enterprise (manufacturing/service/commercial industry, micro, medium, large enterprises).

Technical barriers

Most organization resists lean technology simply because of technical issues surrounding lean implementations. Lack of understanding of basic concept of lean and its tools makes it appear bogus thereby causing massive apathy towards lean.

Organizational barrier

According to various researches, of all the barriers to lean adoption. This is the biggest threat to use of lean. An article on critical success factor (CSF) posits that if the organizational culture is not ready, adoption of lean technology amounts to failure. The absence of support from the top management/weak leadership will result in barrier to adoption of lean.

2.5. Benefit of Awareness of Lean Technique

Lack of sufficient attention to the possible benefits of adopting lean concepts has hindered the performance of micro small & medium enterprise. Insufficient knowledge on how to minimize non-value adding activities (NVAA) is considered a Major barrier to implementing lean. For the low lean adoption, which can be attributed to low awareness, it is clear that currently MSME in Nigeria are not benefiting from lean technique. Increase awareness therefore will result in an increased adoption of lean as a concept of continuous business improvement method. Knowing the benefits of lean practices can create a more in-depth understanding of them within an organization.

In exploring the benefits of lean concept will expose the work culture at an organization that makes all employees strive to continuously reduce cost, im-

prove the quality and shorten delivery cycle to maximally meet customers' expectations.

Although some organizations have transformed & reaped significant benefits of lean manufacturing, many organizations have nosedived in this attempt (Douglas et al., 2017). One of the reasons is that many Organizations ignore to "Assess the organizational readiness" critical success factors (Achanga et al., 2006). The biggest benefit of an increased awareness is that MSME will massively adopt it as continuous solutions to numerous Problems it faces.

2.6. Challenges Facing MSME in Nigeria

The top ten problem of MSME in Nigeria which has affected its profit and performance; includes, access to finance, high interest rate, electricity, poor infrastructure, government policy inconsistencies and Bureaucracy, environmental factors, multiple taxes and levies, access to modern technology, unfair competition, marketing Problems and non-availability of raw materials locally. However, SMEs still suffer from many problems, such as low product quality and working efficiency, budget overruns, and substantial construction waste (Ankomah et al., 2017). By raising awareness and educating managers of MSME about lean, it will improve productivity of MSME in Nigeria against the prevalent tough business operating environment. Lean principles and techniques have become a benchmark for Western manufacturing companies (Lodgaard et al., 2016).

The seven identified wastes by lean which are also part of waste experience by MSME in Nigeria; overproduction, waiting, transportation, unnecessary motion, poor processing, defect and inventory.

Increase awareness will benefit MSME to improve on organization culture that guarantees improved efficiency, reduce Waste and increase productivity, sustains employee satisfaction, free up space, improve product quality, increase profit with less waste because lean is a process of continuous improvement and conservation of resources, to meet a specified target.

3. Methodologies

This study employed quantitative research with focus in establishing relationship between awareness of lean technique and willingness to adopt lean technique by MSME in Nigeria. The adoption of this method is because its numeric pattern can well represent a larger population while providing a comprehensive understanding of the impact of the awareness of lean technique and willingness to adopt it.

Quantitative research designs adopted was descriptive survey in collecting data from selected respondent. A digital descriptive questionnaire (Google form), was adopted for this survey. This is to allow for more accurate response, quick analysis, easy distribution and return.

The participant of this survey are MSME operating in 6 zones across Nigeria, their locations are both urban and rural area. Those selected, are participants

who identified as either micro, small or medium enterprises. With total sample size of 137 MSME operators as respondents covering over eight business sectors namely, technology/software, hospitality/entertainment, service/logistics, healthcare, manufacturing, agriculture, Finance/fintech, Trading/commerce, construction.

These 137 respondents are the managers or operators of the MSME, who are citizens and reside in Nigeria as at the time of the survey.

The study questionnaire comprises of Awareness of lean, gender of MSMEs ownership/operator, level of education, size of the organization (micro, small, and medium), MSME willingness to adopt lean. After collecting of data from 137 samples the data analysis was done with IBM SPSS statistical analysis. The aim is to measure the awareness level of lean technique among MSME in Nigeria and the willingness of MSME in Nigeria to adopt lean technique.

4. Results Findings and Discussions

4.1. Gender

Gender classification of our samples **Table 1** shows that out of 137 respondents interviewed, 102 were males and 35 were females which represents 74.5% and 25.5% respectively. This implies that majority of MSME operators and managers are male.

4.2. Education

As seen below on **Table 2** show that education level of the respondents who has university degree is 53.3%, followed by secondary education 29.2%. Only 1.5% of the respondent had primary education and 1.5% had professional certification. These signify that Nigeria MSME boosts of highly educated and informed managers, which ought to make it easy for them to understand lean technique.

Table 1. Gender frequency table.

	Frequency	Percent	Valid (%)	Cumulative (%)
Male	102	74.5	74.5	74.5
Female	35	25.5	25.5	100
Total	137	100	100	

Table 2. Education frequency.

Category	Frequency	Percent	Valid (%)	Cumulative (%)
Primary	2	1.5	1.7	1.7
Secondary	40	29.2	33.9	35.6
University	73	53.3	61.9	97.5
Professional	2	1.5	1.7	99.2
Doctorate	1	0.7	0.8	100
Total Valid	118	86.1	100	
Missing	19	13.9		
Total	137	100		

4.3. Size of SMEs

The MSME size (by number of employee) **Table 3** shows less than 10 workers (micro enterprises) has the highest frequency of 65 and 47.4%, MSME 11 - 49 (small enterprises) has 25 and 18.2% and MSME 50 - 199 (Medium enterprises) has frequency of 13 and 9.5%.

This indicates that MSME sector in Nigeria is dominated by micro enterprises (less than 10 workers and less than 5 million capital) at over 47.4%. The finding is relevant as it shows that micro enterprise constitutes majority of businesses and provides jobs for majority of Nigerians.

4.4. Awareness of Lean Technique

The data from sample to measure awareness level of lean technique among MSME **Table 4** shows that 107 (78.1%) of the respondent are not aware of lean techniques. Only 22 (16.1%) of the respondent shows they are aware of lean techniques. The remaining 8 (5.8%) of the respondent was undecided. It indicates very low awareness and knowledge of lean technique among MSME operating in Nigeria contrary to their level of education and exposures. This result also agrees with previous researches on lean practice in Nigeria. Lean is none existing in Nigeria (Enoch, 2013). There is lack of awareness of lean concept (Umude-Igbru & Price, 2015). The level of awareness of lean construction among stakeholders in the building industry was low (Oladiran, 2018).

4.5. Willingness to Adopt Lean

The willingness to adopt lean technique **Table 5** indicates that 65 (47.4%) of the respondent are “undecided/Neutral” on whether they will incorporate lean into their operation, while 41 (29.9%) respondent indicates willingness to adopt lean.

Table 3. Frequency size of SMEs.

Category	Frequency	Percent	Valid (%)	Cumulative (%)
<10	65	47.4	47.4	47.4
11 - 49	25	18.2	18.2	65.7
50 - 199	13	9.5	9.5	75.2
missing	34	24.8	24.8	100
Total	137	100	100	

Table 4. Frequency of awareness of lean.

Category	Frequency	Percent	Valid (%)	Cumulative (%)
No	107	78.1	78.1	78.1
Yes	22	16.1	16.1	94.2
Maybe	8	5.8	5.8	100
Total	137	100	100	

Table 5. Frequency of willingness to adopt lean.

Category	Frequency	Percent	Valid (%)	Cumulative (%)
Never	1	0.7	0.7	0.7
Not so willing	7	5.1	5.1	5.8
Neutral	65	47.4	47.4	53.3
Willing	41	29.9	29.9	83.2
Extremely willing	23	16.8	16.8	100
Total	137	100	100	

Also 23 (16.8%) respondents shows “extremely willingness” to adopt lean. however, only 7 (5.1%) of the respondent said “Not so willing” and 1 (0.7%) respondent said “Never”. this results shows that MSME are willing to adopt lean technique in improving their business, so long as they understand the benefits and application of lean technique.

5. Conclusion

For Nigeria MSME sector to become globally competitive, it has to rise above the various business environmental setbacks facing it, by cutting down a lot of waste associated with doing business in Nigeria.

This research aimed to evaluate the willingness to adopt lean technique among MSME in Nigeria and the level of awareness of lean business technique.

Base on the analysis of the data generated from sample N = 137,102 are males (74.5%) and 35 are females (25.5%), indicating that MSMEs sector operators and managers in Nigeria are not only well educated but male dominated. The bulk of MSMEs in Nigeria according to our data are micro enterprise, which is consistent with our expectation, that micro enterprises in Nigeria is the largest employer of labor. The MSME in Nigeria are not using lean tools, because they are not aware or have any knowledge of it, the study showed 107 (78.1%) are completely unaware, not familiar, no knowledge of lean technique. Further in consistence with our study, result shows out of 137 respondents, 111 (81%) have never heard or seen other enterprise using lean business technique, the direct effect is not having the willingness to adopt it.

By exposing the benefits of lean practices, it will create a more in-depth understanding of them within organization (Al-Najem, 2014).

Finally MSME operators and managers are not adopting or using lean technique as a result of lack of knowledge or information and low awareness of lean technique in enterprise operations. In the future this study recommends that MSME operators in Nigeria should be engaged on real benefits of adopting lean technique in business management. Exploring the effect of lean on organization performance result showed a positive relationship between the adoption of lean practices and performance (Negrão et al., 2020). Though low awareness is not the only barriers to lean applications, going forward other factors responsible for low awareness and adoption should be studied extensively.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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