

Manufacturing SMEs' Decisions to Innovate and Transform in the Emerging Economy: Empirical Evidence from Nigeria

¹Julius Eziashi, ²Eustathios Sainidis, ³Bamituni Etomi Abamu & ⁴Uzo Anozie

^{1, 2 & 4}Northumbria University, United Kingdom

³University of Gdańsk, Poland

Abstract

Presently, manufacturing SMEs are seeking to improve their competitiveness through the integration of innovative technologies to guarantee an additional transformational mechanism for their production. The recognition of manufacturing decision-making as integral to the ability of small and medium-sized enterprises to transform and innovate is established. However, the specific processes that influence manufacturing decision-making among Nigerian SMEs remain not understood. Existing frameworks offers limited explanations to the unique Nigerian situation burdened by scarce resources and limited institutions. The purpose of this research is to investigate how Nigerian manufacturing SMEs decisions are considered and made in their manufacturing related actions for innovation and transformation. Drawing from the qualitative data analysis of 17 SMEs, we identified eight decision domains that play an important role in Nigerian SMEs, which include production control, human resource management, plant size and capacity, machinery, budgeting and financial resource allocation, plant location, technological knowhow and new product development. The findings present empirical evidence in understanding manufacturing SMEs decisions, innovation, and transformation of their manufacturing process and practices. The findings have implications for government policy and will assist professional practitioners in understanding manufacturing SMEs decision, to innovate and transform in the emerging economy in the perspective of Nigeria.

Keywords: Manufacturing SMEs, Nigeria, Emerging Economy, Innovation, Transformation

Wordcount: 198

1.0 Introduction

The growing global competitiveness of the world economy over the last decade has compelled Nigeria manufacturing SMEs (MSMEs) to implement innovative and transformative strategic decision-making measures aimed at increasing their productivity and market share (Le et al., 2025). The fundamental shift in global competition for market share, means manufactured products from Nigeria must compete with manufactured goods from other emerging economies such as the Brazil, Russia, India, China, South Africa (BRICS), Singapore Indonesia and Malaysia (Le et al, 2025; Dodd, et al, 2019; UNIDO, 2013). These global competitive manufacturing dynamic environments have made Nigerian MSMEs to make innovative and transformative manufacturing decision to enable them to remain productive, efficient and competitive. The Nigerian MSMEs operational decisions are considered akin to that of most Sub-Saharan Africa countries and emerging economies (UNIDO, 2013). Therefore, the research findings and contribution made on manufacturing decision of Nigerian MSMEs is considered useful to other Sub-Saharan Africa countries and emerging economies. The need then arises for making manufacturing decision to mitigate on operational inefficiency and improve production efficiency (Eziash and Sainidis,2023; Ehie and Muogboh, 2016). The operational inefficiencies of Nigerian MSMEs are comparable to that of most developing economies (Africa Development Bank, 2023).

1.1 Research Purpose and Objectives

The purpose of this research is to investigate how Nigerian manufacturing SMEs decisions are considered and made in their manufacturing related actions for innovation and transformation. The specific objectives are:

1. To examine the manufacturing decisions that are made by Nigerian SMEs.
2. To identify the factors influencing the decisions of manufacturing SMEs in Nigeria

Based on our research objectives, and further development of the research, we have formulated the research question: *How do Nigerian Manufacturing SMEs make strategic manufacturing decisions in their goal to innovate and transform?*

1.2 Research Gap and Contribution

Our research bridges the gap between innovation theory and the operational reality of manufacturing SMEs in Nigeria. Existing theories of innovation including dynamic capabilities (Teece, Pisano and Shuen, 1997), technological accumulation (Bell and Pavitt, 1993), and absorptive capacity (Cohen and Levinthal, 1990), have provided conceptual tools for understanding firm level innovation. However, these tools have been rarely operationalized at the level of manufacturing decisions within the context of Nigerian SMEs. Secondly, studies such as Nwosu (2019) have relied on quantitative aggregate-level which does not provide insight into the microlevel decision processes through firms achieve their innovation objectives. This paper presents a constructive discussion and insight for managers and policy makers developing competent ways to improve production, and deal with operational inefficiencies. The contribution of our study includes identifying manufacturing SMEs operational flaws and production inefficiencies that challenge managers and provide theoretical and practice-led knowledge that are both relevant to academic scholars and management practitioners. The discussion provides a framework to understand how manufacturing SMEs innovate and transform in the emerging economy.

In terms of structure, the first section is the review of literature where we discuss the characterization of SMEs, our central unit of analysis, and then the innovation models of manufacturing SMEs in emerging economies. The second section contains our research methodology, which includes our research approach, data collection methods, population sample, and analysis technique. The third section is the data analysis where we analysed our data and presented our findings. In section four, we discussed the findings in relation to previous studies and literature. Finally, we concluded in section five and highlighted the implication of study.

2.0. Literature Review

2.1 The Characterisations of SMEs

The socio-economic advancement of several countries in the emerging economies of the world is attributed to the role of SMEs in the national development and creation of jobs (Africa Development Bank, 2023). In recent years the definition of SMEs has become even more problematic as the definition differs from one country to another due to different government of nations setting their own parameters that defined businesses as SMEs (Eziashi and Sainidis, 2024). Empirically, many academics have demonstrated that there is no generally acclaimed definition for SMEs as some of the given descriptions are country specific and based on their measure to economic development and growth (Aruwa and Gugong, 2007). The characterisation of SMEs is distinct from one country to another, this has repeatedly been defined according to the total number of employees and the assets of their enterprise (Jutla et al., 2002). Several SMEs are identified based on their business formation, location, size, and their total profits (Rahman, 2001). Nevertheless, BERR (2009) stated that micro firms are fewer than 10 employees, small firms are less than 50 employees' medium firms are more than 50 employees, but less than 250 employees and large firms are above 250 employees. The European Union characterised SMEs in the same way to BERR's definition, nevertheless they incorporated their yearly business generated revenues. The dimension of micro firms as being less than 10 employees with annual revenue not above €2 million, small firms as having not more than 50 employees and yearly revenue not exceeding €10 million, medium firms less than 250 employees with yearly revenue not exceeding €43 million (European Commission 2003). The Nigeria manufacturing SMEs are engaged in the transformation of raw materials into processed goods (Onugu, 2005). The main government institution that governs SMEs in Nigeria SMEDAN defined SMEs as small firms employing less than 50 and total asset less than \$3200, medium firms between 50-199 employees with asset less than \$3.200000 (SMEDAN, 2013; Apulu et al., 2011).

2.2 Innovation Models of Manufacturing SMEs in Emerging Economies

One of the main catalysts for the economic transformation in emerging markets is the innovation of SMEs. According to Ghobakhloo (2018) and Mamman et al (2019), their impact is well documented through the increased volume in production, investment level, and operational efficiencies. Innovation in SMEs have been historically defined as simply the automation of plants (Bouri et al., 2011). However, this neglects the

important role internal management strategy in the process (Hitt et al., 2007). Today, this concept has been reframed in contemporary research with innovation now regarded as process which is both complex and multifaceted. According to Theresa and Hidayah (2022), the growth of manufacturing SMEs in emerging economies is now linked to a combination of product design, technological integration, and the strategic management of intellectual property, which are all internal decision-making capabilities. Moreover, Kang et al (2016) and Ghobakhloo (2020) argue that the ability of SMEs to quickly improve product designs and optimize plant efficiency has become a competitive differentiator.

Innovation is not just an upgrade for SMEs in emerging economies; it has become a necessary strategy for survival. As a strategy, it represents the ability to transform in reaction to the competitive international environment. However, Okpara (2009) claims that despite this necessity, the failure rate among SMEs remains high. Eventually, innovation must be seen as a necessity for manufacturing SMEs if they are keen to not only operationally transform but also survive and thrive. A comprehensive innovation process will not only require financial investment, but good decision-making that integrates internal resources with the changing requirements of customers, to achieve operational success (Adam and Alarifi, 2021; O'Regan et al, 2006).

The role of SME owners and managers is well acknowledged in steering manufacturing decisions that decrease production costs, facilitate the hiring of skilled labor, and reduces material waste (Mamman et al., 2019). The justification of innovation in the manufacturing SMEs decision literature is well acknowledged (O'Sullivan et al., 2011). It has been described as multifaceted, encompassing modifications to existing products, as well as advancing the processes and service delivery (Fagerberg et al., 2013; O'Sullivan, 2002; O'Sullivan et al., 2011). These innovations range from the gradual improvements, mostly accomplished through models in Total Quality Management (TQM), Six Sigma, and Lean Manufacturing, to transformational shifts that radically modify business operations (Adam and Alarifi, 2021; O'Sullivan et al., 2011; Tidd, 2006). Studies from O'Sullivan (2002), and O'Sullivan et al (2011) argue that the main function of innovation in the manufacturing process is to transform raw materials and customer needs into high-value goods, and at the same time, maintaining a competitive position. This is accomplished by integrating specialized concepts in management, and advanced process technologies such as

- Agile Manufacturing, to main flexibility during unstable market environments, reduced product lifecycles, and risks of technological obsolescence (Hill, 2009; Hill and Hill, 2009; Schroeder et al., 2011), and
- Lean and Just-in-Time (JIT) Systems, to ensure that operational wastes are eliminated, and quality management is integrated in the production cycle (Dubey and Gunasekaran, 2015).

Eventually, adopting advanced technologies stimulates growth and helps manufacturing firms improve their operational excellence, and overall profitability by extension (Chatha and Butt, 2015).

2.3 Manufacturing Innovation and Process Improvement

Extreme competitiveness and rapid technological evolution are defining the contemporary manufacturing landscape, exposing firms to underperformance, inefficiencies, and a negligible margin of error (Juran, 2016). Manufacturers cannot afford to make financial losses or interruptions in their service delivery caused by unreliable production process, especially in an era shaped by continuous innovation and the expectation of high quality, rapidly delivered goods from customers (Srivastava and Jena, 2011). It is imperative for firms to adopt comprehensive manufacturing strategies to improve their processes if they are to navigate these challenges. These strategies are not also necessary for ensuring product quality and delivering services on time, but also for optimizing manufacturing performance and maintaining a sustained competitive advantage (Jevgeni et al., 2015).

More importantly, manufacturing management must recognize process failures and their systematic impact, as they are primarily the main drivers of poor organizational performance (Srivastava and Jena, 2011). Studies on this issue have consistently identified dependence on obsolete machinery equipment, and outdated technologies as the cause of operational inefficiencies which ultimately results in the inability of firms to meet market and customer demands (Srivastava and Jena, 2011; Jevgeni et al., 2015). As a result, improvement in the manufacturing process is no longer an option, but a primary requirement for firms seeking to remain competitive in the global market.

2.4 Manufacturing Decision Process and Transformation

The decision-making processes of SMEs over the past several decades have undergone significant change. This change or evolution has been driven by the rapid advancements in manufacturing technology, strategic management frameworks, and information systems which are all aimed at cutting costs, enhancing product quality, and optimizing the overall efficiency and output (Lassen et al., 2024; Lassen and Wæhrens, 2021). The manufacturing process at its core, comprises both physical infrastructures, such as plant facilities and machinery, and the organizational systems needed for production planning. The broader objective for this transformation is to equip plants with the capacity to be operationally flexible, and efficient (Moller et al., 2022; Liao et al., 2017; Kagermann et al., 2013).

However, there is empirical evidence that suggests a persistent gap in execution despite the widespread availability of innovative technologies, and a clear strategic for this process. According to several research studies (Ghobakhloo and Iranmanesh, 2021; Larsen et al., 2023; Lassen and Wæhrens, 2021), only a limited number of SMEs have achieved a comprehensive transformation in their production processes, indicating the difficulty in moving from technology adoption to real organizational change.

3.0. Research Methodology

The study presented in this paper incorporated a qualitative research approach considering its usefulness and exceptional features that are used to address the what, why and how questions in research (Easterby-Smith et al; 2012) to understand from a diverse viewpoint the Nigeria manufacturing SMEs decision and innovation. The research technique is developed in understanding useful evidence in analysis (Zikmund, 2003). This exploratory study presents empirical evidence, with a qualitative research method, where theoretical advancement is determined (Easterby-Smith et al., 2012).

3.1 Data Collection

Data was collected from the responses manufacturing managers via semi-structured interviews, as the study empirically presents an understanding of the manufacturing SMEs decision process and practice in the emerging economy within the context of Nigeria manufacturing SMEs, identifying their business decisions and operational transformation, through their experiences, buttressed in the explanatory epistemology, where interpretation of the study is from within the research participants (Creswell, 2009; Denzin and Lincoln, 2011; Bryman, 2012).

3.2 Population sample

For this study, we selected a purposive sample of 17 SMEs, which we believe are representative of the population (Williams et al, 2006), possessed the specific qualities we were seeking in a population sample (Denscombe, 2007). These SMEs were selected from across 8 states in the country where SMEs are mostly concentrated (Eziashi and Sainidis, 2023; SMEDAN, 2013).

SME	State/Location	Position of Respondent	Years of Operation
McA	Lagos	Operations Manager	10
McB	Lagos	Operations Manager	15
McC	Lagos	Operations Manager	7
McD	Abia	Manager	3
McE	Abia	Managing Director	20
McF	Abia	Manager	11
McG	Abia	Operations Manager	7
McH	Rivers	Manager	11
McI	Rivers	Managing Director	10
McJ	Anambra	Supervising Manager	5
McK	Anambra	Assistant Manager	30
McL	Anambra	Manager	10
McM	Kano	Manager	15
McN	Ogun	Manager	5
McO	Ogun	Manager	13
McP	Delta	Manager	7
McQ	Edo	Manager	7

3.3 Data Evaluation

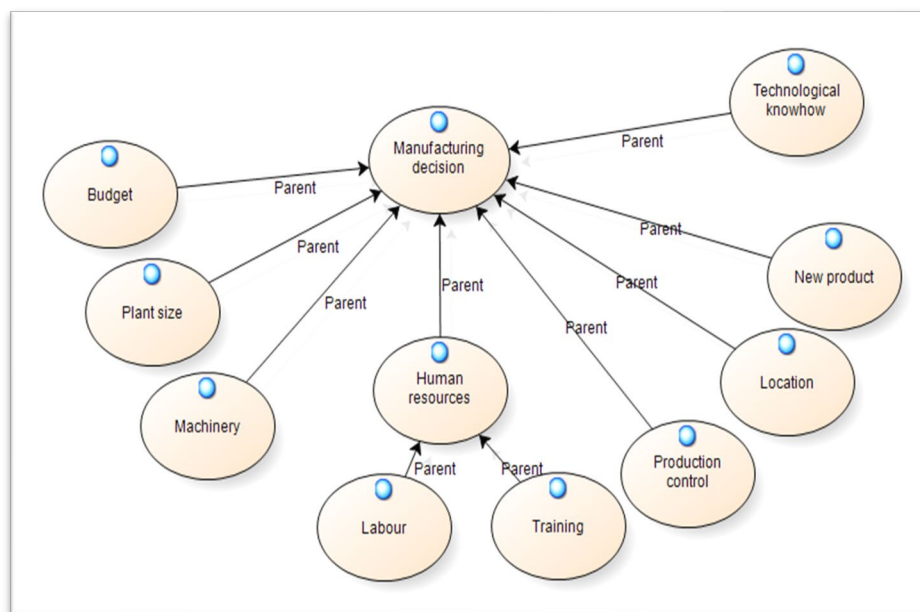
The paper is based on an empirical study which was designed to give insight in the knowledge and experiences of manufacturing SMEs senior managers and owners in identifying their decision models, business innovation and manufacturing transformation in Nigeria. The Semi-structured interviews were used as the data collection instrument. Seventeen (17) senior managers and owners of SMEs were interviewed, corresponding to 17 Nigeria manufacturing SMEs businesses in the six geopolitical zones across Nigeria. The interview approach provided an understanding of the manufacturing SMEs decision in the emerging economies within the context of Nigeria. The data analysis was conducted by building textual data from the interview transcriptions, using the template analysis (King, 2009) to code the emerging themes from the transcribed interview data to explain the experiences of SMEs owners and senior managers in understanding the manufacturing decision process and practice of Nigeria manufacturing SMEs. Nvivo was used as QUAL data analysis software tool which works well with template analysis to construct theoretical conclusions grounded in the data.

The Template analysis offers flexibility in its approach in qualitative data analysis (King, 2009) and offers insightful interpretations on the study participant's understandings that are repeatedly overlooked in other data analysis. Template analysis is considered useful where the textual data is obtained from where the research instrument includes interview (Goldschmidt et al. 2006; Thompson et al., 2012; Lockett et al., 2012; Brooks, 2014; King et al., 2015). In addition, thematic template data analysis offers structure to the study and showcases the fullness of the textual data as they emerge from the themes unit to be coded for an easy analysis of the data (Crabtree and Miller, 1999). The thematic template analysis employed in the study applied the hierarchical coding procedure to adaptably analyse the textual data to the requirement of the study (King et al., 2015). The development of a prior code is necessary in breaking down the chunk of data. Priori codes are common classifications of the extracted data from the objectives and aims of the data explored to form a simple framework on which to commence the investigation of the data (Gibson and Brown, 2009).

4.0. Analysis

Our findings reveal a picture of manufacturing decision-making among Nigerian SMEs that is multi-dimensional and complex. We identified several factors within the manufacturing decision domain that are relevant for SMEs in their ability to innovate and transform in the emerging economy. They include production control, human resources, plant size, machinery, budget, location, technological know-how, and new products. While the documented processes through which decisions are made, the responding participating SMEs provide clear decision criteria, rationales and orientation.

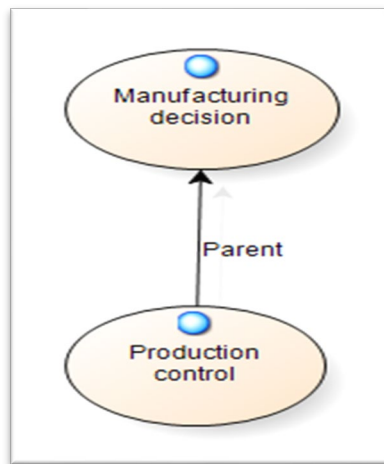
Figure 1: Emerging themes of manufacturing decision with the Nigerian SMEs sector



To understand the manufacturing SMEs decision, senior managers and owners were asked the question: *What manufacturing decision do you make and how do you make your manufacturing decision?* Their responses were analysed presented in figure 1. Further analysis provided the manufacturing decisions made by Nigerian MSMEs are analysed and discussed separately for better understanding. The managers of MSMEs McC, McQ, McN, and McM have made manufacturing decisions on” *production control, plant size, and location*”. Likewise, the managers of McN, McD, and McG have made manufacturing decision on” *human resources, technological knowhow, budget, and new product*”. The manufacturing decisions are made towards the manufacturing needs of Nigerian MSMEs. The interview responses from the SMEs senior managers and owners as stated earlier will be presented to capture their experiences and insights.

4.1 Production control

Figure 2: Coding for production control

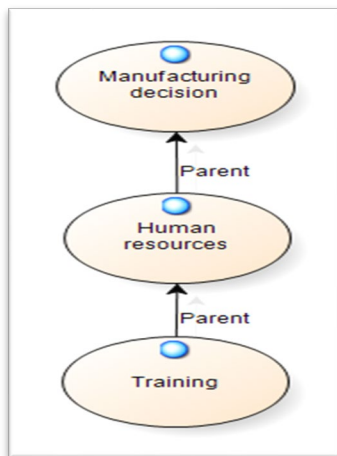


The theme manufacturing decision was coded and generated a high code production control. Nigerian MSMEs are continually having difficulties in meeting up with high production to enable them to remain competitive. The response from McM focuses on the impact of production decision-making, and not the process itself, which can be observed from the SMEs direct statement *There are many decisions we make daily in the production process to enable us to have an excellent production performance. Making wrong production decisions can be fatal and often times lead to a poor delivery performance. We make sure that the orders are right, and we stick to the agreed delivery dates in order to reduce waiting for the time to other customers* (McM). The SME’s claim that wrong decisions "can be fatal" and lead to "poor delivery performance," describes manufacturing decisions as a risk-management issue. The response from McM places emphasis on the cost of wrong decision-making.

McC’s response on the other hand provides more disclosure as it reveals the cause of delivery failure which are attributed to internal and human factors, rather than external factors such as consumer demand or market conditions. McC states that *“sometimes it can be very difficult to meet the delivery dates of customers due to some workers altering their order priorities. This was a time that we have to take drastic decisions on the training of all our workforce on the production line to enable them to understand the product quality and design and also ensure that all these standards are continually maintained* (McC). The SME admits that the process of production has not been followed as a result of the workers inability to follow instructions. The decision made on having the right trained workforce on the production line has been very useful to Nigerian MSMEs, who took to that strategic option.

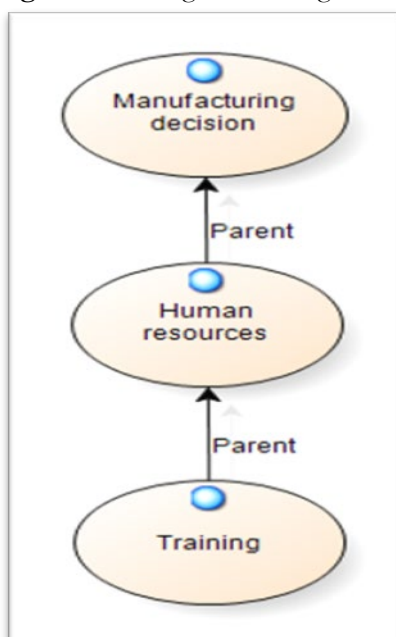
4.2 Human resources

Figure 3: Coding Human resources



The theme manufacturing decision was coded and generated a high code human resources and low code training. Insights from SMEs McD and McD illustrates how they approach the management of human resources. McD in their response explain that *"in our business we focus on talents, so our human resources decision is to recruit and train our employees on manufacturing skills"* (McD). Similarly, the manager of manufacturing SME McG expressed that *'we need talent and highly knowledgeable employees who can perform their required manufacturing responsibilities, our manufacturing human resources decision is made to employ the people with the right talent'* (McG).

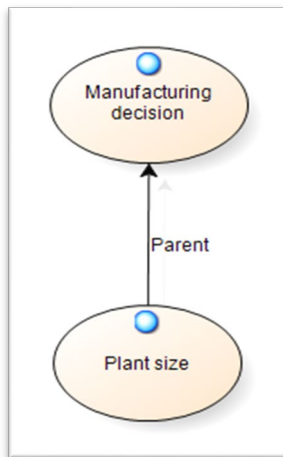
Figure 4: Coding for training



Despite the agreement of talent being central to their operational capabilities, we observed that they differ subtly in their approach, as McD's strategy leans towards "building", and McG's strategy focuses on "buying". A two-stage strategy was identified in McD's response: "recruit and train our employees on manufacturing skills.", which suggests that the company not only recruits, but treats in-house training as a key part in building manufacturing capabilities. On the other hand, McG's chooses selection over development. Their emphasis on "talent," "highly knowledgeable employees," and people who "can perform their required manufacturing responsibilities" indicates an approach that is competence-based and recruitment-led.

4.3 Plant size

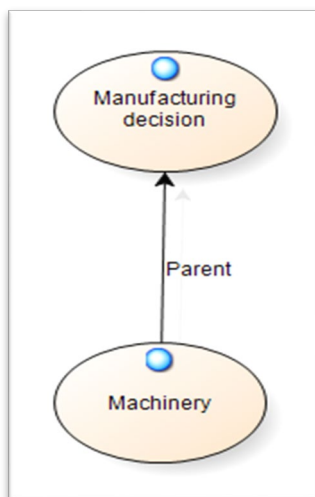
Figure 5: Coding for Plant size



The theme manufacturing decision was coded, and it generated a high code plant size. Plant size is a factor considered by SMEs in their decision making, and our findings reveal that the plant size in manufacturing decisions is determined by the capital or resources available. According to the manager of McQ suggest that their company's decisions are determined by financial resources and not totally influenced by market growth or opportunity. In their response, they state that *"the plant size manufacturing decisions are made to be very much consistent with the resources made available. The significant part of the plant size decisions includes, how we address frequent product demands. Another reason for plant size manufacturing decisions is to increase the production and manufacturing activities. The plant size decision is useful when there is an increase in the product demand as a result of the market push. The manufacturing plant size decision is made to also help deal with the production cost, as a bigger manufacturing plant allow the manufacturing of a variety of products"*(McQ). The decision that is made on the plant size is to increase manufacturing activities which are dependent on the available resources and market demands.

4.4 Machinery

Figure 6: Coding for machinery.



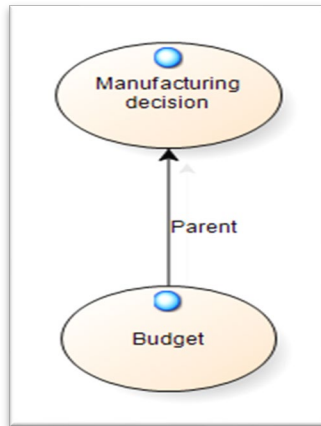
The theme manufacturing decision was coded, and it generated high code machinery. The manager of manufacturing SME McH states that *"the inadequate equipment and machinery needed for improved manufacturing production process has been a major concern to most Nigerian MSMEs. As a manufacturing manager innovation also requires that we have the required equipment, laboratories, and tools, to build and test new products. Nevertheless, several Nigerian companies have not sufficiently invested in these identified issues"* (McH).

By framing *"inadequate equipment and machinery"* as *"a major concern to most Nigerian SMEs"*, McH suggests that while it is a challenge for them, it is not an isolated one. They claim it's an issue that is systemic, sector-wide across other SMEs. Another interesting observation from McH's response is the innovation framing.

The statement on "build and test new products", directly links manufacturing infrastructure to innovation capability. Machinery decision is vital as it allowed manufacturing managers to make the necessary manufacturing improvements needed to maximise the production

4.5 Budget

Figure 7: Coding for budget



The theme manufacturing decision was coded, and it generated a high code budget. Budget is a recognized factor in the decision of manufacturing SMEs. While it has been implicitly mentioned in previous analysis regarding resource-constrained decisions on plant size, and the under-funding of machinery, SMEs McE, McB, McG, and McK directly identify budgeting and resource allocation as a manufacturing decision domain. Based on the responses, the manager of McE directly acknowledges the financial reality of Nigerian SMEs by admitting *"money is always a limited resource to most Nigerian MSMEs."* However, the company does not view a budget only in monetary terms but expands its definition to include raw materials usage, labour and our production output, as they explicitly stated that the *"Manufacturing decisions we make in the budget is not always about the monetary terms alone, we consider a lot of issues, raw materials usage, labour and our production output"* (McE). This reveals that a manufacturing budget is understood to be a multi-dimensional resource plan covering all types of resources, and not only finance.

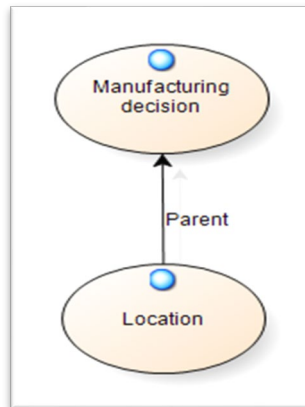
The manager of manufacturing SME McB states that *"the decisions made on budgets enable us to project our manufacturing needs and the means to accomplish it. We have to consider every aspect of the business is it for short-term or long-term purposes. Budget decisions are very important, as it enables us to mirror all the ongoing manufacturing activities to make the needed adjustments that will move the business forward"* (McB). A unique observation of McB's response is in describing budgets as allowing them *"to mirror all the ongoing manufacturing activities to make the needed adjustments that will move the business forward."* This metaphorical use of "mirror" frames a budget as not just a forward-looking plan, but as monitoring and feedback mechanism (backward-looking).

Equally the manager of manufacturing SME McG said that *"budget decisions are made to enable us to know how we are doing business wisely. Our income in terms capital expenditure is set so that we can focus on our business targets. Sometimes we cut back on expenses if we are not getting the desired results"* (McG). For McG, their response *"budget decisions are made to enable us to know how we are doing business wise."*, seems to be performance-monitoring oriented. The budget is a means of assessing their business performance, making it a form of diagnostic tool. McG also responds to budgetary control by cutting back on expenses *"if we are not getting the desired results."* The company exhibits cost-control behaviour that is reactive and triggered by shortfalls in performance.

The manager of manufacturing SME McK states that *"making manufacturing decision on a budget requires us to look at the cost of production and the viability of the product that we want to include in our budget. If the cost of producing the products is higher than the profit projected, we have to think otherwise"* (McK). By stating *"if the cost of producing the products is higher than the profit projected, we have to think otherwise."*, they presented the most financial perspective that can be observed among all responses All four SMEs provide perspectives that are distinct but complementary, particularly on how manufacturing management and budget decisions function together. They collectively introduced resource allocation as a factor in manufacturing decision-making.

4.6 Location

Figure 8: Coding for location



The theme manufacturing decision was coded, and it generated a high code location.

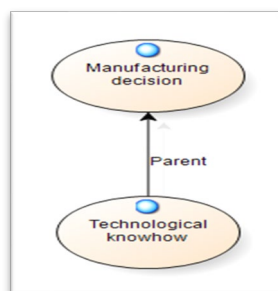
Plant location is not viewed by McN as an issue of logistics or operations, but as a critical element for participation in the global marketplace. In their response to manufacturing decisions, the manager of manufacturing SME McN noted that *“making the correct decisions about the location or site of the manufacturing plants and facilities is fundamental to our being able to participate in the global markets. I believe that if we make the right manufacturing choices it will give us some competitive edge”* (McN). " This decision frames the company as internationally oriented and external-looking, in contrast to being domestically focused. On the hand, SME McJ are more focused on proximity to infrastructure when it comes to plant location. Their manager state that *“having the right manufacturing plant location that is nearer to infrastructures such as good roads makes the delivery and distribution of products to the market easier than in a location where there are no good road infrastructures”*(McJ). In contrast to McN, this decision on plant location is based on efficiency in distribution and logistics.

The response of McP is that the *“Manufacturing decisions we make on plant locations is very strategic, and as such requires a detailed inquiry. The setup of a manufacturing plant in a wrong location usually impacts on the operational cost. For instance, the poor location of a manufacturing plant might continue to increase the cost of manufacturing and production operations. The cost of transportation and advertising are also impacted by the manufacturing plant location choices and decisions”* (McP). McP mentions the financial consequences of making the wrong location decisions when they claimed, "the setup of a manufacturing plant in a wrong location usually impacts on the operational cost." Additionally, they identify the cost factors to include manufacturing and production operating costs, transportation costs, and advertising costs.

McF provided an elaborate account of their plant location decision which is made at the firm level. While other SMEs identified, access to infrastructure, capacity to go international, operation cost as factors affecting their plant location decisions, McF is more concerned about their proximity to consumers. Their manager *“said when we make decisions on factory sites, we take the location of our factory into consideration, as the costs of transportation of finished goods and distribution of domestic products in Nigeria is very high, as a result our manufacturing is mainly done as nearly as possible to the consumers even when it sometimes appears inconvenient”* (McF). In summary, location decisions are influenced by several factors.

4.7 Technological knowhow

Figure 9: Coding for technological knowhow

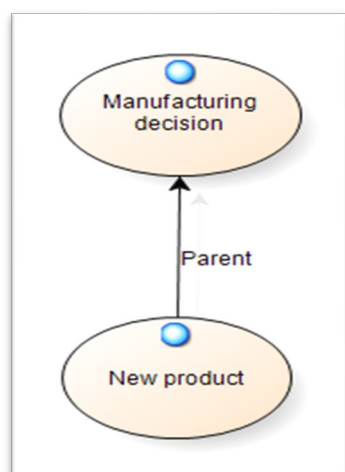


The theme manufacturing decision was coded, and it generated a high code technological knowhow. In response, the manager of manufacturing SME McD said *“manufacturing decisions nowadays is all about your technological knowhow. We make the manufacturing decision on technological knowhow to choose the right manufacturing equipment and technologies which will enable us to simplify the product designs and manufacturing process”* (McD). This is a bold claim that centers technological knowledge as the critical determinant of manufacturing decision, which contrasts factors like cost, human resource, budgeting, location, and plant size, as indicated by other SMEs. Regardless, McD frames manufacturing decisions with the connection to technology as a priority.

The response of McK on the hand, explicitly acknowledges a difficulty by saying *“making manufacturing decisions on technological knowhow is very complex especially in this present era off of technological advancement which requires that we have the ability to appropriately select the manufacturing process, the products designs, equipment, machinery, and material that will function with the chosen technology, be it the automation of the factory plant”* (McK). The framing of technological decisions as complex is first an admission of technology as difficult strategic issue, and secondly, recognising the rapidly changing technological environment, where technology changes faster than what managerial knowledge can keep up with.

4.8 New product

Figure 10 Coding for new product



The theme manufacturing decision was coded, and it generated a high code new product. MCAs response to new product decisions are framed primarily as a product-renewal and cost-minimizing strategy. They explain that *“we make manufacturing decision on new products, which we design and use to change some of our old product line that already exists in the market at a lesser price unit. These new products will still be at the same quality and performance level, but with a lower cost benefit to our product users and customers”* (McA). The main logic behind this is the development of a similar product with the same performance and quality, but at a lower cost.

The response from McH is more innovation oriented as the frame new product decisions as a mechanism for delivering "innovative product ideas" and strategies to remain competitive. They state that *“as a manufacturing manager our target is to make manufacturing decisions that bring about innovative product ideas and deliver competitive strategies that will enable us to develop new products to meet our company’s market expectations and needs in order to grow the business”* (McH). This places new product decisions within the framework of growth and competitive strategy, where developing new products are the means through which SMEs differentiate, build market position, and generate revenue.

On the hand McJ is the SME with the most process awareness and market-oriented among the SMEs making new product decisions in manufacturing. They acknowledge the possibility of disruptions in operations from new product decisions, as well as market dynamics as a factor in new product decisions. In their response, they state *“our new product decisions are sometimes made from market expectations and customer demands. As a manager, new product decision is very difficult to make as it can sometimes alter the whole manufacturing and production plans. We study the behaviour of our products in the market to check if it is still attracting the right customers before making decision to replace the products with new products”* (McJ). This statement is relevant because it exposes the friction between the need to adapt product according to customer demand, against the need to remain efficient and consistent in the production process.

5.0. Discussion

5.1 Nigerian MSMEs manufacturing decisions to innovate and transform

In this paper we studied the manufacturing decisions of SMEs and their actions for innovation and transformation in an emerging economy, with Nigerian SMEs as a case study. We sought to examine their manufacturing decisions and identify the factors influencing these decisions. The concept of scholars and professionals who contributed to the innovation and transformation of manufacturing decision types and its associated policy area was first presented in the 1980s (Hayes and Wheelwright, 1984). Since then, the study of decision areas of SMEs in manufacturing decision process has received extensive consideration (Rusjan, 2005). Our findings from SMEs operating in Nigeria contributes towards understanding SMEs in emerging economies, and manufacturing decisions they make to ensure business continuity and remain competitive as well. Our findings reveal that Nigerian SMEs have made both structural and infrastructural manufacturing decisions which further builds on the works of Hayes and Wheelwright (1984), Díaz Garrido et al (2007) and Slack et al (2010) who have categorised manufacturing decisions in structural and infrastructural.

5.2 Production control and planning

Our findings reveal the production control dimension of manufacturing decision making by Nigerian SMEs, and their accounts exposes a basic sector-wide challenge in the inability to move production from planning to execution. The emphasis on order accuracy and adherence to schedule as the main objectives of production control. This claims directly aligns with the study of Vollmann et al (2004) who identified the activity of production control as a core function. The implications are that there must be conformity of actual production against planned schedule. In other words, missing the delivery date of one customer will create a waiting time for others.

5.3 Human Resource Management and Talent Development

Our findings reveal that human resources decisions are made based on policies regarding training, employee skills, performance appraisal and job expansion, which is in agreement with the work of Miltenburg (2005). However, we found two separate approaches to managing human resources, which has long been theorized in human resources literature, that talent management is a buy or build decision. According to Adenikinju (2005), the build or development approach to talent with the manufacturing sector in Nigeria, may be a matter of necessity and not strategy due to the deficit in specialized capabilities required by SMEs. The decision to buy talent is highly dependent on the talent market to supply ready-made skills. This choice has implications because within the Nigerian manufacturing context, it cannot be assumed that the availability of highly skilled employees will match demand.

In emerging economies, training and talent development have continued to lead in policy considerations (Cook and Nixon, 2000). According to Aremu and Adeyemi (2011), Training allows Nigerian SMEs workforce to acquire the necessary skills required to perform their job tasks, even though Apulu et al (2011) claims that training is not up to date among Nigerian SMEs. However, Nigerian SMEs understand the need for training of their employees to perform the required manufacturing tasks.

5.4 Plant Size, Location and Capacity

The size of a manufacturing plant and the number of employees can influence the decisions made by SMEs (Swamidass and Kotha, 1998; Cagliano and Spina, 2000; Spring and Dalrymple, 2000; Choudhary et al., 2012). The importance of location as indicated in our findings also agrees with the studies of Aremu and Adeyemi (2011), Ariyo (2005) and Malik et al (2002), who stated that SMEs located in the city have performed better in terms of job creation, earnings and manufacturing skills as they have more access to training facilities in the cities than in the rural area.

The plant size and location, which are structural manufacturing decisions, are choices with serious consequences, because they are both strategic and capital intensive (Hayes, Pisano, Upton and Wheelwright, 2005). We classify both decisions as consequential because, not only do they require significant capital, they are difficult to reverse once made. Our findings reveal that plant size can determine the volume of manufacturing, and decisions on size is driven by the availability of resources, and product demand, which agrees with Van Mieghem (2003) on how current demand influences capacity, instead of anticipated

demand. The response on location decisions reveals an environment that is influenced by the logistical and infrastructural situation in the Nigerian economy. The emphasis on proximity and road infrastructure, all reflect the challenges SMEs might face in an emerging economy like Nigeria (Khanna and Palepu, 2010).

5.5 Equipment, Technology, and Innovation Capability

Our analysis that addressed issues on machinery, equipment investment and technological knowhow, collectively describe the technology aspect of innovation capability in manufacturing. Nigerian SMEs have made manufacturing decisions on the purchase of machinery to enable them improve their manufacturing processes. The findings add to the studies of Tan et al (2006) and Hallgren (2007) who stated that for managers to achieve their manufacturing process objectives, decisions on new machines and equipment will have to be made within the manufacturing function, to enable managers to allocate the resources for the purchase of the needed machinery and equipment.

The rapid changes that technologies bring into products have made SME managers to urgently respond to their manufacturing technological requirements. Our findings have shown that the manufacturing decision made in technological knowhow has enabled Nigerian SMEs to appropriately select their manufacturing processes, products designs, equipment, machinery, and material that will function with their chosen technology, be it the automation of the factory plants. The research findings support the studies of Baines et al (1999) which states that although a technological decision has enabled manufacturing businesses to choose their process and product designs, it can be quite challenging sometimes to choose the right technology without having an expert knowledge. While the importance of technology in manufacturing decisions have been established, there is a challenge for Nigerian SMEs due to a harsh macroenvironment that includes, import costs for capital equipment, exchange rate volatility, and limited access to finance, all of which combined increases the cost of technology acquisition to meet innovation requirements (Obembe and Soetan, 2015).

5.6 Budgeting and Resource Allocation

Our findings on budgeting decisions among SMEs reveal a common absence of explicit budgeting relating to innovation investment, even though financial management orientation vary internally. However, excepting innovation, the findings are similar to the studies of Schlegel et al (2016) which show that manufacturing budget decisions are made to enable SMEs make investments and allocate resources to support their manufacturing operations. Budgeting decisions have enabled Nigerian SMEs to support their manufacturing operations and manage their expenditures.

The framing of budgeting as the rationing of resources during scarcity reflects the reality that plagues the development and operations of SMEs (Beck, Demirgüç-Kunt and Maksimovic, 2005). For instance, the cost-cutting decision in response to underperformance discourages innovation, which has been similarly argued by Hamel and Prahalad (1994) that those factors that are most vulnerable to cost-reduction measures, are those needed for maintaining competitive advantage, e.g., technologies, skills, innovation infrastructure. It is established that the allocation of resources in Nigerian manufacturing SMEs is dictated by the profitability of the current period. The implication is that there is a misalignment between the investment requirement that stimulates innovation and transformation, and the budget architecture of the SMEs.

5.7 New product Development

New products manufacturing decisions are very complex, as it can make or mar the manufacturing businesses. The making of manufacturing decisions to develop new products is strategic to Nigerian SMEs in both meeting their market demands and giving them the competitive edge. The research findings have shown that Nigerian SMEs make innovative manufacturing decisions to enable them to deliver new products to meet their market needs. The findings concur with O'Sullivan (2002) and O'Sullivan et al (2011) who stated that innovation is useful in improving the production process and in improving the competitive advantage of manufacturing firms. Innovation in the manufacturing process of SMEs has been linked to process technology and the manufacturing concept of lean manufacturing, agile manufacturing and just in time (JIT), which enabled manufacturing businesses to eliminate waste (Schroeder *et al.*, 2011).

Our findings identified three distinct positions of the development of new products that included a product renewal and cost-reduction strategy, a market-driven product development strategy, and a product

innovation-driven strategy. In the first strategy, old product designs are replaced with new products that has been developed. The new products still possess the same quality and performance level but developed at a lower cost. The second strategy is driven by market opportunities and customer demands. New products are developed based on the expectations of the market and will be adapted to meet changing taste of consumers. However, the third strategy is not driven by the need to lower costs or meet customer demand, but rather for differentiation and to build market position. New products are developed based on innovative ideas that will help SMEs remain competitive and generate revenue. Findings from our studies have been confirmed by other studies such as Yan et al (2017) who explained that new products are made from strategic decisions, by manufacturing organisations to meet their market demands and to create a competitive advantage. Our findings also identify with Porter's generic strategies (Porter, 1985). The focus on lower costs mirror cost leadership that uses efficiency and supply chain optimization to maintain strategic advantage. On the hand our innovation-driven strategy directly mirrors the differentiation strategy which focuses on building unique products through product design and quality.

6.0. Conclusion

The purpose of the paper and the empirical study presented here, was to gain an in-depth insight of the decision process and practice of Nigeria manufacturing SMEs in their ability to innovate and transform. Drawing on qualitative data from 17 SMEs, we identified eight decision domains that play an important role in Nigerian SMEs, which include production control, human resource management, plant size and capacity, machinery, budgeting and financial resource allocation, plant location, technological knowhow and new product development.

This study contributes at the level of innovation theory, as it provides a qualitative and operational evidence on how technological capability, absorptive capacity, and technological capability are managed in the specific context of manufacturing SMEs in Nigeria. Our finding that technology decision complexity, equipment deficits, and the absence of formal processes in developing new products are collectively responsible for the constraints observed in the development of innovation capability, contributes to a grounded understanding of technological learning and absorptive capacity in the sub-Saharan African emerging economy context, which is now an extension of the theories beyond the study of advanced economies, and large-firms that are the predominant case studies.

Empirical evidence in the findings have shown that manufacturing SMEs like most other organisations in the emerging economies have many operational inefficiencies that hinder their abilities to innovate, transform and compete. These operational and process inefficiencies have major effects on the manufacturing decision of productivity, innovation, and flexibility to compete with the products from other emerging nations. The findings presented in the paper have empirically increased the body of knowledge and practice in manufacturing SMEs in understanding decision to innovate and transform. This has possible implications for managers, policy maker and other business practitioners in the field of manufacturing operation and production management. Emerging economy government policies should be directed towards measures to address the technological challenges, to improve the innovative abilities of manufacturing SMEs.

References

- Adam, N.A. and Alarifi, G. (2021) Innovation Practices for Survival of Small and Medium Enterprises (SMES) in the COVID-19 Times: The Role of External Support. *Journal of Innovation and Entrepreneurship*, 10(15).
- Adenikinju, A. (2005). African imperatives in the new world trade order: Country case study of the manufacturing sector in Nigeria. In: Oyejide, T.A. and Njinkeu, D. (eds.) *African Imperatives in the New World Trade Order*. Africa World Press, pp.187–241.
- Aremu, M. A., & Adeyemi, S. L. (2011). Small and medium scale enterprises as a survival strategy for employment generation in Nigeria. *Journal of sustainable development*, 4(1), p.200.
- Africa development bank (2016) <https://www.afdb.org/en/countries/west-africa/nigeria/>
- Apulu, I., Latham, A., & Moreton, R. (2011). Factors affecting the effective utilisation and adoption of sophisticated ICT solutions: Case studies of SMEs in Lagos, Nigeria. *Journal of Systems and Information Technology*, 13(2), pp.125-143.

- Ariyo, D. (2000). Small firms are the backbone of the Nigerian economy. *Africa Economic Analysis*.
- Aruwa, S. and Gugong, B. (2007) An assessment of Small and Medium Industries Equity Investment Scheme (SMIEIS) Implementation Guidelines. *Journal of Humanities*, Kaduna State University, 1 (2007).
- Beck, T., Demirgüç-Kunt, A. S. L. I., & Maksimovic, V. (2005). Financial and legal constraints to growth: does firm size matter?. *The journal of finance*, 60(1), pp.137-177.
- BERR (2009). *Manufacturing: New Challenges, New Opportunities*. September.
- Bouri, A., Breij, M., Diop, M., Kempner, R., Klinger, B., & Stevenson, K. (2011). Report on support to SMEs in developing countries through financial intermediaries. *Dalberg*, November, 1-48.
- Brooks, J. (2014). *Young people with diabetes and their peers - an exploratory study of peer attitudes, beliefs, responses and influences*. Project report to Diabetes UK, University of Huddersfield.
- Bryman, A. (2012). *Social Research Methods*. 4th edition. Oxford: Oxford University Press.
- Cagliano, R., & Spina, G. (2000). Advanced manufacturing technologies and strategically flexible production. *Journal of operations Management*, 18(2), pp.169-190.
- Chatha, K.A. and Butt, I. (2015) Themes of study in manufacturing strategy literature. *International Journal of Operation and Production Management* 35(4), pp.604–698.
- Cook, P., & Nixson, F. (2000). *Finance and small and medium-sized enterprise development*. Manchester: Institute for Development Policy and Management, University of Manchester.
- Crabtree, B. F. and Miller, W. L. (1999) *Doing qualitative research*, 2nd Edn. Thousand Oaks, Calif: London: Sage.
- Creswell, J. W. (2009) *Research Design: qualitative, quantitative and mixed approaches* 3rd edition. Thousand Oaks, Sage.
- Denzin, N. K. and Lincoln, Y. S. (2011) *The Sage Handbook of Qualitative Research* 4th Edn. Thousand Oaks, Sage.California
- Díaz-Garrido, E., María, J. and López, S. (2020). Servitization and digitalization in manufacturing: the influence on firm performance. *Journal of Business & Industrial* 35 (3), pp.564–574.
- Dodd, N., van der Merwe, J., Bond, P., & Dodd, N. (2019). BRICS' trade with Africa: Long live the new king, just like the old king. *BRICS and Resistance in Africa: Contention, Assimilation and Co-optation*. London: Zed Books, pp.73-96.
- Dubey, R., Gunasekaran, A. and Ali, S. (2015) Exploring the Relationship between Leadership, Operational Practices, Institutional Pressures and Environmental Performance: A Framework for Green Supply Chain. *International Journal of Production Economics*, 160, pp.120-132.
- Easterby-Smith, M. Thorpe R, and Jackson P. (2012). *Management Research*. 4th edition. Sage.London
- Ehie, I. and Muogboh, O. (2016),"Analysis of manufacturing strategy in developing countries", *Journal of Manufacturing Technology Management*, 27(2), pp.234 – 260
- European Commission (2003). Recommendation 2003/361/EC regarding the SME definition.
- Eziashi, J., and Sainidis, E. (2024). Manufacturing SME Strategy to Grow and Develop in an Emerging Economy: Evidence from Nigeria. In S. Dadwal, P. Kumar, R. Verma, & G. Singh (Eds.), *Drivers of SME Growth and Sustainability in Emerging Markets* (pp. 1-35). IGI Global. <https://doi.org/10.4018/979-8-3693-0111-1.ch001>
- Fagerberg, J. Martin, B.R. Andersen, E.S (2013). *Innovation studies: Evolution and future challenges*. Oxford University Press, Oxford UK
- Ghobakhloo, M. (2018), "The future of manufacturing industry: a strategic roadmap toward Industry 4.0", *Journal of Manufacturing Technology Management*, 29(6), pp. 910-936.
- Ghobakhloo, M. (2020), "Determinants of information and digital technology implementation for smart manufacturing", *International Journal of Production Research*, 58(8), pp.2384-2405.

- Ghobakhloo, M. and Iranmanesh, M. (2021), "Digital transformation success under Industry 4.0: a strategic guideline for manufacturing SMEs". *Journal of Manufacturing Technology Management*, 32(8), pp.1533-1556.
- Gibson, W. and Brown, A. (2009). Working with Qualitative Data. London.SAGE Publications, *Qualitative Report* 8(4), pp.597-607
- Hallgren, M., (2007). *Manufacturing strategy, capabilities and performance*. Ph.D. Dissertation, Linkoping Univeristy, Sweden.
- Hayes, R., Pisano, G., Upton, D., & Wheelwright, S. (2005). Pursuing the competitive edge. *Danvers: John Wiley & Sons*.
- Hayes, Robert H., and Wheelwright, Steven C. (1984). *"Restoring Our Competitive Edge: Competing Through Manufacturing"*. New York: John Wiley.
- Hill T (2009). *Manufacturing Operations Strategy*. 3rd edition. Basingstoke: Palgrave MacMillan.
- Hill, A. and Hill, T. (2009). *Manufacturing Operations Strategy*, 3rd edition. Palgrave Macmillan, Basingstoke.
- Hitt, M.A.Ireland, R.D. and Hoskisson, R.E. (2007). *Strategic management: Competitiveness and globalization* (5th edition.). Cincinnati, OH: Southwestern College Publishing Company
- Jevgeni, S. Eduard, S. and Roman, Z. (2014). Framework for Continuous Improvement of Production Processes and Product Throughput .25th DAAAM International Symposium on Intelligent Manufacturing and Automation, DAAAM. *Procedia Engineering* 100, pp.511 – 519
- Juran (2016). *Quality Handbook: The Complete Guide to Performance Excellence*, Seventh Edition
- Jutla, D., Bodorik, P., & Dhaliwal, J. (2002). Supporting the e-business readiness of small and medium-sized enterprises: approaches and metrics. *Internet Research*, 12(2), pp.139-164.
- Kagermann, H., Helbig, J., Hellinger, A. and Wahlster, W. (2013), "Recommendations for implementing the strategic initiative Industrie 4.0: Securing the future of German manufacturing industry", Final report of the Industrie 4.0 Working Group, Forschungsunion.
- Khanna, T., & Palepu, K. G. (2010). *Winning in emerging markets: A road map for strategy and execution*. Harvard Business Press.
- King, N (2009) 'Book review: Phenomenological psychology: Theory research and method' *Qualitative research in organizations and management: an international journal*, 2(2).
- Brooks, J., McCluskey, S., Turley, E., & King, N. (2015). The utility of template analysis in qualitative psychology research. *Qualitative research in psychology*, 12(2), pp.202-222.
- Larsen M.S.S. Lassen, A, H and Schou, C. (2023). Manufacturing Innovation: A Heuristic Model of Innovation Processes for Industry 4.0. *Applied System Innovation* 6(6), p.98
- Lassen, A.H. and Wæhrens, B.V. (2021), "Labour 4.0: developing competences for smart production", *Journal of Global Operations and Strategic Sourcing*, 14 (4), pp.659-679.
- Le, T., Tran, N. P., & Hoque, A. (2025). Enhancing Green Innovation Through National Intellectual Capital: The Role of Institutional Quality in Asia–Pacific Economies. *Economies*, 13(5), p.126.
- Liao, Y., Deschamps, F., Loures, E., de, F.R. and Ramos, L.F.P. (2017), "Past, present and future of Industry 4.0 - a systematic literature review and research agenda proposal", *International Journal of Production Research*, 55(12), pp.3609-3629,
- Lockett, S.H. Hatton, J. Turner, R. Stubbins, C. Hodgekins, J. and Fowler, D (2012). 'Using a semi-structured interview to explore imagery experienced during social anxiety for clients with a diagnosis of psychosis: an exploratory study conducted within an early intervention for psychosis service', *Behavioural and Cognitive Psychotherapy*, 40, pp.55–68.
- Mammana, A. Bawoleb, J. Agbebic, M. Alhassan, A. (2019). MSME policy formulation and implementation in Africa: Unpacking assumptions as opportunity for research direction, *Journal of Business Research*, 97, pp.304-315.
- Miltenburg, J. (2005). *Manufacturing strategy: how to formulate and implement a winning plan*. CRC Press.

- Møller, C., Madsen, O., Berger, U., Schou, C., Lassen, A. H., & Waehrens, B. V. (2022). The smart production vision. In *The Future of Smart Production for SMEs: A Methodological and Practical Approach Towards Digitalization in SMEs* (pp. 13-28). Cham: Springer International Publishing.
- Mutula, S. M. and Brakel, P. V. (2007) ICT skills readiness for the emerging global digital economy among the SMEs in developing economies: case study of Botswana. *Library Hi Tech News*, (25), pp.231-245.
- Okpara, J.O (2009). Factors constraining the growth and survival of SMEs in Nigeria: Implications for poverty alleviation. *Management Research Review* 34(2), pp.156–171.
- Onugu, B. A. N. (2005) *Small and medium enterprises (SMEs) in Nigeria: Problems and Challenges*. PhD Thesis, St. Clements's University [online]. Available at: <http://www.stclements.edu/grad/gradonug.pdf>
- O'Regan N, Ghobadian A, and Sims M. (2006). Fast tracking innovation in manufacturing SMEs. *Technovation*, 26(2), pp.251–261.
- O'Sullivan D. (2002) Framework for managing business development in the networked organisation. *Computers in Industry* 47(1), pp.77–88
- O'Sullivan, D. Rolstadås, A. and Filo, E. (2011). Global education in manufacturing strategy. *Journal of Intelligent Manufacturing* 22(5), pp.663–674.
- Rahman, S. (2001). A comparative study of TQM practice and organisational performance of SMEs with and without ISO 900 certification. *International Journal of Quality and Reliability Management*, 8(1), pp.35-49
- Rusjan, B. (2005). Model for manufacturing strategic decision making. *International Journal of Operations & Production Management*, 25(8), pp.740-761.
- Schlegel, D., Frank, F., & Britzelmaier, B. (2016). Investment decisions and capital budgeting practices in German manufacturing companies. *International Journal of Business and Globalisation*, 16(1), pp.66-78.
- Schroeder, R.G. Flynn, B. and Flynn, E. (2011). *The high-performance manufacturing project*. Working Paper, University of Minnesota, Wake Forest University, USA.
- Slack, N., Chambers, S., & Johnston, R. (2010). *Operations management*. Pearson education.
- SMEDAN (2013). *Small and Medium Enterprise Development Agency of Nigeria, Small Business in Nigeria*, Abuja.
- Spring, M., & Dalrymple, J. F. (2000). Product customisation and manufacturing strategy. *International Journal of Operations & Production Management*, 20(4), pp.441-467.
- Srivastava, R. K. and Jena, D. (2011). Manufacturing: A Case Based Approach Process Improvement in Precision Component Manufacturing: A Case Based Approach. http://www.iaeng.org/publication/IMECS2011/IMECS2011_pp1269-1274.pdf
- Swamidass, P. M., & Kotha, S. (1998). Explaining manufacturing technology use, firm size and performance using a multidimensional view of technology. *Journal of Operations Management*, 17(1), pp.23-37.
- Tan, K. H., Lim, C. P., Platts, K., & Koay, H. S. (2006). Managing manufacturing technology investments: an intelligent learning system approach. *International Journal of Computer Integrated Manufacturing*, 19(1), pp.4-13.
- Theresa, I., & Hidayah, N. (2022). The effect of innovation, risk-taking, and proactiveness on business performance among MSMEs in Jakarta. In *Tenth International Conference on Entrepreneurship and Business Management 2021 (ICEBM 2021)* (pp. 42-48). Atlantis Press.
- Thompson, A.R. Smith, J.A. and Larkin, M. (2012). Interpretative phenomenological analysis and clinical psychology training.
- Tidd, J. (2006). A review of innovation models. *Imperial College London*, 16, pp.0-17.
- UNIDO (2013). Emerging trends in global manufacturing industries http://www.manufacturing-policy.eng.cam.ac.uk/policies-documents-folder/2013-emerging-trends-in-global-manufacturing-industries-unido/at_download/file

Van Mieghem, J. A. (2003). Commissioned paper: Capacity management, investment, and hedging: Review and recent developments. *Manufacturing & Service Operations Management*, 5(4), pp.269-302.

Vollmann, T. E., Berry, W. L., Whybark, D. C., & Jacobs, F. R. (2004). *Manufacturing planning and control systems for supply chain management: the definitive guide for professionals* (pp. 598-p). McGraw Hill LLC.

Wheel Wright, S. C. (1984). Manufacturing strategy: defining the missing link. *Strategic management journal*, 5(1), pp.77-91.

Yan, J. Wang, L. and Xiong, J. (2017). "Alcatel-Lucent falls, Huawei ascends new product development makes the difference", *Journal of Business Strategy*, 38(1), pp.22 - 30

Zikmund, W. G. (2003) *Business Research Methods 7th* edition. Thompson South-Western: Ohio.