THE EFFECT OF TECHNOLOGY INNOVATION ON GROWTH OF MEDIUM ENTERPRISES IN NORTH CENTRAL NIGERIA

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Abstract

The study investigated the effect of technology innovation on growth of medium enterprises in North Central Nigeria. The population of the study comprised of 243 medium enterprises in North Central Nigeria. The study adopted the census approach the entire population of 243 owner/managers of these medium enterprises in North-Central Nigeria served as the sample size of the study. Questionnaires were therefore, administered on this sample but only 223 were usable for analysis. The regression results revealed that technology innovation had significant positive effect on the growth of medium enterprises in North-Central Nigeria. The study concluded that technology innovation practice had significant positive effect on growth of medium enterprises in North-Central Nigeria. The study concluded that technology innovation practice had significant positive effect on growth of medium enterprises in North-Central Nigeria. The study concluded that technology innovation practice had significant positive effect on growth of medium enterprises in North Central Nigeria. The study recommended among others, that medium enterprises in Nigeria should focus on developing unique technology innovation through extensive research and development via teamwork as this has the most potential to improving the medium enterprises growth in Nigeria.

Key words: Growth, Medium Enterprises, North Central Nigeria, Technology Innovation

1.0

INTRODUCTION

1.1 Background to the Study

Globally, innovation is broadly seen as an essential component of competitiveness embedded in the organizational structures, process, product and services within a firm. Innovation within a firm is considered as one of the essential components for survival and growth, as these innovation activities (product innovation, process innovation, technology innovation, marketing innovation, organizational innovation); create value and competitive advantage for successful organizations.

Innovation remains the major strategy and driving force for Medium Enterprises (MEs') growth and survival in any competitive business environment, as the introduction of novel products and services has remained the thrust behind the spring up enterprises and the expansion of the existing ones (Ukpabio *et al.*, 2018). In the past few decades, technological changes have proven to either

be sustainable or disruptive to companies all over the world; innovation and adaptability are key tools to surviving any form of hardship and staying relevant in the current competitive market (Zwingina *et al.*, 2017; Akimwale *et al.*, 2017; Ukpabio *et al.*, 2018).

Innovation has become a key tool for small and medium enterprises which strive to cope with today's highly competitive environment (Al-Battaineh, 2018). The importance of innovativeness of MEs to their growth is widely acknowledged and established in literature (Masood *et al.*, 2013; Njogu, 2014; Ibidunni *et al.*, 2014; Zwingina *et al.*, 2017; Akimwale *et al.*, 2017;Okumu *et al.*, 2019). Innovate or die' is a popular slogan used today by many successful companies such as Gillette, Proctor and Gamble, and Microsoft, among others (Bamidele *et al.*, 2018; Choi, 2019; Nguyen *et al.*, 2019), but what does it really mean? One way of understanding this saying is by reflecting upon reports from industry and academia which argue that a lack of innovation will lead to products obsolescence and customer disintegration (Akimwale *et al.*, 2017; Suhaq *et al.*, 2017; Okumu *et al.*, 2017).

On a macro level, innovation has been proven to be a vital injection for economic wealth (OECD, 2005). Simultaneously, innovation catalyzes the micro level, where it is considered a continuum for the establishment of new or updated products (i.e. incremental change). Thus, the level of MEs concern inter/intra-relationships crossing organizational boundaries to boost performance and enhance growth, strengthen competitive advantage, and enable market flexibility (Akimwale *et al.*, 2017; Suhaq et *al.*, 2017; Okumu *et al.*, 2019).

In this study, the unit of analysis is Medium Enterprises (MEs) which are defined as those enterprises with total assets (excluding land and buildings) are above fifty (50) million naira, but not exceeding five (500) million naira with a total workforce of between 50 and 199 employees. This definition of MEs is adapted from the definition and classification of SMEs as provided by National Bureau of Statistics /Small and Medium Enterprises Development Agency of Nigeria (NBS/SMEDAN) (2017).

The independent variable is innovation practice, and was conceptualized as five-dimensional constructs, namely: product innovation, process innovation, technology innovation, organizational innovation, and market innovation. These dimensions were adapted from prior researches such as OECD (2005), Alpay et al. (2012), Karabulut (2015), Akinwale et al. (2017), Akosile (2017), and Obunike and Udu (2018). Innovation reflects the tendency of a firm to enhance, appreciate and acquire new ideas, novelty, experimentation and the creative processes that may result in new products, services or technological process. Product innovation means introducing the new products/ services or bringing about significant improvement in the existing products/ services. Process innovation means changes in the ways of producing or developing products, including new logistics, new raw material, new production lines, new production processes/methods, and new technology. Technological innovation refers to the process by which firms master and implements the design and production of products/services that are new to the business irrespective of whether the products/services are new to their competitors or their customers or the world. Organizational innovation is described as the introduction of new practices of doing business, workplace organizing methods, decision making system and new ways of managing external relations and dealing with other firms. Whereas marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, products

placement, product promotion or pricing (OECD, 2005; Alpay et al., 2012; Karabulut, 2015; Akinwale et al., 2017; Akosile, 2017; Obunike and Udu, 2018).

Medium Enterprises growth is the dependent variable of the study. Medium Enterprises growth in general refers to increase in size of MEs. Growth MEs' growth has been identified as a key driver for the creation of wealth and employment and economic development in every country. Business grows from micro to small to medium and to large. Medium Enterprises growth is can be defined as increase in size of MEs in terms of sales growth, employment growth, market share growth, and firm size growth (Peter, 2011).

The effect of innovation practices on small and medium enterprises has attracted a lot of write-ups from many academics and researchers, however, mixed results were found from these prior studies (Dada, 2016; Zwingina *et al.*, 2017; Akimwale *et al.*, 2017; Suhaq *et al.*, 2017; Okumu *et al.*, 2019; Egwakhe *et al.*, 2021). Besides, relatively little research exist on the effect of innovation practices on growth of MEs in North Central Nigeria; most of the studies conducted on this phenomenon of interest were not conducted in the study area, and some of these studies were not even carried out in Nigeria (e.g.Salavou *et al.*, 2004; Masood *et al.*, 2013; Karabute, 2015; Subhan, 2016; Jin and Choi, 2019; Nguyen *et al.*, 2019; Kijkasiwat and Phuensane, 2020; Tjahjana *et al.*, 2020). In addition, most studies on this phenomenon of interest were done many years ago (e.g Masood *et al.*, 2013; Raji, 2014; Njogu, 2014; Ibidunni *et al.*, 2014; Olughor, 2015). The recent development in the globe requires that similar studies be carried out to be in line with the current development pattern. The foregoing situations have created a gap in knowledge in the field of study which this study sought to fill.

1.3 Objective of the Study

i. Examine the effect of technology innovation on growth of medium enterprises in North Central Nigeria.

1.4 Research Question

i. How has technology innovation affected growth of medium enterprises in North Central Nigeria?

1.5 Statement of Hypothesis

Ho1: Technology innovation has no significant effect on growth of medium enterprises in North Central Nigeria.

1.6 Significance of the Study

The study will add to the knowledge of past researches on effect of innovations practice on growth of medium enterprises. The study will contribute to the broadening of our understanding of the effect of innovation practice and use in medium enterprises especially from developing countries perspective. It will also avail knowledge that is of use to owner-managers of medium enterprises, researchers and policy-makers by providing insights on the effect of innovation practices and how medium enterprises should adopt them. Additionally, it will provide current and up to date assessment of the effects of innovation practice on medium enterprises growth in Nigeria.

Besides, the study will provide relevant information to scholars and academics with regard to the relationship between innovation practices and growth of the medium enterprises. In addition, researchers will be able to gain additional knowledge from the study given that it is focusing on a several medium enterprises that operate within North Central region in Nigeria. Future researchers and academic institutions, especially those of higher learning will also benefit from the findings of this research as a source of future reference and also to identify further research gaps to be filled in the future.

2.0 LITERATURE REVIEW2.1 Theoretical Framework2.1.1 Schumpeterian theory of innovation

The theory of innovation was propounded by Schumpeter in 1934. Schumpeter was an economist who coined the term "creative destruction" to describe the outcome of the process of innovation by competing firms interacting in a given market place. Creative destruction refers to the portable opportunities seized by innovators, which ultimately benefit not just them but the whole society. The theory holds the assumption that an entrepreneur is one having three major characteristics: innovativeness, foresight and creativity. Creative destruction implies that the entrepreneurs destroy the prevailing equilibrium in the market thereby disrupting existing goals and changing the direction of the economy. They achieved this through creating new market, introducing a new way to make products, discovering new markets for a product, finding new sources of raw material and establishing new ways of making things or organization.

With the process of creative destruction, Schumpeter (1934) was one of the earliest scholars in highlighting the importance of innovation in entrepreneurial activity. He argued that the creative destruction was a process that disrupts current market structures by means of new goods or services, new markets, new production process, sources of supply and organization structures. Innovation mainly refers to an iterative process initiated by the perception of a new market and/or new service opportunity which leads to development, production, and marketing tasks striving for its commercial success. Accordingly, Schumpeter calls innovation the specific tool of entrepreneurs, the means by which entrepreneurs exploit change as an opportunity for a different business or a different service. Schumpeter (1934) stressed the role of entrepreneurs as primary agents effecting creative destruction and emphasized to the entrepreneurs the need to search purposefully for the sources of innovation, the changes and their symptoms that indicate opportunities for successful innovation as well as their need to know and to apply the principles of successful innovation.

The Schumpeterian articulation of innovation has been carried forward by successive scholars and researchers. On his part, Drucker (1985) held that entrepreneurs are always searching for change, responding to it, and exploiting it as an opportunity, and engaging in purposeful innovation. Furthermore, the link between innovation and business growth in SMEs is supported by the results of Covin and Wales (2012) who found that innovation is among the key factors that stimulate business growth in SMEs. Schumpeterian theory supposes that firms' progress comes from innovations they carry out motivated by the pursuit of profit. That is, each innovation is aimed at creating some new process or product/service and new market that give its creator a competitive

advantage over its business rivals by rendering obsolete some previous innovation (Mwangi and Ngugi, 2014).

Therefore, in SMEs, innovation provides a holistic, vibrant and complementary base to SMEs growth resulting to SMEs' sustainability and superior performance (Afriyie and Musah, 2019). Thus, this theory is relevant to the present study because it provides a deeper understanding of innovation and its dimensions (product, process, technological, organizational and market innovations) in relation to MEs' growth.

Innovativeness is paramount to the survival and growth of small enterprises (Ibidumi et al., 2014). A study by Rosenbusch et al. (2011) identified that innovativeness has strong positive effect on financial growth measures such as return on sales, returns on assets and profitability. Moreover, Rosli and Sidek (2013) recorded a strong positive relationship between innovativeness and nonfinancial performance measures. Ngugi et al. (2013) examined the influence of innovativeness on the growth of small and medium-sized enterprises. They based their research on the RBV and operationalised innovativeness to include new goods and services, new processes and technological advancement, while enterprise growth was operationalised as sales growth, employment growth, profit, market share growth, customer satisfaction and owner's/manager's satisfaction. They found that both the individual and composite dimensions of innovativeness had significant positive relationships with growth of SMEs in Kenya. Similarly, Salavou and Avlonitis (2008) investigated the influence of product innovativeness on the performance of small and medium-sized manufacturing, food and beverages, and textile enterprises in Greece and concluded that product innovativeness influenced performance. In another related study, Alpayet al. (2012) examined the innovativeness-SME growth relationship. The results indicated that there was a strong linear relationship between innovativeness and performance of SMEs in Turkey.

2.1.2 Diffusion of innovation theory

The diffusion theory was developed by Evereth Rogers in 1962 and is now in its fifth edition (as cited in Akosile, 2017). This theory explains how, why and at what rate new ideas and technology spread. He argues that diffusion is the process by which an innovation is communicated over time among the participants in a social system. The origins of the diffusion of innovation theory are varied and span multiple disciplines. Rogers proposes that four main elements influence the spread of a new idea: the innovation itself, communication channels, time and a social system. This process relies heavily on human capital. The innovation must be widely adopted in order to self sustain. Within the rate of adoption, there is a point at which an innovation reaches critical mass.

From the perspective of innovation and technology orientation, Rogers (1995) proposed the Diffusion of Innovations (DOI) theory in order to explain the concept by which innovation could be transferred between different people over certain periods of time by different means. The process of introducing a new innovation has been investigated for more than 30 years (Rogers, 2003; Rogers, 1983). Rogers' theory as noted by (Al Mamun, 2018) describes, among the most popular models of adoption in his book "Diffusion of Innovations" and has used the model as a framework for many studies from a wide range of subjects.

The diffusion of innovation theory has been used in several fields, such as strategic management, political science, management, public health, communications, accounting, history, economics,

technology, innovation and entrepreneurship, etc. (Johnson, 2015; Stuart, 2000). In addition, Rogers' theory has been widely used in the theoretical framework in the field of technology adoption and innovation diffusion. Rogers' growth in innovation theory is perhaps best suited to exploring the technology orientation in small and medium enterprises and insightful ecosystems (Li and Asim, 2019; Parisot, 1995; Medlin, 2001).

Diffusion of innovation research usually involves technological innovation and Rogers (2003) typically used the word "technology" or "innovation" as synonyms. Rogers refers to the diffusion as "a process in which innovation is thoroughly communicated between members of the social system through certain channels over time". Innovation, communication channels, time and social structure are the four basic elements of diffusion of innovation (Chege and Wang, 2020). Previous research has revealed that organisational culture encourages innovation (Do *et al.*, 2018; Pedersen et al., 2018). Indeed, a culture that promotes and embraces innovation can be linked and defined by conduct that demonstrates an affection and incentive for advancement, risk-taking, free expression, focus on teamwork, communication, respect and trust, together with the promotion of group meetings and staff relations, empowering staff to improve their effectiveness, and working regularly on current model (Lijauco *et al.*, 2020; Tang *et al.*, 2020; Rogers, 2003, 1995).

The primary drivers of sustainability, competitive advantage and efficiency for small and mediumsized enterprises are the introduction of new technology and non-technology innovation (Price *et al*; 2013). According to Fagerberg *et al.* (2004) MEs with higher innovations have significantly better ratios of income and employment than MEs that are less innovative and creative. As a result, innovation research, particularly in the field of small and medium-sized enterprises, is vital due to the newness array of processes and activities undertaken by enterprises and their innovation responsibilities, which lead to sustainability, success in the enterprise and inclusive growth (International Labour Office, 2015; Anderson and Eshima, 2011; Jia *et al.*, 2020). Rogers (2003) defined innovation as an idea, practise or project considered to be specific to an entity or to a number of other adoption components. The diffusion of innovation involves establishing the capabilities of innovation cultures that promote the effectiveness of innovation and competitive advantages that support sustainable growth of small and medium enterprises in a new market dynamics.

2.2 Conceptual Framework

The concepts relevant to this study are carefully clarified as presented below.

2.2.1 Concept of Innovation

The term innovation comes from the Latin – innovare – meaning to make something new; that is turning opportunity into new ideas and putting these new ideas into widely use practice. Firstly, it is important to understand what innovation entails from a conceptual perspective. Innovation relates to the doing of new or novel things or the doing of old things through new strategies so as to enhance sales, cost, and profit or market performance (Abdilahi *et al.*, 2017). Innovation has also been suggested to be the use of institutional, technological or human resources in ways that achieve new products, markets and practices (Abdilahi *et al.*, 2017). Innovations can manifest as a new service or product, a new technological process in production, a new organizational administration structure or system, a new program or plan. Product and process innovation types

are the major focus of academic literature on innovation, although organizational innovation is also a newer type of innovation dimension being focused on by researchers (Braunerhjelm *et al.*, 2016). The innovative capability of the firm has been tied to the process of research and development (R&D) within the SME. R&D leads to the generation of newer knowledge which informs new innovations (Zimmerman, 2017). As such, SMEs which regularly do R&D activities are more likely to have newer knowledge and thus will be able to come up with new services or products or newer processes of production.

In the third edition of the Oslo Manual, innovation is defined as the implementation of a new or significantly improved product (goods or services), a process, a new marketing techniques or a new organizational method in business practices, workplace organizations or external relation (OECD and Eurostat, 2005). Here, innovation was classified into four different types which are product innovation, process innovation, marketing innovation and organizational innovation. Here, the product and process innovation were grouped into technological innovation while marketing and organizational innovation were grouped as non technological innovation.

Innovation is described as "the introduction of new or improved processes, products or services based on new scientific or technology knowledge and/or organizational know-how" (OECD, 2015). An invention is the first occurrence of an idea for a new product or process whereas innovation is the act of putting it into practice. There are different types of innovation in business (Trott, 2008); however it can be related to new products or services, new production processes, new marketing techniques, and new organisational or managerial structures (Rebound, 2008). Innovation may also involve technology, intellectual property, business, or physical activity (Sundbo, 2003).

Innovativeness is paramount to the survival and growth of small and medium scale enterprises. A study by Rosenbusch et al. (2011) identified that innovativeness has strong positive effect on financial growth measures such as return on sales, returns on assets and profitability. Moreover, Rosli and Sidek (2013) recorded a strong positive relationship between innovativeness and nonfinancial performance measures. Ngugi et al. (2013) examined the influence of innovativeness on the growth of small and medium-sized enterprises. They based their research on the RBV and operationalised innovativeness to include new goods and services, new processes and technological advancement, while enterprise growth was operationalised as sales growth, employment growth, profit, market share growth, customer satisfaction and owner's/manager's satisfaction. They found that both the individual and composite dimensions of innovativeness had significant positive relationships with growth of SMEs in Kenya. Similarly, Salavou and Avlonitis (2008) investigated the influence of product innovativeness on the performance of small and medium-sized manufacturing, food and beverages, and textile enterprises in Greece and concluded that product innovativeness influenced performance. In another related study, Alpay et al. (2012) examined the innovativeness-SME growth relationship. The results indicated that there was a strong linear relationship between innovativeness and performance of SMEs in Turkey.

Various types of innovative developments are associated with different aspects of growth and performance. Previous studies mention a positive relationship between the innovation and performance (Centobelli *et al.*, 2019; Chegeand Wang, 2020). The impacts of innovation on the performance of a firm can be demonstrated by both financial and non-financial indicators (Mashal,

2018). The positive impacts of innovation include the ability to compete with others (Anwar, 2018; Conto *et al.*, 2016), financial accessibility (Abdu and Jibir, 2018), connection and communication (Radzi et al., 2017), marketing (Adam *et al.*, 2017), and export performance.(Azar and Ciabuschi,2017; Love *et al.*, 2016; Prange and Pinho, 2017). However, some critics have a different perspective. For example, Karabulut (2015) found that innovation has negative impacts on firm growth. It has also been suggested that a failure to consider the potential negative effects of innovation could eventually impact on the environment and lead to uncontrollable business growth ((Laforet, 2011). In spite of reservations like these about potential negative impacts, there is strong support in the literature for the positive effects of innovation on firm growth (Kijkasiwat and Phuensane, 2020).

2.2.2 Concept of technology innovation

Technology means the information, equipment and processes required to transform input into output in the organization (Akosile, 2017). Technology looks at how inputs are converted into outputs. It encompasses the way small scale manufacturing firms produce goods/services using tools, equipment, techniques and human know how. Innovativeness as the main characteristic of entrepreneurs has been defined differently by scholars. Technology is a systematic application of physical forces for production of goods and services. The knowledge used in practical ways in industry (Oxford 2005). It is the knowledge, process, tools, methods and systems employed in the creation of goods and improving in services. Technology is the result of man's learned and acquired knowledge or his technical skills regarding how to do things well (Khalil, 2000).

Technological innovation provides the life-blood of economic activities. Technological innovation is a tool for economic growth and the application of those inventions to meet emerging business opportunities, and to meet social needs, and environmental challenges. For any organization to be able to compete, it must be technologically innovative. Technological innovation and core competitiveness enjoy symbiotic relationship (Prahalad and Hamel, 1990).

Technological Innovation Capability (T.I.C) is an important component of the core competitiveness of the SMEs sector, and core competitiveness play a role in promoting or influencing technological innovation. Technology should be so designed to be able to match the marketing capability of the organization and be seen as reflecting in the strategic plan of the firm and its overall success. Innovation should match resources inputs, technology and market. This according to Liao (2001) is part of innovation and the new combination of various elements of productivity.

The current technological advancements are wielding considerable alteration in smoothing manufacturing firms' operative field. They impact firms and their products, consumers and market. More so than ever, this has resulted in turbulent and rapid changes in customers' tastes and needs, resulting in shortage of products brands' life cycles (Obunike and Udu, 2018).

The product brand that enhances firm's profitability today can be the cause of its failure in the near future as technologies are obliging firms to rethink and retool everything they do internally, especially the products they produced and the processes of production. Technology has intensified manufacturing business innovativeness effort, making production faster, easier and cheaper than that of the larger organizations (Ojo and Ololade, 2014). This is because customers through

technological advancements have prompt information of new innovative product brands of competitors. Therefore, most firms irrespective of their size have an innovative objective. The study argues that in order for firms to remain competitive in the global market, they need to intensify their efforts to achieve their innovative objectives through the improvement of existing products, introduction of entirely novel products and also introduction of new processes or techniques of production (Piening and Salge, 2015).

MEs generally struggle to achieve these objectives in order to grow. As a result, technological innovativeness, once an option for manufacturing firms, has become a crucial factor of their growth (Iorun, 2014). Technology involves tools, techniques, materials and methods firms used to produce new product/process or improved products/or process. Technology can enhance small business innovativeness opportunities in manufacturing, logistic, customer service, finance and almost every business activity (Oyeku *et al;* 2014). The keyword in technological innovativeness is "novelty or improved product/services and processes" applied to a firm.

Technological innovativeness therefore enables small scale manufacturing firms to either clinch to only product-oriented innovativeness, which includes altering the product shapes, dimensions, size, colour or introducing improved versions of the existing products, or entirely introducing a novel product either to the firm or to the market. This is aimed at increasing sales growth and employment growth. It can also be achieved through process-oriented innovativeness achieved through altering the existing methods of production, using new or modified material in the process of manufacturing (Dimnwobi *et al.*, 2016). This is aimed at reducing cost or quality improvement to ensure firm size growth and market shares growth. There is a need, therefore, for small scale organizations to be open to exploit existing technologies, generate new ones and engage in global technological collaborations.

3.0 METHODOLOGY

This section discusses the research design, the study area, population of the study, sample and sampling techniques, instruments of data collection, validation of the instrument, reliability of the instrument, method of data collection, variables specification, model specification, and data analysis techniques.

3.1 Research Design

This study utilized the survey research design. Quantitative data were gathered in order to establish the effect of the independent variable (innovation practice) on the dependent variable (growth of MEs). The reason for the choice of survey research design is grounded on the fact that it helps researchers to collect data from respondents regarding their views and knowledge concerning the study variables in order to achieve the study objectives. The justification for the choice of survey research design is because it would help to elicit opinions of respondents on the effect of innovation practices on growth of MEs in North Central Nigeria.

3.2 The Study Area

The study focuses on the effect of innovation practices on growth of MEs in North Central Nigeria. The geographical location covered by the study is the North Central Region of Nigeria. The study was limited to only the MEs that are located and operational in the six states in North Central – Nigeria (Benue State, Kogi State, Kwara State, Nasarawa State, Niger State, and Plateau State) including the Federal Capital Territory. There are 243 MEs in North Central Nigeria (NBS/SMEDAN, 2017). 28 of these MEs are in Benue State, 16 of them are in Kogi State, 18 of them are in Kwara State, another 18 of these MEs are in Nasarawa State, 47 of them are in Niger State, and 41 of the MEs are in Plateau State, while 75 of these MEs are in Federal Capital Territory (FCT). Appendix 4 captured this information.

The study area is the central part of Nigeria and is regarded as part of northern Nigeria. The region has arable land for agriculture; hence it is an agrarian region, and rich in farming with common crops such as: yam, rice, soya beans, guinea corn, maize, millet, amongst others; which serves as rich sources of raw materials for manufacturing firms. The region also houses the two major rivers in Nigeria, namely river Niger and river Benue, thus supporting even dry season farming and fish/aquaculture businesses. The region is rich in solid minerals such as having high deposits of limestone for cement production, thus making the region a viable zone for primary raw materials for industries to thrive.

The economy of North Central Nigeria comprised the private and public sectors. With respect to industrial development, the private initiative is mainly confined to micro, small and medium enterprises. Vast investment opportunities exist in large, medium and small enterprises in the region. There are good prospects for innovation practice in terms of product innovation, process innovation, marketing innovation, technology innovation and organizational innovation in the medium enterprises sector in the region.

3.3 Population of the Study

The population of this study comprised 243 MEs in North Central Nigeria (NBS/SMEDAN, 2017). The study focused on only owners/managers of MEs in the study area. The decision to focus on only the owner/managers of these MEs was informed by the fact that they are presumed to be more knowledgeable and are also in a better position to provide relevant information on how innovation practice affects the growth of their enterprises in terms of sales growth, employment growth, market share growth, and firm size growth. The population of the study is shown on Table 1. From Table 1, it can be seen that 28 of these MEs are in Benue State, 16 of them are in Kogi State, 18 of them are in Kwara State, another 18 of these MEs are in Nasarawa State, 47 of them are in Niger State, and 41 of the MEs are in Plateau State, while 75 of these MEs are in Federal Capital Territory (FCT).

State	Number of MEs in North Central Nigeria	Percent	
Benue	28	11.4	
Kogi	16	6.5	
Kwara	18	7.4	
Nasarawa	18	7.4	
Niger	47	20.0	
Plateau	41	16.7	
FCT	75	30.6	
TOTAL	243	100	

Table 1	l:	Popu	lation	of the	Study
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Source: NBS/SMEDAN (2017)

3.4 Sample and Sampling Techniques

The nature of the present study called for the adoption of a census approach. As a result of the small size of the population, the census approach was used in selecting the sample size; hence the sample size of the study was the same with the population. Consequently, the researcher adopted a census approach and the entire population of 243 owner/managers of MEs in North Central Nigeria was used as the sample to achieve a desired level of precision. The list of MEs sampled in North Central Nigeria by state can be found in Appendix 5.

The owners/managers of MEs from North Central Nigeria were considered for the study based on the criteria: Owners/Managers who are chief executive officers of MEs, and who operate these MEs based on NBS/SMEDAN (2017) definition of MEs; the Owners/Managers who operate MEs in North Central Nigeria for at least a period of 5 years (i.e. 2016 to 2020 and beyond). The study focused on only owners/ managers of MEs in the study area because as CEOs of their respective enterprises, they are presumed to be more knowledgeable and are also in a better position to provide information on how innovation practices affect the growth of their enterprises in terms of sales growth, employment growth, market share growth, and firm size growth.

4.0 RESULTS AND DISCUSSION

4.1 Technology Innovation

Owners/managers of MEs in North Central Nigeria were asked to respond to a number of statements or items regarding *technology innovation* in their enterprises and the responses are summarized and presented in Table 13. To analyze the responses, respondents that strongly agreed and those who agreed were combined in one category of those who *concurred or agreed with* the items. Besides, respondents who strongly disagreed and those who disagreed were combined in one category of respondents were those who neither agree nor disagree- undecided about the items. Thus the three categories of responses were compared. Interpretation was then drawn from the comparison of the three categories accordingly. Comparison of responses to these items indicates that the percentage of those who concurred

ranged from 20.4 % to 45.7 %, while those who are undecided ranged from 14.5 % to 21.3 % and those who opposed ranged from 0.9 % to 13.6 %.

From those comparisons it is evident that the range of percentages of those who concurred is higher than those that were opposed and those that were undecided. This implies that majority of the respondents agreed or strongly agreed that technological innovation is a vital factor in their enterprise growth; their enterprise has technological capability in innovatively developing new products; that the enterprise also has technological capability for new process development; that employees in their enterprise have technical knowledge about the production process which has been acquired through formal training; that their enterprise has acquired advanced machinery or equipment to produce new products; and that their enterprise has embraced the use of computerized records as part of its accounting system to have an improved internal control mechanism. The implication of the findings revealed that owners/ managers of MEs in North Central Nigeria agreed that there is technology innovation existing in their enterprises.

Item	S	A	1	A	τ	D]	D	S	D	То	tal
	F	%	F	%	F	%	F	%	F	%	F	0⁄0
Technological innovation is a vital factor in my enterprise growth.	61	27.4	93	41.7	37	16.6	22	9.9	10	4.5	223	100.0
My enterprise has technological capability in innovatively developing new products.	65	29.4	101	45.7	35	15.8	16	7.2	4	1.8	221*	100.0
The enterprise also has technological capability for new process development.	73	32.7	90	40.4	33	14.8	25	11.2	2	0.9	223	100.0
Employees in my enterprise have technical knowledge about the production process which has been acquired through formal training.	62	28.1	92	41.6	32	14.5	26	11.8	9	4.1	221*	100.0
My enterprise has acquired advanced machinery or equipment to produce new products.	58	26.2	99	44.8	44	19.9	18	8.1	2	0.9	221*	100.0
The enterprise has embraced the use of computerized records as part of its accounting system to have an improved internal control mechanism.	45	20.4	95	43.0	47	21.3	30	13.6	4	1.8	221*	100.0

Table 13: Respondents' Views on Technology Innovation

Source: Author's Computations, 2022

Note: SD = strongly disagree; D = disagree; UD = Undecided; A = agree; SA = strongly agree; Freq = frequency; *2 missing values.

4.6 Test of Hypothesis

Technology innovation has no significant effect on growth of *medium enterprises* in North Central Nigeria.

Based on the result of the regression analysis, hypothesis three was also rejected in favour of the alternate that technology innovation has a significant positive effect on the growth of medium enterprises in North Central Nigeria as indicated by the following: B = 0.164, t = 2.145, p = 0.033. The regression equation is presented thus when all the other variables are held constant: MEG = 0.299 + 0.164TNI + 0.076

Table 21: Regress	ion Results	and Findings
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Нур	Variable	В	SE	<i>t</i> -value	p-value	Decision
	Constant	0.299	0.270	1.107	0.270	
H_{01}	Product Innovation	0.265	0.064	4.168	0.000	Reject
H_{02}	Process Innovation	0.136	0.067	2.037	0.043	Reject
H_{03}	Technological Innovation	0.164	0.076	2.145	0.033	Reject
H_{04}	Organizational Innovation	0.148	0.064	2.304	0.022	Reject
H_{05}	Market Innovation	0.204	0.062	3.296	0.001	Reject

Dependent Variable: Growth of medium enterprises (MEs)

Independent Variables: (Constant), Product Innovation, Process Innovation, Technological Innovation, Organizational Innovation, Market Innovation

Source: Authors computation, 2022

4.7 Discussions of Findings

4.7.3 Hypothesis three

Technology innovation has no significant effect on growth of *medium enterprises* in North Central Nigeria.

According to the result of the regression analysis, hypothesis three, which states that technology innovation has no significant effect on growth of medium enterprises is also rejected in favour of the alternative hypothesis that technology innovation has a significant and positive effect on the growth of MEs in North Central Nigeria. The result also shows that technology innovation contributes 16.4 % of the variation in growth of medium enterprises in North Central Nigeria. This

means that MEs that are able to master and implement the design and production of products and services that are new to the business irrespective of whether the products and services are new to their competitors or their customers will be able to grow their turnover, number of staff employed, market share and MSE size. In order words, medium enterprises in North Central Nigeria that have systems in place to support technology innovation will contribute positively to the growth of their MEs. Similar research findings carried in Nigeria have also shown that technology innovation improves the performance of firms (Oyewale *et al.*, 2013; Akande and Oladejo, 2013; Oladejo *et al.*, 2014; Adeyeyetolulope, 2014; Penalba *et al.*, 2015; Akimwale *et al.*, 2017; Obunike and Udu, 2018; Maliki and Amusa, 2019). Research conducted in other countries by Gyeke-Dako *et al.*, (2016), Afenya *et al.* (2019), Chege *et al.* (2019), Mallinguh *et al.* (2020) have also found a significant positive effect on the performance of firms.

5.2 Conclusion

The moderate explanation of growth of MEs from technology innovation practice may arise as a result of other factors not captured in the model. This may explain why technology innovation practice has a moderate effect on the growth of MEs. However, as the study reported, technology innovation process contributes moderately in explaining the variance in growth of MEs in North-Central Nigeria; therefore, technology innovation practices should be encouraged and supported. The concept therefore, holds great promise as a tool for entrepreneurs to be technological innovative and creative in the management of MEs as its implementation and deployment will help medium enterprises to grow and achieve success in Nigeria.

5.3 Recommendations

The following are the recommendations of this study:

- a) As the results indicated, organizational innovation as an aspect of innovation practice was also significantly related to growth of MEs in North-Central Nigeria. It ranks fourth in its impact on the growth of MEs in Nigeria; hence MEs should not neglect in developing and implementing organizational innovation practice. Ways they can ensure organizational innovation is through constant introduction of new business practices, new ways of managing their external relations and mechanisms, routines, procedures and processes that are daily reviewed, updated and creatively deployed across the organizations. In that way, MEs in Nigeria will be able to achieve sustained growth.
- b) Process innovation has the least influence on growth of MEs in North-Central Nigeria. Be that as it may, owners/managers of MEs should consider implementing process innovation especially for those in the service sector. However, deployment of resources for this aspect of innovative practice should not be favored above product or market innovation practices which have the most impact on growth of MEs. Despite this claim, owners and managers of MEs should endeavor to continuously improve on their production techniques that are more efficient and effective which may also include on an expansive training program for its employees. In such a way, MEs may be able to contribute to their growth in North-Central Nigeria.

c) Innovation practice should therefore, be designed, developed and implemented to support and complement the broader strategic management framework. Greater resources should be allocated to product innovation practice followed by process innovation, technology innovation, organizational innovation and market innovation. Deploying resources to those aspects of innovative practice that has the most impact on growth of MEs is most costeffective and sustainable as the overall long-term growth of such MEs will be sustained.

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