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Firms' Performance and Innovation: Evidence from Small and Medium Enterprises (SMES) in Nigeria

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ABSTRACT

The effect of innovations on the performance of SMEs in Nigeria was examined in this study using firm-level data from the Enterprise Survey Panel Data for the years 2007-2014/2015. To investigate the relationships between innovation outcomes and firms' performance, we used static panel data models. The Hausman test statistic was used to choose between fixed and random effects estimators. The result showed that 52.05 percent of the 1729 firms polled claimed they had developed a new or significantly improved product, and 52.54 percent said they had developed a new or significantly better process. In the period under review, however, less than half of the organizations (41.87 percent) had undergone organizational transformation. Finally, we noticed that there was a transition from one form of innovation to another in the period under review. Furthermore, there was a significant and favorable link between innovation outcomes and R&D spending, as well as employee training. The studies also demonstrated a positive and statistically significant link between firm's productivity and innovation outcomes. As a result, we recommended that the governments at all levels need to encourage strategic coordination of both human and non-human capital in SMEs, such as R&D personnel, FDI inflows, technology, and information. There is also a need for increased access to funds for research and innovation in formal institutional contexts, as well as policy packages that are highly supportive of innovation.

Keywords: Innovation, Technology, R & D Expenditures, Fixed Effects and Firm Performance

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1. Introduction

As indicated in the literature, SMEs have played a vital role in the economies of both developed and developing countries in terms of turnover, employment, and serving as a vehicle to combat poverty (Akanji, 2006; Akintoye and Oladejo, 2008; Akande, 2013). Apple, Microsoft, Toyota, IBM, and Mercedes-Benz are just a few of the globally recognized brands that immediately come to mind when considering the concept of innovation. Not only their early movements/domination, but also their commitment to innovations; both in times of adversaries and success, set these corporate entities apart. These companies are all market leaders that have managed to maintain their brand identities over time (Pavan, 2007). The success of these brands can be ascribed in part to their constant innovation. As a result, both small and large enterprises must prioritize innovation capability in order to ensure their success in the global market. Several empirical studies have looked into the idea of innovation as a prerequisite for industrial development (see Saunila, 2019; Egbetokun et al., 2012; Abereijo et al., 2007; Lin, 2007; Calantone et al., 2002; Romijn & Albaladejo, 2002; Lawson & Samson, 2001;). According to Zheng et al., (2010), innovation is defined as the ability to develop valuable and creative items or knowledge.

Innovation is derived from the conversion of knowledge, skills, and ideas, according to Lawson and Samson (2001). Innovation is defined as the ability to continuously produce new items, processes, and systems for the benefit of corporate organizations and their stakeholders. Small and medium-sized businesses (SMEs) can use innovation to improve their performance and market competitiveness. Anecdotal evidence supports the presence of this link between SMEs' innovation skills and their performance in Nigeria (see Abereijo et al., 2007 and, Gunasekaran et al., 2000). Meanwhile, research on innovation in small businesses has been divided into two categories: causes of innovation and effects of innovation. SMEs, according to Kuteyi (2013), are the engines of national growth, generating jobs and contributing to GDP. This is supported by (Muntala et al., 2012; Ayozie & Latinwo 2010, and Ariyo, 2008), who believe that SMEs will increasingly embrace labor-intensive technology, reducing job scarcity, particularly in developing nations. Given the importance of SMEs in economic development, particularly in developing countries, there is a need to improve their performance in order to fully exploit their potential. Furthermore, in order for these SMEs to thrive in the increasingly competitive international economy, they must acquire the necessary prerequisites for improved products and processes, improved organizational procedures, and enhanced marketing approaches (Yoguel & Boscherini, 2000). As a result, allocating a portion of their available resources to capacity building will assist these businesses in developing the necessary capacities to cope and compete effectively in the global market.

In the world's newly industrialised countries, such as Hong Kong, Taiwan, South Korea, and Singapore, empirical data abounds on how SMEs have significantly transformed not just their manufacturing capacity but also their foreign inflows from deliberate trade (Ehinomen & Adeleke, 2012). As Adeleke (2002) correctly points out, SMEs account for a major portion of these countries' economic potential. SMEs continue to be a driver of economic growth and development. Unfortunately, despite Nigeria's renowned quantity of SMEs, the same happy narrative cannot be told because fast economic growth through SMEs is still comparatively unachievable (Awe, 2012). In Nigeria, governments at all levels are attempting to make SMEs more effective as drivers of production activities in order to ensure a balanced industrial development and, ultimately, to increase manufacturing's contribution to GDP and economic growth. This intends to resurrect the sector in order to boost its global competitiveness and turn it into a source of export revenue in a global economy (Ehinomen & Adeleke, 2012). In light of this, the focus of this research is on evaluating the impact of innovation on the performance of SMEs in Nigeria. As a result, the following research questions are proposed for the study; What are the types of innovation activities carried out by SMEs in Nigeria? What are the factors influencing SMEs' innovation in Nigeria? What is the effect of innovation on SMEs performance in Nigeria?

2. Literature Review

2.1. The Twin Concepts of Technology and Innovation

The tools, techniques, materials, and methods used by businesses to generate new or improved goods or processes are referred to as technology. Manufacturing, distribution, customer service, and finance are just a few of the areas where technology helps SMEs develop (Oyeku et al., 2014). Technology refers to the information, equipment, and processes that an organization uses to convert input into output (Kearney, 2017). It describes the processes by which raw materials are transformed into finished commodities, as well as the methods by which SMEs produce things and services using a set of technical skills and human resources. The buzzword in technical innovation is "originality of thought."

On the other hand, the definition of innovation differs between professions and individuals. However, understanding the growth paths of economies requires a Schumpeterian perspective on innovation. The process of leveraging knowledge to create new initiatives that lead to changes in a company's production and organizational structure is known as innovation. Schumpeter (1934) defines innovation as delivering new products or adjustments to existing ones, cutting costs through new methods, recognizing the importance of the market, and increasing productivity (Ferreira et al., 2017). He considered any of the following applications to be innovation: a new product or enhancement to an existing product; a new method or technology in the industry; the discovery of a new market; the establishment of new input and raw material sources and; changes in the industrial structure.

Innovation, according to the World Bank (2017), involves commercial applications of new technology, new materials, or new methods and processes. It mostly refers to the technique of leveraging existing technologies, copying features from other products, or adopting new business models from industry competitors. This idea has recently become a hot topic in conversations about how to boost productivity in both rich and developing countries.

In line with Schumpeter's concept of innovation, the Organisation for Economic Cooperation and Development (OECD) came up with four main types of innovation in its Oslo Manual (2005), which are categorized into two broad clusters of technological and non-technological innovations. The following are the four primary sorts of innovations:

i. Product innovation is defined as the introduction of a new or significantly improved product or service in terms of its qualities or intended uses. Technical requirements, components and materials, embedded software, user friendliness, and other functional characteristics are examples of significant breakthroughs. To measure the complexity or uniqueness of an innovation in this context, traditional surveys have used three criteria: new products for the company, new products for the market, and new products for the global market.
ii. Process innovation is the implementation of a novel or considerably improved manufacturing or delivery technique. Creative techniques for producing goods or providing services; innovative logistics, delivery, or distribution methods for inputs, goods, or services; and innovative supporting activities for processes, such as maintenance systems or operations for purchasing, accounting, or computing, are all examples of significant changes in procedures, equipment, and/or software.
iii. Marketing innovation is the introduction of a new marketing approach that involves considerable changes in product design or packaging, product positioning, product promotion, or pricing. These are designed to increase the effectiveness and efficiency of marketing in order to gain a competitive advantage.
iv. Organizational innovation is the introduction of a new method for organizing the working environment of a company or enterprise. Structure innovations, such as the number of levels of hierarchy; function divisional structure (R&D, production, human resources, finance, and so on) or the borderline between line and support functions; and procedural innovations, such as changes to day-to-day activities, are all influenced by accountability and responsibilities. New procedures and processes are adopted inside a firm organization as a result of this innovation.

Manufacturing enterprises must transform raw resources into outputs, which needs technical touches across the industrial spectrum to generate new goods. Values are frequently formed through the transformation of basic materials into finished goods (Obunike & Udu, 2019). Furthermore, corporations utilise skills and expertise in the process of converting input into

product. Technological innovation involves firms having technical competencies in order to produce types that are relevant to client needs.

2.2. The Characteristics of Small and Medium Businesses and Performance Indicators

The term "Small and Medium Enterprises" has no common definition. Depending on their level of economic development, different countries and organizations define SME in different ways. Meanwhile, total worker count, total investment (assets), and sales turnover are the most widely utilized measures to describe SMEs. Small and medium-sized enterprises (SMEs) in Nigeria are companies with 11 to 100 employees and/or a total cost of less than 50 million naira, including land costs. Both public and private organisations in Nigeria have campaigned for various definitions of the three dimensions.

Table 2.1.
Institutional Definitions of SMEs

	Assets (N Million)			**No of Employees**		
Institution	**Micro**	**Small**	**Medium**	**Micro**	**Small**	**Medium**
Bank of Industry	<=5	>5<=100	>100<=500	<=10	>11<=50	>=51<200
SMEDAN	<=5	>5<=50	>50<=500	<10	10-49	50-199
FMTII		<=50	<=200	10	100	300
World Bank				<5	5-19	20-99
UNIDO				<5	5 -19	20-99

Author's compilation (2020)

The process of determining the efficiency and effectiveness of an action is known as performance measurement (Neely, Gregory & Platts, 1995). The transferring of the complicated reality of performance into ordered symbols that can be related and relayed under the same circumstances is known as performance measurement (Lebas, 1995). Performance measurement is believed to be more important than quantification and accounting in today's corporate management (Koufopoulos, Zoumbos & Argyropoulou, 2008). The benefits derived by the shareholders from the firm's shares can be regarded as the firm's value (Rouf, 2011). The financial statement reported by the company can be used to assess the company's success. As a result, a high-performing organization will encourage management to make excellent disclosures (Herly & Sisnuhadi, 2011).

There has been a plethora of methods proposed to quantify financial performance, including: Return on Assets (ROA), Return on Equity (ROE), Profit Margin (PM), Earnings Per Share (EPS), Price-Earnings Ratio (PE), Return on Sales (ROS), Expense to Assets (ETA), Cash to Assets (CTA), Sales to Assets (STS), Expenses to Sale (ETS), annual stock return (RET), Operating Cash Flow (OCF), Return on Capital Employed (ROCE), and many others. The majority of these proposed metrics have been used in governance research.

2.3. Theoretical Review

This study is based on two theories: Knowledge Spillover Theory and Firm Performance in the Context of New Endogenous Growth Theory, with the latter being the primary focus.

2.3.1. Knowledge spill-over Theory

The entrepreneurial idea of knowledge spill-over explains how entrepreneurs create possibilities by leveraging market-oriented but underutilized intellectual works created by others (Audretsch & Keilbach, 2007). This hypothesis proposes a key channel for knowledge/discovery spread and has a significant impact on our understanding of the

knowledge-driven economic growth nexus. Only a small amount of literature, however, identifies opportunities and acts on them through entrepreneurship in the context of specific expertise. The following two strands underpin the KSTE: (i) the existence of knowledge filters in knowledge-creating enterprises, and (ii) the existence of knowledge filters in knowledge-creating organizations.

In the context of an endogenous growth model, a knowledge filter is defined as an impediment that prevents old knowledge from being comprehensively translated into economic understanding (Braunerhjelm et al., 2010). When it comes to assessing knowledge, individuals who developed it have an advantage over users, and their approaches to commercializing knowledge are likely to be significantly different. Because innovators of new discoveries are unable to fully exploit the benefits of their discoveries, others exploit them through knowledge spillovers. Knowledge spill-overs are unintended gains gained by parties other than those who invested and participated in the discoveries (Agarwal et al., 20007). The KSTE is based on filters that make it difficult for inventors to fully realize their benefits, as well as knowledge spill-overs that enable the entity to commercialize the information.

2.3.2. The Performance of Firms in the New Endogenous Growth Theory

Endogenous growth theory is a development of earlier growth theories. The work of Harrod-Domar was extended by the addition of labor and technology to the growth model as the second and third factors of production, respectively, thanks to the works of Solow (1956) and Swan (1956). The notion of factor substitution between capital and technology underpins this model. This claims that as more of the factor is employed in conjunction with other variables, the MPs of the factor are not fixed. Another assumption stated by Solow is that each item, labor and capital, has a diminishing return when employed separately, but constant returns when used together. As a result, he credits long-term growth dynamics to a residual element that leads to technological advancement. Essentially, the theory states that economic growth is caused by the accumulation of physical capital and the increase of the labor force, as well as technical innovation, which raises capital and labor productivities. In general, this model states that an economy's output is a function of labor (L) and capital (K) under constant returns, with production doubling resulting in an equivalent change in output. As a result, output (Y) is a function of the productivity efficiency (A)/technical development with which capital and labor are united.

According to Barro and Sala-i-Martin (2004), for an economy to avoid recession in the long run, technical advancement in the form of new idea generation must be on the proper track. As a result, rather than treating technological advancement as an exogenous element, it is critical to explain its evolution within the model.

2.4. Empirical Literature

The causal link between innovation capacities and firm success has been studied in Nigeria and other developing countries (Oura et al., 2016; O'Cass & Sok, 2014). For example, Namusonge et al. (2016) investigate the impact of innovation on the performance of Nigerian Stock Exchange-listed companies. On a sample of 60 companies listed on the Nigerian Stock Exchange, descriptive statistics and panel regression analysis were utilized. Using a panel model, they discovered a correlation between entrepreneurial innovation and the performance of companies listed on the Nigerian Stock Exchange. On the one hand, they discovered a negative association between innovation and returns on assets (RoA), while on the other hand, they discovered a negative relationship between innovation and returns on equity (RoE). This shows that while there is some level of innovation among enterprises in Nigeria, its impact on RoI and RoE has yet to be felt. This means that significant innovation in Nigeria is still in its

infancy. Similarly, Egbetokun et al. (2012) looked studied the Nigerian Cable and Wire Manufacturing Industry from 2003 to 2007. According to the report, SMEs in emerging countries are innovative, and industry organization and increased investments in learning and capacity building will improve performance. Abereijo et al., (2007) looked into the ability and talents of manufacturing SMEs to innovate. They used a purposive sample technique to conduct a survey of SMEs in Ibadan and Lagos. A questionnaire was utilized to collect the primary data, which was then analyzed using descriptive and inferential statistics. They determined that no SMEs had produced significant achievements that were distinctive and science-based. If SMEs in Nigeria are to attain true innovation, they advocate for improved educational backgrounds in science and technology courses beginning at the elementary level, as well as increased and ongoing investments in R&D operations.

According to Hajar (2015), innovation has a positive impact on firm performance in Indonesia. Terziovski also supported up this claim. Kuswantoro (2012) contends that innovation channels are positively connected with firm success, while (2010) shows that culture and strategy are major determinants of business performance. In China, Cielik et al. (2013) utilized a probit model with firm-level datasets. They discovered that the possibility of exporting is directly proportional to the degree of product and process innovation. In 2003, process innovation was more important for export performance than product innovation, while in 2012, product innovation was more important. Finally, innovation capability is linked to new product performance (Zhang & Hartley, 2018), brand performance (Odoom & Mensah, 2018), and overall firm performance (Dadfar et al., 2013; Keskin, 2006). The preconditions for this interaction, according to Dadfar et al. (2013), include an effective and efficient organizational environment.

3. Research Methodology

his section of the paper is divided into three sub-sectionss: the first describes the data source and variable descriptions, the second addresses the theoretical framework, and the third discusses the study's estimating methodologies.

3.1. Data Sources and Description

The data used in the study came entirely from the World Bank's Enterprise Survey Panel Data (WBES). The World Bank Economic Survey (WBES) is a panel data collection with data from 2007 to 2009, as well as 2014 and 2015. (WBES, 2015). Firm characteristics, access to finance, annual sales, workforce mix, innovation and technology, and performance measurements are all covered in a typical Enterprise Survey. Data on the performance of SMEs, various forms of innovation among selected firms, and key company characteristics for Nigerian SMEs in the WBES were used in the study.

Table 3.1.
Description of variables

Dependent Variables		**Variable description**
SMEs' Performance	OutputLab	Measured with firms' output to total full-time employee in 2013.
		Independent/Control Variables
Innovation Index	Innov_Index ($\prod$)	The index is a simple unweighted average of the lack (score of 0) or presence (score of 1) of each of the identified elements affecting firms' innovation, with a maximum value of 4 for any firm's presence of the 4 types of innovation
Research and Development Expenditure	R & D Expend	Measured as a dummy variable taking a value (Yes=1; No=0) to ascertain if the firm had allocated some funds to R & D in the last 3 years (RD)
Firm size	FS	The number of employees (FS)
Top Manager's experience	MExp	The number of years of top managers in the industry/business operation (TME)
Foreign Technology	FT	Adoption of foreign technology in the firm's operation (FT)
Managerial Education Level.	MEduc	Measured by the educational level of top managers in the firm (ME)
Employ Training	StaffTra	Measured with information on whether employees had access to formal training in the last 3 years.

Source: Author's Compilation

3.2. Analytical Framework

The empirical model was structured using a C–D production function (Hsieh & Klenow, 2010; Kalaitzi, 2018). A production function expresses the technical relationships between physical quantities of inputs and outputs. The C-D function is chosen because it provides for a wide range of changes in the investigation of a wide range of themes in both microeconomics and macroeconomics. This function can represent human capital, inventions, physical capital stock, and technology as outputs and inputs. The total of the elasticities Intriligator is used to calculate the returns to scale of the businesses in question (1980).

Our empirical model, on the other hand, can start with a simple C D production function and expresses as:

$$Y_{it} = A_{it} K_{it}^{\alpha} L_{it}^{\beta}$$
$$0 < \alpha + \beta \leq 1 \quad (1)$$

Where = firm performance, K represents capital stock, L represents human capital, and I and t represent cross sectional units and time, respectively. In the meantime, is the physical capital stock share, and is human capital. Finally, A is the productivity criterion. As a result, we came up with the equation (2):

$$A_{it} = f(T^{\theta} I^{\lambda} N^{\phi}) = T_{it}^{\theta} I_{it}^{\lambda} N_{it}^{\phi} \quad (2)$$

T stands for technology, I for innovation, and N stands for knowledge. When we substitute eq. (2) into (1), we get:

$$Y_{it} = K_{it}^{\alpha} L_{it}^{\beta} (T_{it}^{\theta} I_{it}^{\lambda} N_{it}^{\phi}) \quad (3)$$

Where α, β, θ, λ and ϕ denote the elasticity of production function with respect to K; L; T; I; and N. Consequently, equation (3) is transmuted into linear form and thus, taken the natural logarithm of both sides of the equation:

$$\ln Y_{it} = c + \alpha \ln K_{it} + \beta \ln L_{it} + \theta \ln T_{it} + \lambda \ln I_{it} + \phi \ln N_{it} + \varepsilon_{it} \quad (4)$$

Where c is the intercept, α, β, θ, λ and ϕ are elasticity coefficients, while ε is the error term. Our empirical static panel model will therefore be depicted by equation (5) as specified by Olubusoye *et al.*, (2016):

$$\ln Y_{it} = c + \alpha \ln K_{it} + \beta \ln L_{it} + \theta \ln T_{it} + \lambda \ln I_{it} + \phi \ln N_{it} + u_i + u_t + v_t \quad (5)$$

Where c denotes the intercept, lnY is the dependent variable, lnI denotes the model's key independent variables, and lnK, lnL, lnT, & lnN denote the determinants of SMEs' performance or control variables. The error term has been split into three components using equation (4), as illustrated in equation (5).

3.3. Estimation Technique and Empirical Model

We employed appropriate descriptive statistics, in a bid to realize our objective one, to identify all kinds of innovations among the selected SMEs while objective two was addressed using a pooled regression technique to the panel data in the World Bank Enterprise Survey (WBES, 2015). The dependent variable is innovation outcomes measured by innovation index ($\prod$), computed using firms' response on presence or absence of (product, process, organization and marketing) innovation. The index is a simple unweighted average of the lack (score of 0) or presence (score of 1) of each of the identified elements affecting firms' innovation, with a maximum value of 4 for any firm's presence of the 4 types of innovation (Abereijo, 2007). As a result, the empirical model for determining the relationships between innovation outcomes and its determinants looks like this:

$$\prod_{it} = \alpha_0 + \alpha_1 RD_{it} + \beta_1 FS_{it} + \beta_2 MExp_{it} + \beta_3 StaffTra_{it} + \beta_4 FT_{it} + \varepsilon_{it} \quad (6)$$

Where $\prod_{it}$ a simple unweighted index is the dependent variable used to capture innovation outcomes, RD_{it} is expenditure on R & D in the last 3 years, FS_{it} is company size (measured by the number of full-time employees), $MExp_{it}$ is the top management experience, $StaffTra_{it}$ is the potential for employees to generate new ideas through training provided by their employers, and FT measures firms' access to foreign technologies are the independent variables, and the error term is ε_{it}. The error term is assumed to be ε_{it} idd with constant mean and variance.

Meanwhile, to achieve objective three of the study, we adopted static panel data models, according to Olubusoye *et al.*, (2016), to examine the relations between innovation capabilities and firms' performance. The dilemma of which model is superior between fixed effects and random effects is the most recurrent challenge in panel data analysis. We used the Hausman test to decide between fixed and random effects (Green, 2008). We therefore, modelled the ratio of firms' output in 2013 to its full-time employee in 2013 as dependent variable. Thus, the empirical model that observes the relations between innovation and ratio of output to full employees in 2013 (S) is structured as follows;

$$OutputLab_{it} = \alpha_0 + \alpha_1 \prod_{it} + \beta_1 FS_{it} + \beta_2 RD + \varepsilon_{it} \quad (7)$$

Where; $\prod_{it}$ a simple unweighted innovation index used to capture firms' innovation outcomes; FS_{it} is firm's size (captured by size of full-time employees), and ε_{it} is error term. We assume

here that the ε_{it} follows a one-way error component model.

4. Discussions and Results

4.1. Identifying the many sorts of innovation activities that SMEs in Nigeria engage in

The various types of innovation activities carried out by SMEs in Nigeria are represented in Figure 1 Product, process, organizational, and marketing innovation are the four categories of innovations discovered among SMEs in Nigeria. It is evident that 900 (52.05 percent) of the 1729 businesses had launched a new or significantly enhanced product in the previous three years, while the remaining 829 (47.95 percent) reported to have not carried out any form of product innovation. As regards a new or significantly enhanced process in the previous three years, 908 (52.54%) of the enterprises responded affirmatively, while 821 (47.48%) have not. Similarly, 981 (56.74%) of the firms surveyed said they had engaged in marketing innovation in the previous three years, whereas 748 (43.26%) were found to have conducted new or significantly better marketing strategies in the last three years. In the case of new or significantly enhanced organizational organization, however, just 724 (41.87%) of the enterprises responded affirmatively, while 1005 (58.13%) have not conducted any sort of organizational innovation in the previous three years.

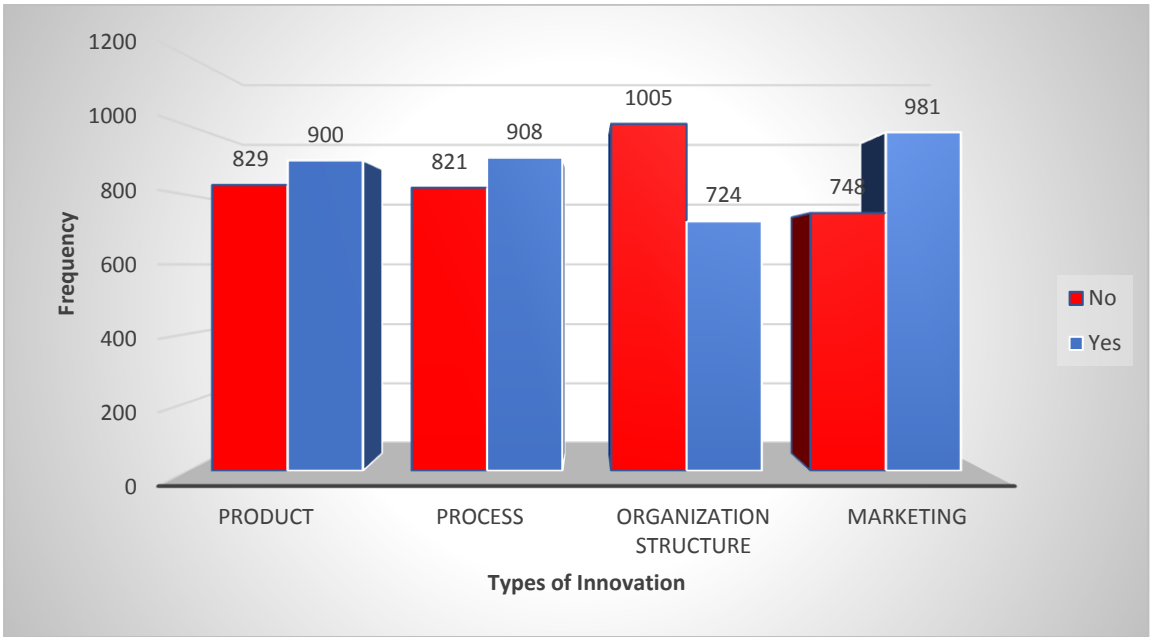

Figure 1: Innovation activities among SMEs in Nigeria
Source: Author's computation, 2020

4.2. Descriptive Statistics

Table 4.1 shows the descriptive features of the series under consideration in this study. Given the descriptive qualities of the variables, it is clear that the vast majority of them are categorical in nature; nevertheless, only one of them is statistically significant at the 1% significance level, indicating that the series has a high degree of normal distribution.

Table 4.1.
Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
INNOV INDEX	1588	.521	.395	0	1
EMPLOY TRAIN	4725	.251	.434	0	1
FIRMSIZE	6950	2.12	.59	1	3
MAN EXPERIENCE	1588	.462	.499	0	1
R & D EXPEND	1588	.159	.366	0	1
PRODUCT	1588	.533	.499	0	1
PROC	1588	.538	.499	0	1
ORGSTRUC	1588	.43	.495	0	1
MARKT	1588	.582	.493	0	1
FOREIGN TECH	2981	.109	.311	0	1
MAN EDUC	1588	.482	.5	0	1
OUTPUTLAB	600	31.055	17.996	0	100

Source: Author's Computation

4.3. Determinants of Firms' Innovation Outcomes

The result of a pooled regression estimation technique of our data is presented in Table 4.2. The result depicts the observed relation between innovation outcomes proxied by a simple unweighted average known as innovation index and its determinants. Our findings reveal a nonnegative and significant relationship (P<0.1) between innovation outcomes of firms and the STAFFRA. It shows that an hour increase in STAFFRA leads to 0.13 increase in firms' innovation. In other words, this asserts that as SMEs' training of its employees increases, their ability to use initiative and innovate also increases. This implies that the amount of opportunity and time given to employees by the firms' management to develop new ideas and initiatives, go a long way in influencing firms' innovation capabilities positively. This result is corroborating the earlier findings of (Abereijo, 2007 and Romijn & Albaladejo, 2004). Similarly, it is discovered that a nonnegative and significant relationship (P<0.1) exists between innovation outcomes of firms and R & D Expenditure. It shows that a given increase in R & D spending leads to 0.24 increase in firms' innovation. This implies that as SMEs' R & D spending increases, their ability to use initiative and innovate also increases. This has been earlier confirmed by a number of other researchers that include (Abereijo, 2007; Cieslik and Ting Qu, 2018). Meanwhile, empirical evidence on the relationship between organizations' innovation outcomes and R & D spending is mixed. However, the firm size is found to be positive but statistically insignificant at (P>0.1), indicating that larger organizations have greater ability to innovate. To put it differently, the larger a company is, the greater its ability to innovate. This is consistent with Barassa et al., (2016) findings from a survey of enterprises in Ghana, Tanzania, and Uganda. Similarly, the relation between innovation outcomes and access to foreign technology exhibits a positive but insignificant relation at (P>0.1). This illustrates that a unit increase in FT leads to a 0.02 unit increase in a firm's innovation outcomes.

Table 4.2.
Pooled Regression Results

INOV_INDEX	Coef.	Std. Err.	t-value	p-value	[95% Conf	Interval]	Sig
FIRMSIZE	.024	.031	0.79	.429	-.036	.084	
STAFFTRA	.129	.035	3.65	0.000	.06	.199	***
RD_EXPEND	.235	.041	5.71	0.003	.154	.316	***
FOREIGN_TECH	.024	.054	0.44	.658	-.083	.131	
MEXP	.046	.032	1.44	.15	-.017	.109	
CONSTANT	.414	.069	6.04	0.0051	.279	.549	***

Mean dependent var	0.565	SD dependent var	0.387
R-squared	0.107	Number of obs	600
F-test	14.222	Prob > F	0.000
Akaike crit. (AIC)	507.743	Bayesian crit. (BIC)	534.125

**** p<.01, ** p<.05, * p<.1*
Source: Data Analysis, 2020

4.4. Relationship between Firm Performance and Innovation Outcomes

The Hausman test statistic, developed by Hausman in 1978, is used to choose between two estimators of Fixed Effects (FE) and Random Effects (RE). As a result, the hypothesis that is being tested is:

H_0 : No difference between FE and RE

Vs H_1 : FE and RE coefficient estimates are different

The Hausman estimator was found to be statistically significant at (p<5% and p<1%) and was rejected, thus we computed and analyzed the fixed effects estimator. As a result, the FE estimates were used in the investigation, as the fixed effect was found to be more efficient. The results of our fixed effects estimator are shown in Table 4.3.

As previously indicated, an empirical model was estimated to proxy firms' performance. The dependent variable in the model is the ratio of a firm's output to labour (OutputLab). The result depicts the observed relation between firms' performance and innovation outcomes proxied by a simple unweighted average known as innovation index. The results of the model reveal a nonnegative but insignificant association (P>0.1) between a firm's ability to innovate and its labor productivity. It reveals that a unit improvement in a firm's innovation index results in a 0.93 unit increase in output per worker. Putting this differently, as a firm's ability to innovate improves, so does its labor productivity. This means that as a company's ability to innovate grows, so does its performance. Accordingly, analysing other variables in the models, looking at R & D spending is found to be positive ad statistically significant (p<1%). As the firm's expenditure on R & D increases, there is increase in firms' performance.

Similarly, the regression between access to foreign technology and firm's performance shows a positive but statistically insignificant result. This implies that the higher the access to foreign sophisticated technologies, the higher the firm's performance.

We made inferences regarding observed values using goodness-of-fit tests, which are statistical approaches that determine the relationship between actual and anticipated values in a model. These tests make it easier to forecast future trends and patterns when they are employed in decision-making. Thus, using the R-square values for the models' goodness of fits, we found a value of 2.4%. This implies that the variables in the models explain only about 2.4 percent of the variation in firms' performance. This may appear disappointing statistics, however in non-time series/panel data with a vast range of observations, such low R-squared values are to be

expected (Gujarati, 2004). Thus, models are adequate enough to explain variations in firm performance in Nigeria. Meanwhile, using F-statistics in the model, at 1 percent, clearly the F-statistic values are found to be statistically significant which corroborates the R-squared statistic. This implies that the variables in the models are jointly significant and the result is not by accident. As a result, there is no reason no to reject the null hypothesis—firm performance is unrelated to the regressors in the models. In short, we accept that the empirical model is a good fit to measure firms' performance. Therefore, the F test, which measures the overall significance of the estimated regression, is also a validation of R-squared significance (Gujarati, 2004).

Table 4.3.
Fixed Effects Regression Results

OutputLab	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
INOV_INDEX	.931	1.961	0.47	.635	-4.781	2.92	
RD_Expend	7.013	1.994	3.52	0	-10.93	-3.096	***
Foreign_Tech	.724	2.558	0.28	.777	-4.299	5.747	
Constant	32.755	1.298	25.24	0	30.206	35.303	***

Mean dependent var	31.055	SD dependent var	17.996
R-squared	0.024	Number of obs	600
F-test	4.877	Prob > F	0.002
Akaike crit. (AIC)	5163.364	Bayesian crit. (BIC)	5180.952

**** p<.01, ** p<.05, * p<.1*

Source: Data Analysis, 2020

5. Conclusion and Policy Recommendations

In Nigeria, we looked at the link between innovations and SMEs' performance. Innovation, in all of its manifestations, is seen as a critical aspect that can significantly improve the performance of SMEs. We also looked at the role of business characteristics including size, managerial experience, foreign technology, and other factors in predicting firm innovation outcomes. In the period under review, 52.05 percent of the 1729 firms surveyed had introduced a new or significantly improved product, and 52.54 percent had installed a new or significantly improved method, according to our findings. While 56.74 percent of firms have carried out marketing innovation. However, less than half of the companies (41.87 percent) had implemented organizational innovation in the recent times. Finally, the findings demonstrated a spectrum of innovations over time, ranging from one form to the next.

A pooled regression estimation technique was used to investigate factors that influence innovation. Our findings revealed a nonnegative and significant ($p<0.1$) link between firm innovation outcomes and the STAFFRA. It demonstrates that a one-hour increase in STAFFRA results in a 0.13 rise in firm innovation. We also identified a nonnegative and significant ($p<0.1$) association between firm innovation performance and R&D spending. Finally, there is a positive but insignificant relationship between innovation outcomes and access to foreign technology.

In the same vein, we used a fixed effects estimator since the Hausman test statistic was found to be statistically significant at (5% and 10%) and thus, fixed effect estimator (FE) was rejected. The findings revealed a nonnegative but statistically insignificant ($P>0.1\%$) association between the innovation index and company labor productivity. R&D spending, on the other hand, is found to be favorable and statistically significant ($p<1\%$). The performance of a

company improves as its R&D budget grows. Similarly, the correlation between foreign technology access and company performance is positive but statistically negligible. This implies that the greater the access to advanced foreign technologies, the better the firm's performance

Following the conclusion, a few policy implications are suggested in order to establish a strong and thriving private sector that can take advantage of economies of scale that exist in both local and international commercial settings:

i. To a large extent, the technology-push mechanism underpins the innovation-labour productivity relationship. As a result, regulations targeted at encouraging all forms of innovations through financial incentives may be critical for firm performance in Nigeria. Such policies may be beneficial in supporting the development of high-novelty innovations and are likely to boost firm's performance that enhances labour productivity.

ii. For a long time, foreign direct investment (FDI) has been recognized as a primary avenue for the transfer of advanced foreign technology to developing countries as a bundle of technological and managerial expertise as well as financial capital. Thus, it is suggested that government should enact and implement policies that promote aggressive inflow of FDI to Nigeria in a bid improve firm's performance via innovation.

iii. Multinational Entities (MNEs) are widely considered as the world's primary source of R&D. They are also likely to provide training to their staff, albeit the amount varies depending on the situation or business. Internal incentives have also been discovered in MNEs to transfer technology across borders and to share technology between parent businesses and subsidiaries. To aid firm's performance through innovation, increase R & D expenditure through private and public sectors should be encouraged and aggressively pursued.

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