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RESEARCH & DEVELOPMENT AND COMPETITIVENESS OF SELECTED MANUFACTURING SMES IN LAGOS STATE, NIGERIA

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ABSTRACT

Small and Medium Enterprises (SMEs) are generally considered as the bedrock of the growth of any economy. Despite their importance, it is observed that manufacturing small and medium enterprises struggle with growth. Studies from different scholars have shown that the connection between research and development and competiveness of small and medium scale enterprises has not been adequately established. Manufacturing SMEs in Nigeria have been performing below expectation as a result of inadequate research and development. Therefore, this study examined effect of research and development on competiveness of selected manufacturing SMEs in Lagos State, Nigeria. The study adopted a survey research design. The population of the study was 2,099 owner/managers of selected manufacturing SMEs. Sample size of 437 owner/managers was determined using Slovin's formula. A structured questionnaire was adapted and validated to collect data from the respondents. Cronbach's Alpha reliability coefficients for research and development and competiveness were 0.85 and 0.817 respectively. The response rate was 92%. Data collected were analyzed using descriptive and inferential statistics. The hypothesis was tested using the simple regression analysis. The findings revealed that research and development have significant effect on the competitiveness ($\beta = 0.342$, $t = 7.838$, $p<0.05$. The study concluded that research and development affect competitiveness of manufacturing SMEs in Nigeria. The study recommended that through the support of the government, small and medium scale enterprise SMEs in particular need to propagate and advocate a culture of research and development using research findings to create superior products and or services to gain competitive advantage.

Keywords: *Research & Development, Competitiveness, Manufacturing SMEs*

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INTRODUCTION

The concept of SMEs growth has become a global issue considering its undeniable importance in every sector of business. Scholars such as (Lekhanya, 2016; Mundia & Moronge, 2017; Rafiki, 2019; Yeboah, 2015) have attributed SMEs growth as a key determinant for economic growth. However, despite its obvious and announced importance, it is severely faced with challenges that limit its growth and inhibits the growth of the economy (Ogunyomi & Brunning, 2018). Research and Development roles can be studied from different perspectives to further aid its understanding and relevant application. Research and Development (R&D) is linked to successful business start- ups, growth and survival leading to economic development (Akoum, 2016; Amaghouss & Ibok, 2013; Borzkurt, 2015; Ildirar, Ozinen & Iscan, 2016; Paivat, Maximiano & Coutinho, 2020). For instance: In the area of economic growth, Amaghouss & Ibok, (2013), Borzkurt, (2015) and Ildirar *et al.* (2016) found a significantly positive effect of entrepreneurial Research and development activities on the growth of the economy. These studies reveal that Research and Development expenditures form a source of economic comparison among countries in the reflection of added economic value. The volume of sales enjoyed by organisations increases on implementation of Research and Development findings in the improvement of current products and commercialization of same (Paiva *et al.,* 2020).

The challenge of competitiveness in the Nigerian manufacturing sector in an environment of strong competition, increasing globalization struggle, higher market and technological dynamism has led managers and researchers to give increasing importance to research and development due to its key impact on a firm's competitiveness. Competitiveness is the demonstrated ability to design, produce and commercialize an offer that fully, uniquely and continuously fulfils the needs of targeted market segments, while drawing resources from the business environment, and achieving a sustainable return on the resources employed (International Trade Center, 2019 cited in Giray, 2020). Despite concerted efforts from various stakeholders to increase SMEs' competitiveness, they continue to fall short of the standards that are expected of them. The decline in expected competitiveness levels of these SMEs has been attributed to a lack of research, creativity, among other factors.

Different studies on research and development R&D and business growth have been carried out in different areas and organisations outside Nigeria (Hermans, Sartas, Van Schagen, Van Asten & Schut, 2017; Schut, Klerkx, Sartas, Lamers, Campbell, Ogbonna & Leeuwis, 2016; Thornton, Schuetz, Förch, Cramer, Abreu, Vermeulen & Campbell, 2017). However, it is observed that studies on how research and development affect the competitiveness of manufacturing SMEs especially in Nigeria has not been clearly stated due to divergent findings from different scholars (Ščepanović, Labib, Buljan, Tijdink & Marušić, 2021; Radhakrishnan & Francis, 2017). The processes adopted by small businesses in Nigeria are not effective, as there are observed deficiencies (Nwuche, & Anyanwu, 2017). The challenge of lack of thorough research leading to developing new and needed products and services for target market affects growth of these businesses. (Fazio, Guzman & Stern, 2019). These issues and challenges in research and development of these manufacturing SMEs often lead to poor efficiency and ineffectiveness.

The main objective of this study therefore was to examine the effect of research and development on competiveness of small and medium enterprises SMEs Growth in selected manufacturing sector in Lagos State, Nigeria.

LITERATURE REVIEW

Resource- Based View Theory (Wernerfelt, 1984)

This study was underpinned by the resource-based view (RBV) of the firm. The resource-based view (RBV) is a managerial framework used to determine

the strategic resources a firm can exploit to achieve sustainable competitive advantage. Barney's 1991 article "Firm Resources and Sustained Competitive Advantage" is widely cited as a pivotal work in the emergence of the resource-based view. The resource- based view theory presents that resource mobilization and management serves as a means to attain a competitive advantage. It further explains that the channels of mobilising the resources as through partnerships and knowledge management. This perspective considers a firm as being a collection of resources (Wernerfelt, 1984).

Resources refer to all components made available by an organization to performers of innovative works tasks (Amabile, 1997). This theory focuses attention on an organization's internal resources as a means of organizing processes and obtaining a competitive advantage. Barney stated that for resources to hold potential as sources of sustainable competitive advantage, they should be valuable, rare, imperfectly imitable and not substitutable (generally known as VRIN criteria). The theory, has some notable proponents. Some of who have explained these organisational resources to include the assets, capabilities, organizational processes, firm attributes, information, knowledge that are controlled by such an organisation such that the firm can both conceive of as well as implement strategies that improves the firm's efficiency and effectiveness (Meyskens, Robb, Post, Stamp, Carsrud, Reynolds, 2010 citing Barney, 1991; Peteraf, 1993). These supporters of the theory held the belief that each firm possesses resources that are both unique (not perfectly susceptible to imitation or easy substitution. The effective utilization of the valuable resources would imply sustainability through attained competitive advantage.

Despite the advantages offered by this theory, a number of criticisms have faced it also. Such include some school of thought arguing that it is tautological (Collins, 1994). Also, it is said that different resource configurations can generate the same value for firms and would eventually not yield any form of competitive advantage. An assumption that a firm can be in a highly competitive market as long as it can exploit advantageous resources does not always hold true. This is because it ignores external factors concerning the industry as a whole. In addition, it is perhaps difficult to find a resource that fits all of Barney's VRIN criteria. The failure to consider factors surrounding resources is another criticism. That is because the assumption is that they simply exist rather than a critical investigation of how key capabilities are acquired or developed (Stinchcombe, 1965).

Resource-based theory is important because it considers the resources that can give an enterprise a competitive advantage while ignoring activities that do not generate profit or are crowded by the current market. It also allows for a better understanding of the link between resources, skills, competitive advantage, and profitability, especially how such competitive advantage can be sustained over time.

Research and Development

Kainulanen (2014) defined research and development (R&D) to mean the systematic activities in order to increase knowledge and use of this knowledge when developing new products, processes, or services. It also encompasses innovation. Research and development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge including knowledge of humankind, culture and society, and to devise new applications of available knowledge (Frascati, 2015). It is the conduct of systematic activities that are involved in the creation of new ideas; improvement of existing ideas and knowledge into new or improved products, processes and services (Oyedoyin, Oyebisi, Oluwale & Jegede 2015). Research and development is defined as work directed towards the innovation, introduction and improvement of products and processes (Lomas, 2017).

As regards the characteristics of research and development, R&D is generally thought to consist of three main activities: basic research, applied

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research, and development (Hall, 2006). Research and Development is always aimed at new findings. Another of its feature is that it could be directed at either specific or general objectives. Also, Research and development activity is largely uncertain about expected outcomes whether in terms of time or resources needed in order to achieve the objectives it set out to achieve. The activity is always planned for. Research and development aims ultimately to produce results that can freely be transferred or that can be traded in the market (Frascati, 2015). Hall (2006) stated that Research and Development hinges on three characteristics - indivisibility, in appropriability, and uncertainty. Concerning advantages, Research and development will enhance innovation and creativity given that proper conduct of R&D activities will expose the SME to innovative ways of creatively providing solution to identified problems (Zhang, Hassan & Iqbal, 2020). Just by doing basic research, any new business owner can figure out the trends and dynamics of their intended market; the understanding of the needs of your targeted audience helps cut back on wastages of resources and finances. With a proper Research and development, the entrepreneur would be able to figure out the benefits of their products and services on the society based on the findings from the report and their experiences (Alam & Murad, 2020). This knowledge fuels the quest for product assimilation the right way in order to achieve maximum results.

In starting up a new business especially if the business is entering a new and unfamiliar market territory, then research is the crucial factor that can save the business from not only the financial setbacks but from the creative pitfalls that is associated with new markets as well. Research and Development helps an entrepreneur isolate where to invest money and efforts in the midst of the abundant opportunities that are bound to be fruitful for the start-up (Sannino, Lucchese, Zampone & Lombardi, 2020). On the down side, Research and development activities are quite expensive. Also, most often than not business owners have a ready mind set of what they intend to do and how and as such rarely implement research findings especially if they consider such findings not in tandem with their mindset.

In view of the above, the researcher defines Research and Development (R&D) as the innovative and systematic action undertaken to create new knowledge or improve on existing knowledge requisite for the development of new products, processes or services or to develop new application for existing knowledge.

Competitiveness

Porter (1993) considers competitiveness as a function of dynamic progressiveness, innovation, and an ability to change and improve. The European commission (2012) defines firm competitiveness as an ability of firms to sustain and gain in market share through their cost and pricing policy, innovative use of production factors and novelties in product characteristics. Competitiveness refers to a firm/s ability to differentiate itself in terms of cost and quality of products and services (Irungu & Arasa, 2017). It refers to the ability of a firm to develop and uphold such opportunities that provide higher performance and sustainable profitability (Ahmedova, 2015). A SMEs ability to through continuous renewal and improvement create and maintain sustainable competitive advantages, leading to higher economic performance over long periods (Poufinas, George & Papadimitriou, 2018).

There are two main classifications of the sources of a firm’s competitiveness: Internal sources, that is, sources that arise from a firm, and external sources which are industry and country-based factors. The internal source include; Internal intangible firm-related sources which mostly include organisational resources, transformational and output-based capabilities and the knowledge of the firm as a whole; employee-related sources mostly include a firm's strategies, human resources, managerial capabilities, and the knowledge of individuals (Maseko, 2017).

Competitiveness arises when an organisation is capable of producing a similar product with less cost than the competitors (cost advantage), or is capable of delivering different and better products/ services than the competitors (differentiation advantage). Competitiveness occurs when there is a cognitive process in an organisation which is shown from the behaviour or belief of members of an organisation (Maseko, 2017). In order to manage the cognitive processes to achieve a competitive advantage, the entire members of the organisation have to understand what they are doing in relation to the corporate culture (Maseko, 2017). Hence, the researcher defined competitiveness as the ability of a firm to strive competitively in a dynamic business environment. In contrast, Ketels (2016); Maseko (2017) see competitiveness as companies' ability to compete successfully on global markets. However, competitiveness is defined by the researcher in the context of this work as the capability of a company to compete favourably above its competitors in every area of the business.

Competitiveness of a firm in most cases will positively relate to the return on investment of the firm (Sujud & Hashem, 2017; Ungerman, Dedkova & Gurinova, 2018). The SMEs that possess stronger market competitiveness in an industry are often more profitable than those companies with weak market competitiveness due to economies of scale. The competitiveness of the company with pioneer product on the average is stronger than the market competitiveness of subsequent entrants.

The advantage of utilizing competitiveness as a measure of business outcomes include: its ability to reveal the quality of management of the company, as good managers often increase the competitiveness of their organisation. Competitiveness supplemented by changes in sales revenue, helps managers evaluate both primary and selective demand in their markets (Etale, Bingilar & Ifurueze, 2016). That is, it enables them to judge not only total market growth or decline but also trends in customers' selections among competitors. Generally, sales growth resulting from primary demand (total market growth) is less costly and more profitable than that achieved by capturing share from competitors (Dragnic, 2014). Nevertheless, the market competitiveness strong relationship to profitability often leads to strategic challenge when top management attempt to establish market competitiveness objectives / goals.

Research and Development support and Competitiveness

In the area of small businesses or SMEs, the findings revealed that support to small businesses in terms of Research and Development assisted in the acquisition of new knowledge and information necessary for innovation in their line of business (Gretsch, Salzmann & Kock, 2019). However, some scholars in their studies concluded that Research & Development projects are not only labour intensive but highly capital intensive requiring other resources as well; and as such SMEs may find engaging in such beyond their reach (Gretsch *et al.,* 2019; Seo & Cho, 2020; Soderbloma, Samuelssona, Wiklunda & Sandbergc, 2015).

The role Research and development (R & D) plays in every facet of life and in this case, the growth of SMEs is undeniably a great one. In expanding knowledge on the effect of research and development and competitiveness, Bornmann (2013), found a positive relationship between R&D activities and growth of businesses in the area of waste management & reduction in pollution and uptake of recycling techniques, promotion of safety, improved health management methods and the likes. This finding was corroborated by Sekliuckienea & Kisielius (2016) who stated a lack of research and development as a key deterrent to the development of entrepreneurship objectives and initiatives. A positive relationship was found between Research and Development (R&D) and creating knowledge that makes business more competitive (Ebrahim, Shamsuddin & Tahathe, 2010).

On their part, Kruszelnicki, Gołuński, Ciochoń, Noya, Pelayo & Z˙yra (2020) found that it is important to increase R&D support by creating the optimal

conditions for firms to access the right knowledge on their own, in order for them to adequately exploit requisite existing knowledge bases and also explore new ideas leading to their innovativeness and growth. This corroborates the findings of Schlaile, Zeman & Mueller, (2018) and Vermeulen & Pyka, (2018). However, the impact that R&D support has on firm growth is more visible through multinational companies' competitiveness as they possess the capability to access this support than SMEs (Ebrahim *et al.,* 2010). Other authors have also pointed out that for R&D support to affect the growth of firms, it would need to be targeted adequately; emphasizing that R&D, if targeted at correct groups, can indeed have a positive impact on the operations, performance and growth of such firms when its details are designed to suit particular groups by setting out specifics for each group (Petelski, Milesi, & Verre, 2020).

From the foregoing, this study proposed:

H_0: Research and development has no significant effect on the competitiveness of selected manufacturing SMEs in Lagos State, Nigeria.

Research Conceptual Model

Figure 1: *Conceptual Model for research & development and competiveness*
Source*: Researcher's Conceptualization (2021)*

METHODOLOGY

The population of this study consisted of the 2,099 manufacturing SMEs in Lagos State. These 2,099 manufacturing SMEs were spread across Lagos State and they represented 25% of the entire SMEs in Lagos State, Nigeria (SMEDAN/NBS, 2018). The target population was manufacturing SMEs. This study only considered this category of SMEs because they possess the key attributes which are operationalized by the research variables and for which measurements are designed in the constructs of the questionnaire.

In order to determine the sample size for the study, Slovin (1992) formula was used. The reason for adopting this formula was that it provides accurate result of the necessary sample size that will be adequate for the research study especially wherever the population for the study is a finite one.

Applying the slovin formula where:

n = sample size
Confidence level = 95%
N = Finite population size which is 388 that is, total number of personnel relevant to the study within the population.
e = Maximum acceptable error margin which is 5%
The figure of 437 samples was arrived at using Slovin's formula as follows:

$$n = \frac{N}{1 + (N\,x\,e^2)}$$

Where:
n = sample size
N = Population size (i.e. total number of study - relevant staff in the Entrepreneurial institutions/agencies)
e = Desired error margin, expressed as a decimal: (i.e 0.05 for 5%)
Thus:
N = 2099
e = (0.05^2) = 0.0025
Therefore:

$$\frac{2099}{1+ (2099*0.0025)} = \frac{2099}{1+5.2475} = \frac{2099}{6.2475}$$

= 335.97439

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Allowing 30% for non-response: (335.97439* 1.3) = 437

Primary data was employed for data generation. A structured questionnaire was adapted and validated to collect data from the respondents. Each variable was examined with questionnaire items adapted from existing questionnaire models that have been tested and confirmed previously in other research works. The response structure of the questionnaire were as follows: VH = Very High, H = High, MH = Moderately High, ML = Moderately Low, L = Low, VL = Very Low. The table below showed the sources of the research instrument. Cronbach's Alpha reliability coefficients for the constructs ranged from 0.7 to 0.91. The response rate was 92%. Data collected were analyzed using descriptive and inferential statistics. The hypothesis was tested using the simple regression analysis.

Table 1: Reliability Result

S/N	Variables	No. of Items	Cronbach's Alpha	Composite reliability
1	Research and Development	5	0.85	0.874
2	Competitiveness	5	0.817	0.814

Source: Pretest Data (2021)

DATA ANALYSIS AND RESULTS

H_0: Research and development has no significant effect on the competitiveness of selected manufacturing SMEs in Lagos State, Nigeria.

Table 2: Summary of Simple Regression Analysis on the effect of research and development on the competitiveness of selected manufacturing SMEs in Lagos State, Nigeria.

Model One $y_1 = a_0 + \beta_1 x_1 + \mu$		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.012	.214		14.084	.000
	Research and Development (RD)	0.342	.044	0.366	7.838	.000
a. Dependent Variable: Competitiveness (CP)						
b. R= 0.366 R^2= 0.134 t(399) = 7.838 P=0.000<0.05						
Source: Researcher's Study, 2021						

Table 2 showed the simple regression analysis results for the effect of research and development on the competitiveness of selected manufacturing SMEs in Lagos State, Nigeria. The result showed that research and development (β = 0.342, t = 7.838, $p<0.05$) have positive and significant effect on the competitiveness of selected manufacturing SMEs in Lagos State, Nigeria. The R value 0.366 indicated that research and development has a weak positive relationship with the competitiveness of selected manufacturing SMEs. The R^2 = 0.134 indicated that about 13.4% variation that occurs in the competitiveness of selected manufacturing SMEs in Lagos State, Nigeria can be accounted for by their level research and development involvement while the remaining 86.6% changes that occurs is accounted for by other variables not captured in the model. The simple regression model is thus expressed as:

$CP = 3.012 + 0.342RD + U_I$------Equation I

Where:

CP = Competitiveness

RD = Research and Development

The regression model showed that when research and development is held at constant zero, the competitiveness of selected manufacturing SMEs would be 3.012 implying that even without any form of research and development there will still be a level of competitiveness. The results of the simple

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regression analysis indicated that when research and development is improved by one unit the competitiveness of selected manufacturing would increase by 0.342. The t statistics corroborated the result with a positive value that is statistically significant which showed that research and development is an important determinant of the competitiveness of selected manufacturing SMEs in Lagos State, Nigeria. The result of the overall model is also highly statistically significant with a p-value that is less than 0.05 ($P < 0.05$) Therefore, the null hypothesis (H_0) which states that research and development has no significant effect on the competitiveness of selected manufacturing SMEs in Lagos State, Nigeria was rejected.

Discussion

The test of hypothesis one revealed that research and development have a significant effect on competitiveness of selected manufacturing SMEs in Lagos State, Nigeria. Conceptually, scholars have made significant contributions on the concept of research and development and competitiveness. Research and Development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge including knowledge of humankind, culture and society, and to devise new applications of available knowledge (Frascati, 2015). Research and Development is the conduct of systematic activities that are involved in the creation of new ideas; improvement of existing ideas and knowledge into new or improved products, processes and services (Oyedoyin, *et al.,* 2015). Research and Development is defined as work directed towards the innovation, introduction, and improvement of products and Processes (Lomas, 2017).

Empirically, the role Research and development (R & D) plays in every facet of life and in this case, the competitiveness of manufacturing SMEs is undeniably a great one. In expanding knowledge on the effect of R&D on the competitiveness of SMEs, Singh, Garg & Deshmurk (2008) reviewed 134 research work on the impact of Research and Development (R&D) on SMEs competitiveness and found a positive relationship between R&D activities and development of SMEs in the area of process development, clean production, new products development, waste management & reduction in pollution, promotion of safety, improved technology management methods, maintenance methods, information technology applications and the likes. This finding was corroborated by Seo & Cho (2016) who stated a lack of adequate of research and development as a key deterrent to the development of SMEs efficient performance.

On their part, Abrantes, Pereira & Botelho (2020) acknowledged that a positive relationship exists between R & D Institutional support services and competitiveness of SMEs, however, they posited from the analysis of their findings that this positive effect of research and development on the competitiveness is not immediate but can only be noticeable from the third year after the R&D support. Bootlink and Helmouth, (2018) surmised that competitive advantage in SMEs does indeed require firm strategies that capitalize on R&D support. On the contrary however, Nunes, Nunes, Sarrasqueiro and Leitao (2012) Is there a linear relationship between R&D intensity and growth? Empirical evidence of non-high-tech vs. high-tech SMEs. Research Policy 41(1): 36–53. (2012) opined that there is a negative linear relationship between R&D and growth in Non-High-Tech SMEs because if Institutional support services in the form of R&D support is made, the R&D support can be copied easily by competitors. He further explained that it was difficult for SMEs to efficiently manage the high risk that comes with R&D support and transforming R&D to effective innovation is always difficult for SMEs. Therefore, unlike the scholars above, his study is unable to support this study. This study is connected theoretically with the Resource – based view theory and Institutional theory with the findings of the study further aligning with Kadriu, Krasniqi & Boari (2019)'s study on the impact of institutions on SMEs' innovation in transition economies. Findings show that institutional support

has a positive effect in terms of innovation through R&D on the competitiveness of SMEs as a result, the assumption behind institutional theory is affirmed – viewing SMEs as entrenched in institutional arrangements that impact the activities of organisations and individuals in subtle but wide-ranging ways which in turn affect SMEs decision making to develop and produce new products and services as well as strategies (Kadriu *et al.,* 2019).

CONCLUSION AND RECOMMENDATION

The study concluded that research and development affect competitiveness of manufacturing SMEs in Nigeria. The study recommended that through the support of the government, small and medium scale enterprise SMEs in particular need to propagate and advocate a culture of research and development using research findings to create superior products and or services to gain competitive advantage. Very few private business firms invest adequately in research and development activities or at least consume information from research outputs to help them strategize their activities dynamically as such, financing R&D should be conceived as a rewarding deal to firms, both internally and externally.

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