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IMPACT OF TECHNOPRENEURSHIP ON BUSINESS PERFORMANCE

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Abstract

Technopreneurship has become a lever to propel creativity and innovation in businesses today. This study investigates the impact of technopreneurship on business performance among agro-businesses in Abeokuta, Ogun State, Nigeria. The study examined empirical evidences on the impact of technopreneurship on business performance. The survey method was adopted. The quantitative research design was employed. Yamane formula was used to determine the sample size. A sample of 126 respondents was selected through random sampling method from of a population of 183 agro-businesses within the study areas and 74% response rate was recorded. Primary method of data collection was used. A well-structured questionnaire was administered and responses were analysed using linear regression on SPSS (Statistical Package for Social Sciences) version 20. The survey demonstrates that technological innovation has significant effect on firm competitiveness ($P = 0.000 < 0.05$; $R^2 = 0.183$) and also technological opportunities significantly influence on firm operational efficiency ($P = 0.000 < 0.05$; $R^2 = 0.445$). Based on the results of findings, the study recommends that businesses need to develop or exploit indigenous technology; new products or processes based innovations; seek new technology ideas and significant technological changes which are key to competitiveness.

Keywords: Nigeria, Technology, Innovation, Technological Opportunities, Business performance

JEL Code: M53, M1

INTRODUCTION

Technopreneurship has become a lever to propel creativity and sustain long-run competitive advantage in the present world where economic issues have combined with increased competitiveness (Merek, 2016). Subsequently, this need to combine the need and requirement for technology with all elements of entrepreneurship led to the development of the term "Technopreneurship" which refers to new or prospective business enterprises that is anchored on technology (Petti, 2009; Ozgulbas et al., 2013). To accomplish business performance objectives, the concept of technological entrepreneurship conceived as a process involving greater practical use of scientific research findings and

modern technologies plays a crucial role. All the activities of this phenomenon relate to "the identification of potential entrepreneurial opportunities arising from technological developments, and the exploitation of these opportunities through the successful commercialization of innovative products" (Petti, 2012; Okorie et al., 2014; Aderemi et al., 2012). The technological creativity can be understood by first appreciating the wider meaning of creativity. However, this is a challenging quest considering the complex and multi-faceted nature of the creativity concept, which makes it difficult to define (Blanco, 2007; Al-Alsari, 2014; Fowosire, Idris & Opoola, 2017). This difficulty is intensified by the domain spanning nature of creativity of technopreneurship, which leads to the existence of various types of creativity. These types include artistic creativity, entrepreneurial creativity, scientific creativity, cultural creativity and technological creativity.

As such, research on the concept has brought diverse characterisations of the notion. Typically, the concept of Technopreneurship creativity is explained from three main perspectives, which are personality traits (a human quality associated with convergent and divergent thinking), processes involved (the stages that one undergoes to produce a novelty) and the product/output of creativity (Dawit, 2005; Atalay, 2013; Cheng et al., 2006). This study focuses on Technopreneurship creativity as a human and social attribute that makes individuals and society adjust to the mutable environment, reformulate life-challenges, and take risks to try new approaches to problems and how it affects business performance. The connection between Technopreneurship and business performance is emphasised in the contemporary economic environment (Maria et al., 2007; Kuratko; 2009; Petti & Zhang, 2011). Some scholars even suggest that the process of technopreneurship is a creative act (Morris et al., 2008; Renko et al., 2009; Espallardo & Ballester, 2009; Alvarez & Barney, 2007; Davis, 2006). Thus, it is pertinent to come up with characterisations of creativity that relate technopreneurship.

Antoncic and Prodon (2008) explains Technopreneurship creativity as "creating something new, for example, creating a new business by developing a new product or service, building an organisation by financial manipulation, reshaping an existing business, creating a business that will exist on its own, and a financial fortune as testimony to the technopreneur's skill in related to technology". This view, therefore, cements an often expressed view that technopreneurship is a creative act. Having clarified the general application of the creativity concept, the focus now narrows to technopreneurial creativity. Dutse et al. (2013) posit that the notion of technological creativity is prominent in literature on education even though its application is still in the fledgling stages. Common definitions of technopreneurs creativity follow Rozana & Abdul hakim (2005) belief that psychologists consider the creativity concept from two perspectives; either as a human trait or as an achievement. This explains the common usage of personality and output scales as measures of one's creativity. Norwatim (2011) refer to the preceding as definition by inclination or capability factors.

The following are, therefore, some of the proposed definitions of technopreneurship that follow the prior-stated criteria. Like Rauch et al. (2003) definition underscores the invention aspect of technological creativity, thus linking the concept with the design, development and commercialisation of new products. In addition, the characterisation also emphasises the problem solving nature of technological creativity.

LITERATURE FRAMEWORK – CONCEPTUAL REVIEW

Technopreneurship and Technological Creativity

Research on the technological creativity construct in the technopreneurship realm is still in its embryonic stage. This is despite the long proposed link between general creativity and technopreneurship (Mengistae, 2006; Kaur, 2006). Scholars claim that a technopreneurship process is an interactive act of creativity which takes place within diverse circumstances in related to technology (Kemp et al., 2003; Olatunji, 2015; Baileti, 2012). Thus the technopreneurs' engagement in technopreneurship creates value by producing novelties, initiating and navigating change. Roos & Roos (1997) asserts that through creative destruction, technopreneurs discard irrelevant products and services and replaced them with new and market-related ones with new technology. In the same vein, they creatively combine resources to make a constant stream of innovations that match market opportunities (Penrose, 1959). Thus, technopreneurs need to possess skills that include creativity, innovation and opportunity recognition ability. In addition, Lumpkin & Dess (2001) theorize that the technopreneurship process rests on innovation, risk-taking and pro-activeness of technological processes. This view is particularly valid in the case of technology opportunity-driven technopreneurship which relies on the technopreneurs identifying and mobilising resources to pursue previously unexplored business opportunities.

Contemporary scholars also suggest a close link between technopreneurship and creativity in modern economies (Laidlaw, 1978; Kuswantoro, 2012; Okorie et al., 2014; Medina & Rufin, 2009; Morone & Testa, 2008). Aderemi et al. (2011) also view the two variables as mutual and inseparable. One of the key qualities of an entrepreneur is the ability to use divergent and convergent thinking to generate ideas, products and services that match existing market requirements or create new market opportunities (Barney, 1991; Grimaldi, Kenny & Wright, 2011). Atuahene, Gima & Ko (2001) proclaim that creativity enhances the relationship between entrepreneurship and economic vibrancy. Poznaka (2010) study covering 31 metropolitan informational cities from USA, Europe and Asia reveals significant correlations between creativity and technopreneurship activity. The results arising from the study's consideration of the two indicators of technopreneurship activity, the number of new businesses created and rate of self-employment, suggested that any perceived positive impact of creativity on

economic performance stemmed from the influence of technological creativity and innovation. However, the outcome of the study did not declare an ever present positive relationship between creativity and technopreneurship in the cities. These conclusions somewhat neutralise suggestions by Lumpklin & Dess (1996) and Quince & Whittaker (2003) that individual creativity levels and the creative environment enhanced creative output. Further observations from the same study note that the correlation between creativity and technopreneurship varied by region and yielded mixed results.

Concept of Business Performance and Technology Opportunities

Performance can be attributed as the main indicator in assessing the operation of an organisation. Many studies in the field of management have looked into the issue of performance especially in the context of strategic management (Alfred, 1989). Measuring performance is important as it provides a benchmark for examining particular strategies implemented in the organization (Anad, Mesquita & Vassolo, 2009). According to Rozana and Abdul Hakim (2005), the assessment of performance is beneficial in upgrading and improving a firm's existing programme and policy. However, there exists a dilemma for the cooperative firm on whether they should focus on the financial aspect or the social welfare of the members (Davis, 2006; Mayo, 2011). This differs to the situation in the private sector where there is emphasis on the social welfare of the members due to the members' status as owners and also consumers of the firm's service and products (Alfred, 1989). Nonetheless, it is vital for the cooperative to focus on its financial performance first in order to ensure its survival (Kaur, 2006) and only then proceed to fulfil its social responsibility to its members (Laidlaw, 1978). On the other hand, some previous studies have discovered a few weaknesses in the business performance of the cooperative sector, especially concerning income earnings (Dawit, 2005; Kaur, 2006; Norwatim, 2011).

In an empirical study, Kaur (2006) found that there exists a big gap in the financial performance of small and large cooperatives in Malaysia. As such, smaller cooperatives have been advised to focus on improving their business performance. In order to generate a positive business performance, the cooperative firm must be able to provide better service for its members compared to the service provided by businesses in the private sector (Bayus, Erickson & Jacobson, 2003). Aderemi et al. (2011) identified two major features of technopreneurship to be high potential opportunity and technology-intensive opportunity. In a study conducted by Alvarez & Barney (2007), they posit that the obvious ability and willingness of entrepreneurs (who anchor their business thrust on technology) to practically perceive and create new business opportunities and decide to venture in to such opportunities in spite of market uncertainties and other challenges, affect business activities, not only within their business units and industries, but also within the economy they are situated.

Technological Innovativeness and Business Performance

Technological Innovativeness could be considered a threat to the existing business practices and technology (Atuahene-Gima & Ko, 2001). An innovative practice can be in the form of a research or engineering venture geared towards creating new technology, products or processes (Renko, Carsrud & Brannback, 2009). Innovation could also be introduced via a new marketing strategy for an existing product (Lumpkin & Dess, 1996), a new promotional and advertising strategy (Avlonitis & Gounaris, 2008) or a new leadership practices (Chen, Tjosvold & Liu, 2006). As such, all innovative processes conducted would enable the creation of new customers and new markets for the firm (Kuratko, 2009). Through the process of ongoing innovation, the reform or upgrade would be able to provide a unique quality to the firm. This would enable the firm to be at the Forefront compared to its competitors (Quince & Whittaker, 2003).

Hence, the distinctive quality from the innovative process would ensure better business performance following the firm's ability to attract new customers. The act of seizing new opportunities enables the firm to glean more benefits compared to its competitors (Anand, Mesquita & Vassolo, 2009). Furthermore, the firm should be able to predict any changes in the market or any problems which may arise (Rauch, Wiklund, Lumpkin & Frese, 2003). This could be fulfilled by monitoring trends or identifying future needs for the firm's existing customers. Previous studies have drawn on the connection between proactiveness and the firm's innovative outlook. Based on the firm's proactive outlook, via the prediction of customer and market needs, this reform is targeted towards bringing changes to the products, service, technology and management techniques (Maria, Martina & Luz, 2007).

BARRIERS TO TECHNOPRENEURSHIP

It is presented in the evidence that technological innovation is an imperative internationalisation driver at the level of the firm and barriers to technopreneurship consequently proceed also as internationalisation barriers

Lack of knowledge for available technologies

The barriers of knowledge for innovation relate to the lack of knowledge of available technologies, knowledge sources and markets and past research has confirmed the presence of considerable barriers to innovation related to knowledge of technologies and markets, accessing finance and the deficiency of skilled labour. Econometric analysis results revealed that firms that are not a division of a big business group or SMEs are more likely to experience barriers of knowledge (Kemp et al., 2003). The main cause of this barrier is that a large organisation or allied grouping has an advantage of size and they can increase fixed costs related to activities of knowledge sourcing or measures management

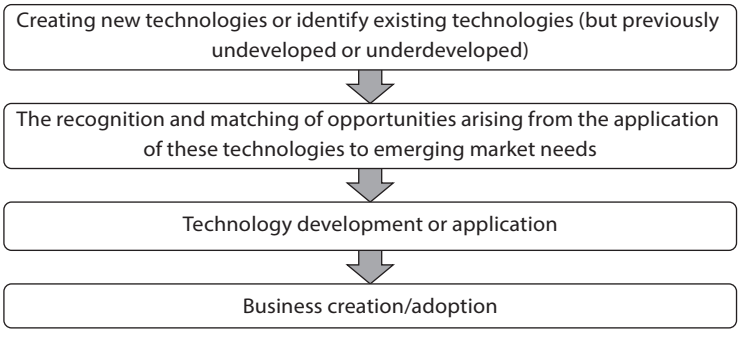
of internal knowledge for an outsized output. Therefore, Technopreneurship have a drawback that they mostly do not have enough money to discover information about technologies and markets in a systematic way. Consequently, the outcome of the result shows that firms are already internationalised in a systematic way and they report experience of more barriers of knowledge to innovation (Ozgulbas, Koyuncugil & Yilmaz, 2006).

Financial barriers for the firms

One more barrier that restrains the activity of Technopreneurship is considered as financial barriers towards innovation for the firms. Past studies have revealed that financial barriers have an advanced impact on innovation for young firms, as well as SMEs (Medina & Rufin, 2009; Kraaijenbrink, Spender & Groen, 2010). The huge organisations or companies which are division of a business groups are less likely to experience these issues and because of their size it is not difficult to set up collateral funds inside the groups. Barriers related to finance are mainly vital for Technopreneurship with narrative technologies and products (Espallardo & Ballester, 2009). It was shown in the past research that firms which are less concentrated are furthermore expected to experience financial barriers. It is shown in the results that this accounts for firms that are dependent greatly on superior knowledge, for example, universities or research institutes. However, it is important to consider IPR in this regard because SMEs can show a few forms of IPR for the effect of their innovation actions which are less likely to be affected by financial constraints (Bayus, Erickson & Jacobson, 2003; Moris et al., 2008).

CONCEPTUAL MODEL OF STUDY

According to Petti (2009), the concept of technological entrepreneurship incorporates four main sets of activities relating to processes illustrated in the diagram below:



Source: Petti, C. (Ed.) *(2009). Cases in technological entrepreneurship: Converting ideas into value.*

Fig. 1. **Technology entrepreneurship set of related activities**

RESEARCH METHOD

The research study adopted a survey research design. It was carried out as an empirical study that assesses the impact of technopreneurship on business performance. The scope of the study covers Abeokuta, Ogun State, Nigeria. The respondents who are owners of agro-businesses within farm settlements in the areas were purposively randomly selected in order to accomplish the objective of the study. Primary method of data collection was used to collect necessary data that was used for the analysis of this study through a field survey of agro-businesses with the aid of purposive well-structured questionnaires. The questionnaire instrument was designed using six (6) point Likert's scale, as well as through an in-depth personal interview guided by the questions raised in the questionnaire which proved to be most effective due to the fact that most respondents could not fill in their responses or due to time constraints (Michal, 2011). A sample of 126 respondents was identified from of a population of 183 agro businesses within the study areas using random sampling method of Yamane (1967) based on reports of the number of agro businesses in the study area and 74% of questionnaire administered were returned. Each of the dependent and independent variables of the research construct were measured by four (4) items each validated by different authors found in extant literature. Pre-test was also conducted through a pilot study which was carried out for the research instrument's validity. Split half method of reliability test results on the split halves 0.724 and 0.813 respectively show that the research instrument is reliable (Kumar, 2010).

DATA ANALYSIS AND INTERPRETATION OF RESULTS

Linear Regression analysis was used to test the research hypotheses and analyse the dependent and independent variables. Subsequently, test of linearity, test of collinearity and test on normality using Normal Q-Q Plot was carried out to ensure the assumption of linear regression that the residuals are normally distributed is met. It is important to meet this assumption for the p-values for the t-tests to be valid.

Hypothesis 1

HO_1: There is no significant relationship between technological innovation and firm's competitiveness.

HA_1: There is a significant relationship between technological innovation and firm's competitiveness.

Table 1

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.428[a]	.183	.174	.43210

a. Predictors: (Constant), Technological Innovation

b. Dependent Variable: Competitiveness

Table 2

ANOVA Table

			Sum of Squares	Df	Mean Square	F	Sig.
Competitiveness * Technological Innovation	Between Groups	(Combined)	4.407	8	.551	2.823	.008
		Linearity	3.805	1	3.805	19.503	.000
		Deviation from Linearity	.602	7	.086	.440	.874
	Within Groups		16.389	84	.195		
	Total		20.796	92			

Interpretation of Results

The result from the model summary Table 1 revealed that the extent to which the variance, competitiveness can be explained by technological innovation is 18.3% (R Square = 0.183).

Table 2 shows the result of the linearity assumption of linear regression test. Based on the ANOVA Output Table 2, value of significance for Deviation from Linearity of 0.874 > 0.05, it can be concluded that there is a linear relationship between the variables of Technological innovation with Competitiveness. It also shows the Fcal 19.503 at 0.000 significant level. The output from table shows that there is a significant relationship between competitiveness and technological innovation.

Table 3

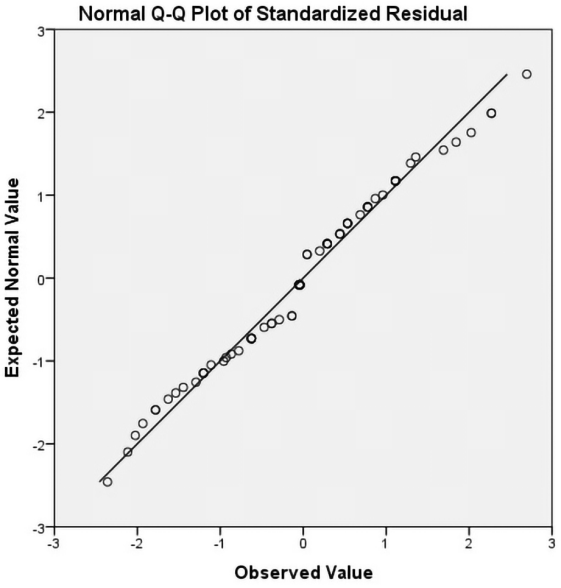
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.732	.673		2.573	.012
	Technological Innovation	.579	.128	.428	4.514	.000

a. Dependent Variable: Competitiveness

The coefficient Table 3 above shows the simple model. The model is shown mathematically as follows: Y = a + bX where 'y' is competitiveness and 'x' is technological innovation, 'a' is a constant factor and 'b' is the value of coefficient.

From this table therefore, Competitiveness = 1.732 + 0.579 Technological innovation. Therefore, a unit (or 100%) change in technological innovation will lead to 0.579 (57.9%) change in competitiveness. The above result implies that there is a significant relationship between technological innovation and competitiveness i.e. since the P value (0.000) is less than 0.05. Thus, the decision would be to reject null hypothesis (HO_1) and accept alternative hypothesis (HA_1), i.e. there is a significant relationship between technological innovation and competitiveness among agro businesses in Abeokuta, Ogun State.



Source: Researchers Computation, 2018

Fig. 2. **Plot of Technological Innovation and Competitiveness**

Figure 2 shows that there is a positive and linear relationship between technological innovation and competitiveness, since the points in the Normal Q-Q plot show a tendency and cluster around a straight line. Most importantly, the assumption of normality of the distribution is met since the points on the plots cluster around the horizontal line. Hence the p-values and b-coefficient for the t-tests are said to be valid.

Hypothesis 2

HO_2: There is no significant relationship between technological opportunities and operational efficiency.

HA_2: There is a significant relationship between technological opportunities and operational efficiency.

Table 4

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.667[a]	.445	.439	.27741

a. Predictors: (Constant), Technological Opportunities
b. Dependent Variable: Operational Efficiency

Table 5

ANOVA Table

			Sum of Squares	Df	Mean Square	F	Sig.
Operational Efficiency * Technological Opportunities	Between Groups	(Combined)	6.139	7	.877	11.498	.000
		Linearity	5.619	1	5.619	73.675	.000
		Deviation from Linearity	.520	6	.087	1.135	.349
	Within Groups		6.483	85	.076		
	Total		12.622	92			

Interpretation of Results

The result from the model summary Table 4 revealed that the extent to which the variance, operational efficiency can be explained by technology opportunities is 44.5% (R Square = 0.445). Table 5 shows the result of the linearity assumption of linear regression test. Based on the ANOVA Output Table, value of significance for Deviation from Linearity of 0.349 > 0.05, it can be concluded that there is a linear relationship between the variables of operational efficiency and technological opportunities. The table also shows the Fcal 73.675 at 0.000 significant level. The table shows that there is a significant relationship operational efficiency and technological opportunities.

Table 6

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.656	.364		7.298	.000
	Technological Opportunities	.549	.064	.667	8.545	.000

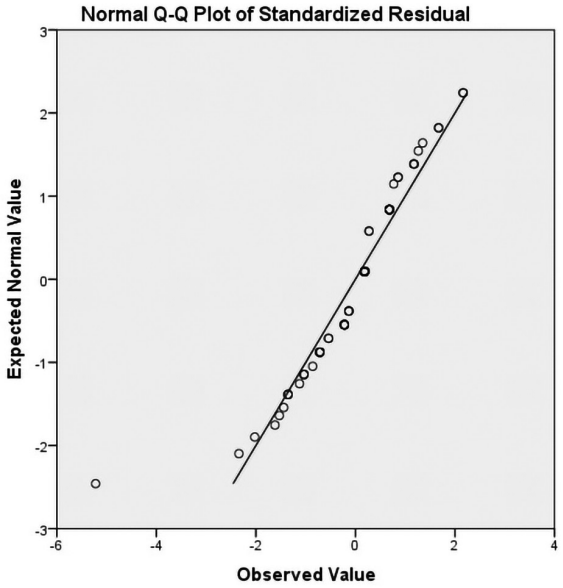
a. Dependent Variable: Operational Efficiency

The coefficient Table 6 above shows the model. The model is shown mathematically as follows:

Y = a + bX where 'y' operational efficiency is and 'x' is technological opportunities, 'a' is a constant factor and 'b' is the value of coefficient. From this table therefore Operational efficiency = 2.656 + 0.549 Technological opportunities.

Therefore, a unit (or 100%) changes in technological opportunities will lead to 0.549 (54.9%) change in operational efficiency.

The above result implies that there is a significant relationship between technological opportunities and operational efficiency i.e. since our P value (0.000) is less than 0.05. Thus, the decision would be to reject null hypothesis (HO_2) and accept alternative hypothesis (HA_2), i.e. there is a significant relationship between technological opportunities and operational efficiency among agro-businesses in Abeokuta, Ogun State.



Source: Researchers Computation, 2018

Fig. 3. **Plot of Technological opportunities and operational efficiency**

Figure 3 shows that there is a positive and linear relationship between technological opportunities and operational efficiency, since the points in the Normal Q-Q plot show a tendency and cluster around a straight line. Most importantly, the assumption of normality of the distribution is met since the points on the plots cluster around the horizontal line. Hence the p-values and b-coefficient for the t-tests are said to be valid.

TEST OF MULTICOLLINEARITY

Test of Multicollinearity is a test for whether one's predictor variables are highly correlated with each other. Tabachnick & Fidell (2001), suggest that "think carefully before including two variables with a bivariate correlation of 0.7 or more in the same analysis. The primary concern is that as the degree of

multicollinearity increases, the coefficient estimates become unstable and the standard errors for the coefficients can get wildly inflated.

Table 7

Coefficients Correlations

		Technological Innovation	Technological Opportunities
Technological Innovation	Pearson Correlation	1	.328**
	Sig. (2-tailed)		.001
	N	93	93
Technological Opportunities	Pearson Correlation	.328**	1
	Sig. (2-tailed)	.001	
	N	93	93

** Correlation is significant at the 0.01 level (2-tailed).

From Table 7 above it can concluded that variables are not highly correlated with each other (i.e. at 0.7 or more) in the same analysis.

DISCUSSION OF FINDINGS

This study empirically investigates the impact of technopreneurship on business performance of agro-businesses in Abeokuta, Ogun State. It provided evidence on how technological innovations and technological opportunities affects and influence a firm's competitiveness and operational efficiency specifically agro-businesses, Abeokuta, Ogun State.

The two hypotheses formulated for the study were significant; thus the null hypotheses (HO) were rejected while alternative hypotheses (HA) were accepted. The study revealed that there is a significant, positive and linear relationship between technological innovation and competitiveness among agro-businesses in Ogun State ($R^2 = 0.183$, $P = 0.000 < 0.05$ and deviation from linearity $0.874 > 0.05$). This finding is consistent with previous studies Fowosire, Idris & Opoola (2017), Atalay (2013); Kuswantoro (2012); Petti (2012).

This outcome of the study is explained on the grounds that new agro products, processes and significant technological changes; developing and exploiting new or improved technologies; and commercialisation of technological ideas help to create value to customers and overtime remains one of the key determinants of competitiveness. The outcome of this study shows that technological opportunities significantly influence firms' operational efficiency.

The results from hypothesis tested proves that the relationship between technological opportunities and operational efficiency is strong, significant, linear and positive ($P = 0.000 < 0.05$, $R^2 = 0.445$ and deviation from linearity $0.349 > 0.05$). The outcome is in consonance with previous studies Alvarez & Barney (2007), Petti (2009), and Blanco (2007). The rapid evolution in technology

(like high potential technologies like internet, modern energy resources and biotechnology), as well as utilising technology intensive opportunities has a significant influence on the output gained from business activities in terms of speed & agility, productivity, process cost, efficiency, quality, and so on. In general, findings show that technological opportunities have the strongest effect on operational efficiency as a measure of business performance.

CONCLUSION

This study examines the impact, role, relationship and influence of technopreneurship on performance of agro-businesses in, Abeokuta, Ogun State. The concept of technopreneurship constitutes an interesting proposition for businesses that are willing to increase their level of innovativeness for better performances through internal capabilities, competencies and resources, as well as favourable external factors, such as technological innovations and technological opportunities. The results revealed that technological innovation and technological opportunities significantly affects and competitiveness and operational efficiency respectively. The relationship involved the innovativeness and proactiveness outlook practiced by the firms which had affected to the higher business performance.

RECOMMENDATIONS

This study provides recommendations based on the conclusions and findings explained earlier.

1. First, businesses need to develop indigenous technology; new products or processes based innovations; seek, commercialise or exploit new technology ideas to meet market needs, customer expectations/preferences and consumer demands, identify market opportunities as well as respond to significant technological changes that affect their business activities. Most importantly, these practices overtime assist them to outperform competitors, achieve growth in sales, raise their competitive position and market competitive landscape.
2. Second, businesses need to identify and exploit the opportunities that emanate from recognition, application, vitality of new science and technologies, as well as the rapid evolution of technology to improve on output gained from their business activities in terms of productivity, speed & agility, efficiency, quality, and so on.
3. Finally, technopreneurship should be a central concern for government and policymakers; technopreneurial development programs need be launched to sharpen business skills and market discernment, as well as boost business and economic growth. Businesses significantly need to develop indigenous technology and commercialize technological ideas.

LIMITATIONS AND SUGGESTION FOR FURTHER STUDIES

The study limitations and recommendations that are deduced from the findings suggest more avenues for future research. This study places emphasis on the impact of technological innovation and technological opportunities on business performance, but does not explain the impact of research and development and Innovation, as well as Intellectual property rights (Patenting culture) both of which are germane in technopreneurship discourse on performance of businesses. Another limitation is the use of questionnaire and a cross sectional study approach. A number of creative methods (in-depth interviews, case study and so on) and use of a longitudinal study could be used in the future for research purposes. Lastly, future research studies on technopreneurship should investigate more large firms and manufacturing industry firms and the endogenous and exogenous factors that directly affect firms' attitude toward innovation and technopreneurship.

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