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Environmental Based Activities and Technology Entrepreneurship Growth in North Western Nigeria

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Abstract. The packages of services offered by an incubator are designed to enhance the success and growth rates of technology startups thus maximizing their impact on economic development. Environmental based activities are those services offered by incubators in collaboration with other government agencies. This paper attempted to empirically assess the contributions of these activities to Technology Entrepreneurship Growth in North Western Nigeria. Positivist epistemology with objective ontology together with interpretive epistemology with subjective ontology was employed. The study used cross-sectional, descriptive and correlational designs, employing quantitative and qualitative approaches. The data were collected using non standardized instrument, with items on Environmental Based Activities and Technology Entrepreneurship Growth, with a sample size of 86. The instruments were tested for their validity and reliability. The data were analyzed at uni-variate, bi-variate and multivariate levels using frequency, percentages, mean, correlation and regression. The results showed that environmental based activities correlates (57.4%) and contribute to growth at 5% level of significance with $p<0.001$ and $R^2=0.33$ implying that 33% of the variation growth is explained by the variable. The study found out that physical infrastructural deficit, absence of science parks and lack of synergy amongst the agencies providing these services were the major causes of incubated enterprises failure in North Western Nigeria. Government should therefore provide the required physical infrastructures itself or through partnership with the private sector. To decongest incubators and make post-incubation visits easy, science parks should be established. Government agencies providing services to incubatees outside the incubator should synergize efforts in order to make the desired impact.

Keywords: Technology Incubation, Incubators, Incubatees, Science Parks, Technology Entrepreneurship Growth.

1. Introduction

Technology Incubation is an intervention program designed to reduce the risk of technology enterprise start-ups' failures and assist in the growth of existing ones. It is an economic platform designed to help startup companies by providing them with the necessary resources and support that they need to evolve and grow into more mature businesses. The focal objective is to produce successful businesses that will exit the programme financially viable and self-supporting. The incubated graduates generate jobs, rejuvenate communities, commercialize new technologies and create wealth for local and national economies (UNESCO-WTA INITIATIVES (2006 - 2010)). Joshua et al., (2010) likened the term incubator to the central meaning of the word: the artificial nurturing of

the chicken egg in order to hatch them faster in a protected setting. The same hatching concept is applied to the incubating of companies; it hastens up new ventures' formation and upturns their chances of success. An incubator thus hatches ideas by providing new ventures with physical and intangible resources (Becker & Gassmann, 2006).

2. Statement of the Problem

The growth of start-up technology based enterprises has been facing a lot of challenges worldwide. In the early days of the growth period of these enterprises; they face difficulties that may lead to their failure (Mutambi et al., 2010), difficulties mainly in securing the resources they need for survival (Ferguson & Olofson, 2004). These enterprises are key players in achieving economic growth of developing countries like Nigeria (Mohammed et al., 2013). In its attempt to address this disturbing trend, the Nigerian government initiated a number of deliberate policies targeted at reducing the high failure. Few among include provision of Small and Medium Enterprises financing (at single digit interest rates), engaging business development consultants to help in developing bankable business plans, simplifying business registration procedures, providing tax breaks or holidays, establishing incubation centers etc. (Ayodeji & Balcioglu, 2010).

In spite of these efforts however, facts abound that a substantial number of incubated businesses in Nigeria fail within the first three years of graduation, while some could not even make it through the first year (Evelyn & Eno, 2014). In addition, Innocent et al. (2014) observed that the Technology Incubation Centers in Nigeria have very weak socio-economic impact on job creation, wealth creation and industrial development. The situation was more worrisome in North Western Nigeria, where a maiden enquiry by the researcher revealed that post incubation mortality was over fifty percent. This study assessed the contributions of Environmental Based Activities to the growth of technology entrepreneurship in North Western Nigeria. The aim was to establish the remote and immediate causes of high post-incubation failure rate in North Western Nigeria.

3. Objectives of the Study

i. To establish the effect of access to finance on technology entrepreneurship growth in north western Nigeria.
ii. To assess the contribution of higher education resources on technology entrepreneurship growth in north western Nigeria.
iii. To determine the relationship between networking and technology entrepreneurship growth in north western Nigeria.
iv. To establish the relationship between regulatory compliance and patenting and technology entrepreneurship growth in north western Nigeria.
v. To assess the contributions of government policies to technology entrepreneurship growth in north western Nigeria.
vi. To establish the relationship between environmental based activities and technology entrepreneurship growth in north western Nigeria.

4. Hypothesis

There is no significant relationship between environmental based activities and technology entrepreneurship growth in north western Nigeria.

5. Review of Related Literature

5.1 Theoretical Review

Options Theory (Hackett & Dilts, 2004).
This theory seeks to predict and explain how incubators and the process of incubation increase the likelihood that new ventures will survive the early stages of development. It conceptualizes the incubator as an entrepreneurial firm that sources and macro-manages the innovation process within emerging organizations, infusing these organizations with resources at various developmental stage-gates while containing the cost of their potential failure. The incubator is

the unit of analysis while incubation outcomes—measured in terms of incubatees' growth and financial performance at the time of incubator exit—provide indicators of success. Incubation is viewed as a catalyst that systematically accelerates the entrepreneurial process thereby institutionalizing the support of ventures with potential for high growth (Hansen et al., 2000).

5.2 Environmental Based Activities

Goedhuys and Sleuwaegen (2010), in a study investigating 947 small and medium entrepreneurial firms in eleven Sub-Saharan African countries, reported that financial limitations are singled out as the major obstacle (from between eleven alternatives) to a firm's growth in five countries out of 11. Consistently, Goedhuys and Sleuwaegen (2000) find that a lack of collateral significantly hampers firms' growth. Research also indicates that access to finance promotes more start-ups and that smaller firms are often the most dynamic and innovative (Vivarelli, 2012). However, Maina et al., (2012), in an evaluation of the IFC program SME Solutions Center in Kenya discovered that a large injection of capital is not necessarily a panacea for SME growing pains at a start-up, early-stage or growth phases. The study by Zouhaïer M'Chirgui, (2012) showed the importance of the presence of academic support structures regarding the number of ventures created by an incubator, areas with multiple academic institutions display strong rates of new entrepreneurial firm creation. R. W. Smilor et al. (1988) found that knowledge-based firms tend to be in proximity to universities or research institutions. Lasrado et al. (2015) study showed that all (knowledge based and other) firms in university incubators experience positive growth in number of employees and sales over time whereas the startup firms in the cohort group are relatively flat in terms of growth in number of employees and sales over time. While studying 18 university incubator firms over a period of 36 months in UK and Ireland, McAdam and McAdam (2008) rated networking and clustering as the most important among factors behind incubated firm success. In a UK survey (UKBI, 2009), 79.6% of respondents indicate that resource providers can be wary of dealing with new ventures lacking credibility and legitimacy (Bhidé, 2000). The incubator lends credibility and legitimacy through association with the venture, showing the positive impact of networking and mentoring. Inanga EL, Azih E (2014) however found that the two constructs (Mentoring and Networking) have no impact in the performance effectiveness of Technology Incubation.

Different scholars such as North (1981) and Machlup (1958) believe that there is reasonable correlation between intellectual property system and the economic development of a nation. They argue that having a robust intellectual property protection system is necessary for sustainable economic development. They suggest that such a system will promote innovation as IPR owners will be encouraged to research more and those who do not have any IPRs will be encouraged to work harder and come up with new innovations knowing that their efforts will be adequately rewarded and protected. Since ideas and information are necessary for the development of any society the creators of these ideas have to be given the right incentives to continue to produce ideas that are relevant for the benefit of the entire community (Asia-Pacific Economic Cooperation, 2006). Naude, Szirmai and Goedhuys (2011) observed that the problem with developing countries is not the shortage of entrepreneurs but rather inadequate policy and institutional environment. Governments should implement innovation friendly reforms. This could include providing policies that will encourage the development of micro-finance banks, venture capital funds and other financial institutions designed to support small and medium size enterprises (SMEs). Onyeka U.O., (2014) discovered that Government policies and endemic corruption are major factors that most entrepreneurs see as negatively impacting entrepreneurial activities in Nigeria. They generally think that the policies formulated by the government are such that does not promote the growth of small and medium enterprises.

5.3 Technology Entrepreneurship Growth

A study conducted by Vernet Lasrado et al., (2015) amongst university incubators revealed that incubators have a significant effect on job and sales growth. The study by DiGiovanna, S., and Lewis, D.A. (1998) at New Brunswick, New Jersey found that the direct jobs created by incubator clients cost significantly less than those created through other types of economic development capital projects. Also, Markley, D.M., and McNamara, K.T. (1995) evaluated the economic and fiscal impacts of an incubator on job creation and local economic development using a case study approach. Their study suggests that the cost-per job created by the incubator in the study is lower than that for some programs aimed at attracting large-scale manufacturing plants. Akcomak and Taymaz (2007) conducted a matched sample assessment of 48 incubator firms in Turkey with respect to their sales growth, employment growth and innovativeness, and discovered that there are differences between on-and-off incubator firms in terms of sales and employment but not in innovativeness. Tangible incubator services and seed funding explain this differential. In another study on the impact of incubation on firm performance during post-graduation period in Turkey also, Yasin Sehitoglu and Omer C.O. (2013) found out that incubated firms outperform the non-incubated firms both in employment and sales growth, showing a positive impact. Studies that have looked at appropriate management and financial planning and skill development of managers were conducted by Ibrahim and Goodwin (1986), Montagno, Kuratko, and Scarcella (1986), Hofer and Sandberg (1987), Lumpkin and Ireland (1988), and Susbauer and Baker (1989). These studies also looked at environmental factors and entrepreneurial characteristics as factors in business success. Ibrahim and Goodwin (1986) stated that "Success in business is defined in terms of rate of return on sales, and age or longevity of the firm". Cuba, Decenzo, and Anish (1983) and Khan and Rocha (1982) also found that sales, profit, and longevity were important to success. Hofer and Sandberg (1987) noted that high quality services or production was the key to success for firms and was directly related to effective management and planning, which relied upon effective management decisions.

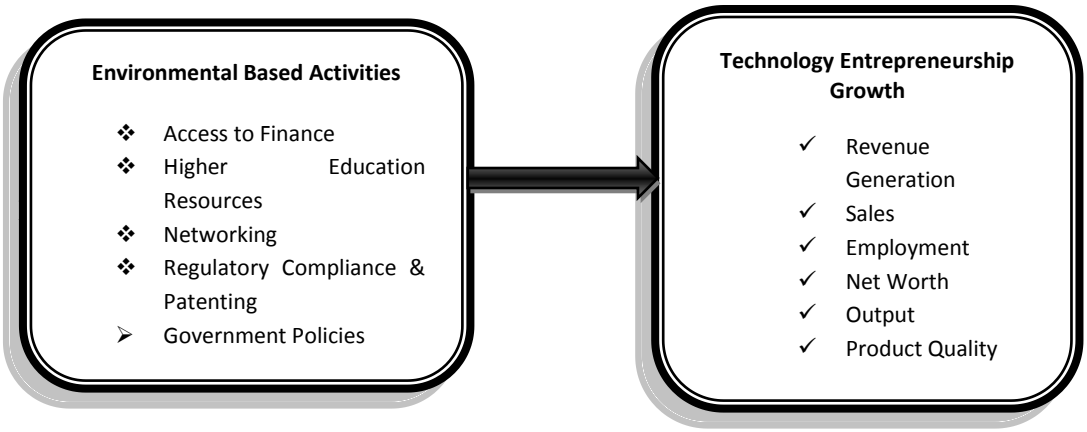
5.4 Environmental Based Activities and Technology Entrepreneurship Growth

The National Technology Incubator's Network of Australia (2009) noted that incubators supported the development of technology based companies in the country, thereby acting as catalyst for the refocusing of Australia's economy towards knowledge-based industrialization. In a study that compared incubator firms with their peers that are not located in the incubators, Aernoudt (2004) found that the first perform better; however, J. R. Lumpkin and R. D. Ireland (1988) found that being in an incubator, does not assure success. Inanga EL, Azih E (2014), while measuring the performance effectiveness of entrepreneurs with some performance indicators from the demographics- Number of Employees, Sales Turn Over, Output and Net Worth suggest that Technology Incubation has a positive effect on the development of Small and Medium Scale Enterprises. All the variables showed positive result which means that the program is effective in the development of Small and Medium Scale Enterprises. Chen's (2009) study of Taiwanese incubators found no direct effect on new venture performance as a result of incubation, whereas Rothaermel and Thursby (2005) showed incubated firms were significantly less likely to experience outright failure. In an exploratory study conducted by Lukman Raimi and Ashok Patel (2014) titled "Harnessing the potentials of technology incubation centres (TICs) as tools for fast tracking entrepreneurship development and actualization of the Vision 20:2020 in Nigeria", using content analysis, the researchers recommended that further research on the subject matter be explored empirically for an objective assessment of the situation. Allen, D., and Bazan, E. (1990) while comparing incubated and non-incubated firms in Pennsylvania found that the failure rate for incubator graduates was lower than that of non-incubator firms. The findings of the study by Inanga EL, Azih E (2014), showed that the

reason for the high failure rate is attributed to some factors, 'first, Linkage to providers of fund, secondly, advertisement and promotion, thirdly, monitoring and reporting, fourthly, physical space and other facilities, lastly, Technology Transfer Program. Inadequate provision of these facilities contributes to business failure of entrepreneurs after graduation. Incubator impact when assessed along the establishment of new technology based ventures that create high value jobs, generation of local and export income and leveraging broader economic activities is quite profound (NTIN, 2009). However despite the popularity of incubators as a means of improving the fates of new business ventures, some scholars asserts that there is limited evidence that they improve firms' performance or viability (Aernoudt 2004; Amezcua et al. 2011; Amezcua 2010; Peters et al. 2004;Rothaermel and Thursby 2005; Scillitoe and Chakrabarti 2010).

6. Conceptual Framework

Figure 1: Conceptual Framework Relating Environmental Based Activities and Technology Entrepreneurship Growth.



Source: *(Adopted by researcher using ideas of Barret (2004), Schumpeter (1934), Kruger (2004), Churchill and Lewis (1983) and Casson (1982).*

7. Methodology

Based on the mixed nature of the study, the study used positivist epistemology with objective ontology together with interpretive epistemology and subjective ontology. Non-experimental, descriptive, correlative and cross-sectional designs were adopted for this study.

8. Response Rate

Table 1 Response Rate

Categories	Number of Enterprises	Percentage (%)
Population	86	100
Total responses	84	97.7

Source: Results of data analysis (2016)

9. Testing for Statistical Assumptions

In order to conduct further parametric statistical tests, the appropriateness of the data has to be ascertained, this study therefore subjected the data to normality test, linearity test, no multicollinearity test and homogeneity test. The result showed that the data was normally distributed. Similarly, the components under the study variables were highly correlated and there was no multicollinearity among the components under incubator based activities and the Levene's test statistic reveals that the data was homogeneous and therefore appropriate for the conduct of parametric analysis.

10. Summary of the Results from Interview

With the mixed method adopted by the study, the obtained quantitative result was supported with qualitative responses. To achieve this, the study interviewed selected entrepreneurs that went through the incubation process from the four locations covered. The locations were Kano, Sokoto, Kebbi and Zamfara (Gusau). Their views on the contributions of the environmental based activities towards the growth of technology entrepreneurship in North Western Nigeria were recorded. These views provided, in more details, information about the study variables.

11. Findings based on the objective of the Study

11.1 Hypothesis Testing

Objective: To assess the contribution of Environmental Based Activities to Technology Entrepreneurships Growth in North Western Nigeria.

The null hypothesis that environmental based activities have no significant contribution to technology entrepreneurship growth in North Western Nigeria was tested using regression analysis at 5% level of significance.

11.2 Relationship Between Environmental Based Activities and Technology Entrepreneurship Growth (Table 3)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.574a	.330	.287	.46068

a. Predictors: (Constant), Government Policies, Higher Education Resources, Regulatory Compliance and Patenting, Networking, Access to Finance.

Table 3 above shows that the correlation between the environmental based activities and the technology entrepreneurship growth is 0.574, implying that there is 57.4% positive relationship between environmental based activities and technology entrepreneurship growth in North Western Nigeria. The value of the R-square (coefficient of determination) is 0.330 indicating that 33.0% of the variation growth is explained by the environmental based activities.

Table 4: ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.140	5	1.628	7.672	.000b
	Residual	16.554	78	.212		
	Total	24.694	83			

a. Dependent Variable: Growth
b. Predictors: (Constant), Government Policies, Higher Education Resources, Regulatory Compliance And Patenting, Networking, Access To Finance

The above table (4) presents the analysis of variance on the regression model, the p-value of the analysis (<0.001) is less than 0.05 we therefore reject the null hypothesis and conclude that the contribution of environmental based activities to technology entrepreneurship growth in North Western Nigeria is significant.

Table 5: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.719	.564		1.274	.206
	Access To Finance	.289	.175	.216	1.653	.092
	Higher Education Resources	.312	.182	.219	1.718	.090
	Networking	-.063	.163	-.046	.388	.699
	Regulatory Compliance And Patenting	.346	.170	.244	2.030	.046
	Government Policies	.560	.178	.364	3.147	.002

a. Dependent Variable: Growth

Table 5 above showed that regulatory compliance and patenting; and government policies have significant contribution to technology entrepreneurship growth at 5% level, while higher education resources and access to finance contribute significantly at 10%. Networking however did not have significant effect on technology entrepreneurship growth among the dimensions of environmental based activities, in North Western Nigeria.

The results of the linear regression shown in table 4 were associated with the following equation for the significant model:

$$\mathbf{Y_{EBA} = 0.719 + 0.289_{IAF} + 0.312_{IHE} - 0.063_{INE} + 0.346_{IRC} + 0.560_{IGP}}$$

Similarly, ten out of the 13 interviewed key informants agreed that incubation centers strive hard to facilitate incubatees' access to needed resources within their immediate environment. They however observed that there is need to do more, pointing out the criticality of their developmental phase. They opined that any delay in accessing such resources like finance at the appropriate time may lead to challenges that can further compound the problems of the start-ups. They were unanimous on the difficulty encountered by incubatees in networking with more established businesses in the industry, pointing out that they see them as a threat because they target same markets.

12. Study Hypothesis and Decision

Hypothesis

There is no significant relationship between Environmental Based Activities and Technology Entrepreneurship Growth in North Western Nigeria.

The null hypothesis was therefore rejected.

13. Conclusions

The main objective of this study was to explore the relationship between Environmental Based Activities and Technology Entrepreneurship Growth in North Western Nigeria. Based on the findings and discussions from the study, a number of conclusions were drawn.

The study concluded that Environmental Based Activities is a significant predictor of Technology Entrepreneurship Growth. This means that incubated enterprises stand a better chance of survival and experiencing higher growth than the un-incubated enterprises. The study also concluded that there exist massive infrastructural deficit and total absence of science parks in North Western Nigeria. These are likely to affect survival rate, cost of doing business and eventual growth. Government should therefore bridge the infrastructural gap and establish science parks for all incubation centers across North Western Nigeria.

14. Summary of the Major Findings

The study found linear, positive and significant relationship between Environmental Based Activities and Technology Entrepreneurship Growth in North Western Nigeria.

15. Recommendations

The study found out that there is a huge deficit of physical infrastructures, particularly electricity, in North Western Nigeria. Majority of the respondents and participants claimed that they generate more than fifty percent (50%) of the electricity they require to operate. This is a very unhealthy situation. The Government should live up to its responsibility in providing this critical infrastructure itself or through the private sector (BOT, PPP etc.). The provision of accessible, reliable and affordable source of energy is a pre-condition for the survival and subsequent growth of technology entrepreneurship. Other infrastructures lacking include water, roads, security etc. Their provision will drastically reduce the burden on these young enterprises; improve their return-on-investment leading to enhanced performance and innovations.

The world over, science parks are created to host graduated enterprises. In these parks, the enterprises continue to grow under the watchful eyes of the incubator business development team. Science parks serve as virtual incubators such that the enterprises within the parks receive professional advice and counseling, in addition to other forms of assistance that the enterprises may require from time to time from the incubator's business development team. By moving graduated enterprises from the incubator to the science park, additional space will be created to admit more enterprises into the incubator. Similarly, the graduated enterprises will have some relief; this will enable them to focus more on facing the challenge of competitors as they expose themselves to the competitive and environmental factors inherent in competing for customers, raw materials, capital and labour, as new entrants to the market. The government should therefore make it a policy that each incubation center has a science park for its graduated incubatees. Presently, there are no science parks in North Western Nigeria.

The logic for the incubator concept hinges on its ability to enhance the initiation, survival and growth of enterprises. If incubators are to provide economic development benefits, then more attention needs to be paid to promoting business growth among incubator clients. The package of services offered by an incubator is intended to enhance the success and growth rates of startups thus maximizing their effect on economic development. Aiming an incubation program on enterprise development requires ensuring that programs planned to enhance the viability and growth of enterprises are in place and that sufficient resources to deliver these programs are available.

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