An Empirical Study Of The Impact Of Technological Innovation System On Small-Scale Business In Nigeria: A Study Of Some Selected Retail Outlets In Bauchi

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Abstract

This study assesses the technological innovation system of small-scale businesses (SSBs) in Nigeria with a focus on some selected retail outlets in Bauchi town. The study was necessitated to authenticate the proposition made by a number of professionals that firms with functioning innovation system are more likely to adopt new technologies and become more successful in Nigerian market. The study focused on System functions approach in view of it evaluative character; hence, suitable for the evaluation of an innovation system performance. Two questions were asked – Q1: Does technological innovation system determine innovation adoption in small-scale businesses? Q2: Is Technological Innovation System instrumental to the performance of small-scale businesses in Nigeria? To gather relevant data, twenty (20) entrepreneurs were interviewed in addition to the literature reviewed; and simple descriptive analysis was employed to weigh the questions. It was found that technological innovation system also determines the adoption of innovation by SSBs; it was also found to be instrumental to the performance of small-scale businesses in Nigeria, specifically in terms of profitability and capacity utilization.

Keywords: Innovation system, System Functions, Technology, Small-Scale Business
Introduction

Small scale business constitutes an important part of today’s business milieu. The roles of small scale businesses in our economy today have been one of enormous contribution to the economic status. The definition of small scale business varies over a wide range of variables such as assets held, number of employees, sales volume and net worth of the business. In this instance, small business is that which, compares to large scale, is with limited amount of resources (Labour, capital e.t.c), which engages in the buying and selling of goods and services with the principal motive of profit (Onwijima, 2009).

Within the context of this study, Technological Innovation System (TIS) has been conceived to be the structures and processes- the actors, institutions, networks and the technology - that facilitate or militate against the performance of all activities related to innovation with a view to producing and marketing goods and services in a skillful manner that produces the best products at a profit to entrepreneur and at minimum cost to actual and potential consumers (Liu & White, 2001).

Problem Statement

The pressure to transform organizations to align with the global innovation trend, results in changing organizational culture by way of business process reengineering, mergers, expansion of the company and the introduction of new technology etc. (Volberda, 1992). A number of small scale outfits fail to appreciate the turn-around tendency of the adoption of technological innovation in their business strategies. This perhaps, is due to limited Technological Innovation System (TIS) appraisal that evaluates the development of a particular technological field, to determine the effectiveness of its functions. Most of the traditional business objectives performance measures are based on productivity and process, which mainly focus on method of investment appraisal such as payback method, return on investment (ROI), cost-benefits analysis (CBA), net present value (NPV), internal rate of return (IRR) (Appelbaum, et.al.,1998). Therefore, measuring how innovation systems are functioning is considered as the big breakthrough in innovation systems research (Utrecht university, 2011) as it aligns SSBs with the global trend.

Research questions

Q1: Does technological innovation system determine innovation adoption in small-scale businesses?

Q2: Is Technological Innovation System instrumental to the performance of small-scale businesses in Nigeria?

2.0 LITERATURE REVIEW
Introduction

It is a wide consensus that the competitiveness of the country’s economy depends on how it thrive in science and technology to facilitate innovation. The Nigeria’s development planning process was not sound due to inadequate effort to actively link Science and Technology and Innovation (STI) with the economic and social spheres. The country’s approach to STI is that of supplying scientific knowledge without providing good linkage with the anticipated users and other elements of the system (John et al., 2008).

To measure improvement in this direction, a number of criteria have been presented to evaluate how innovation systems function. This requires casting a spotlight on actors, institutions, networks and technology that make up the system. The actors are organizations responsible for education, R&D, industrial activities, and consumers. Institutions are the supportive legislation and technology standards. Networks relates to the linkages between organisations in research projects and the implementing bodies and the end beneficiaries. Technology is part of the innovation system as it hinders or facilitates the activities of actors in the innovation system (Jacobson & Johnson, 2000). In order to develop well, a new technology has to become part of an incumbent regime or it even has to overthrow it (Sabatier, 1988).

Measures of performance

Although there is no universal yardstick that combines all the perspectives of different researchers in terms of measures, the old adage of: “What gets measured gets done” still applies. A widely accepted measure of performance would be the success recorded in creating or adding value through technological innovation (Grinstein, 2008). Further, innovation inputs would be monitored and carefully allocated and controlled, as they would be seen as important and scarce assets that should be safeguarded. Within the organization’s processes, technological innovation capacity would be assessed/measured. Critical measures in some organizations include number of new ideas, revenue from new market offerings, or process improvement rates and productivity increases or cost reductions that result from technological innovation (European Commission, 2004).

Assessment Criteria

Even though different innovation systems may have similar components, they may be seen to function in a completely different way. Not withstanding this variation, all sets of uniform assessment criteria are labeled in the literature as functions of innovation systems. According to Hekkert et al. (2007) and Negro et al. (2006), the following functions of innovation systems are more pronounced: 1) entrepreneurial activities, 2) knowledge development, 3) knowledge exchange, 4) guidance of the search, 5) formation of markets, 6) mobilization of resources, 7) counteracting resistance to change.
Defining the Innovation System according to evolutionary theory, Mc Kelvey (1997), ponders over three different functions of innovation systems as (i) retention and transmission of information, (ii) generation of novelty leading to diversity, and (iii) selection among alternatives.

In her overview of innovation system literature, Johnson (2001), identifies 8 system functions: – Supply incentives (for companies to engage in innovative work), Supply resources (capital and competence), Guide the direction of search (influence the direction in which actors deploy resources), Recognize the potential for growth (identifying technological possibilities and economic viability), Facilitate the exchange of information and knowledge, Stimulate/create markets, Reduce social uncertainty (i.e., uncertainty about how others will act and react), Counteract the resistance to change that may arise in society when an innovation is introduced (provide legitimacy for the innovation).

This study uses the innovation system functions suggested by Hekker et al. (2007) and Negro et al. (2006) as the assessment criteria to appreciate the roles played by innovation system in making technological innovations adoptable by the small scale enterprises in Nigeria, thereby facilitating growth and development. For this purpose, five (5) out the eight (8) functions are utilized based on their relevance in this study.

Function 1: Entrepreneurial activities.

This is a very important function of the system as there is no such thing as an innovation system without entrepreneurs. Entrepreneurs are instrumental to a effective functioning innovation system. The role of the entrepreneurs is to harness the potential of new knowledge, networks, and markets into concrete actions to generate and take advantage of new business opportunities. Entrepreneurs can be either new entrants that have the vision of business opportunities in new markets, or existing companies that diversify their business strategy to take advantage of new developments.

Function 2: knowledge development.

The most important resource in the modern economy is knowledge and, accordingly, the most important process is learning (Lundvall, 1992). As mentioned above, mechanisms of learning are at the heart of any innovation process, for that, R&D and knowledge development are prerequisites within the innovation system. This function encompasses theoretical and practical knowledge acquisition. According to Carlsson et al. (2002), three (3) typical indicators to examine this function over time are: 1) R&D projects, 2) patents, and 3) investments in R&D.

Function 3: knowledge diffusion through networks

As viewed by Baumol (2002), the essential function of networks is the exchange of information. This way, network activity can be regarded as a precondition to learning interactively. This function can be assessed by mapping the number of workshops and conferences dedicated to a
specific technology topic, and by mapping the network size and intensity over time. This is important in a strict R&D setting, but especially in a heterogeneous context where R&D meets government, competitors, and market.

**Function 4: Market Formation**

In view of the fact that most inventions are relatively crude and inefficient when they are first known to constitute new innovation, they often have difficulty to compete with existing technologies (Hekkert et al., 2007) as they are perceived to offer only very small advantages, or perhaps none at all, over previously existing techniques. In view of this, it behoves the authority responsible to create protected niche for identified technologies. This would guarantee a possibility for such an environment actors to learn about the new technology and expectation can be developed. Another possibility is to create a competitive advantage by favorable tax regimes or holiday, minimal consumption quotes or implementing some concessions.

**Function 5: Resources mobilization**

The functionality of every innovation system is hinged on the resources available for innovation purpose, both financial and human capital, are necessary as a basic input to all activities within the innovation system. For technology to thrive, adequate budget is necessary to make knowledge production possible. This function is the determining factor for the success of all other functions. Because of its dynamism, it is hard to measure it by means of specific indicators. The most appropriate method to analyze this function is qualitatively, by interviewing core actors on their perception regarding access to sufficient resources.

**Research Strategy**

The National Technological Innovation System was analysed to measure improvement that results from technological innovation in SSBs. A number of criteria have been presented to evaluate how functional innovation systems facilitate business growth. This requires casting a spotlight on actors, institutions, networks and technology that make up the system and assess the gap that exists in measuring up to best value objectives. Primary data collection was undertaken with practitioners using the interview method based on an exploratory research strategy. The twenty (20) interviewed respondents were identified through convenient sampling and were drawn from the pool of experts who had been directly involved in the planning and execution of technological innovation in their organizations. They all have a minimum of five years experience, are holders of at least a university degree qualification and are spread across senior executives, middle management and operational positions of their respective organizations. Descriptive statistics was used for the analysis.
Analysis And Discussion

Attempts have been made at this point to analyze the content of the literature and responses of the selected number of respondents interviewed. Based on literature review and document analysis, system coherence provides the platform upon which SSBs may nourish. Going down the memory lane, the Industrial Revolution is the notable era for the emergence of thinking about systems of innovation and technological change. In their attempt to answer the question how the west grew rich, Rosenberg and Birdzell (1986) were emphatic about the fact that institutional reforms and social changes, which started in 15th century Europe, heralded the commencement of the Industrial Revolution, and the subsequent economic success of the West. As a sign of strategic importance of Technological Innovation System (TIS), public sector, either monarchy or any form of elected or appointed government, defines a system of institutions that regulate the functioning of markets, provides infrastructure and opportunity, protects property rights, and generally mitigates risk. This might not bear the name TIS, but together with a set of interlocked institutions that provide incentives for the creation of new ideas and reward the inherent risk of engaging in innovation and the commercializing of new activities, establish the enabling environment for SSBs to adopt and take advantage of using the new concepts therein. This is obviously the brain behind having functional TIS.

Additionally, personal interview data was analyzed to explore the extent of congruence of the literature with the practitioner’s views. The results are presented in tables 3.1 and 3.2 below.

Table 3.1: Technological Innovation System determines innovation adoption in small-scale businesses

<table>
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<th>RESPONSES</th>
<th>FREQUENCIES</th>
<th>PERCENTAGES</th>
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<tbody>
<tr>
<td>Concordance</td>
<td>18</td>
<td>90%</td>
</tr>
<tr>
<td>Discordance</td>
<td>0</td>
<td>00%</td>
</tr>
<tr>
<td>Indifference</td>
<td>02</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2013

Table 3.1 shows the impact of Technological Innovation System (TIS) on innovation adoption. Eighteen (18), (90%) of the respondents are of the view that TIS that functions well has the tendency of determining the adoption rate of SMEs in Nigeria. None of the interviewees disagree with this assertion. Two (2), (10%) of the respondents choose to remain on the fence maintaining that so many other variables interplay when it comes to innovation adoption in Nigeria. Despite that, this result is strongly in tandem with what obtains in the literature.
Table 3.2: Technological Innovation System is instrumental to the performance of small-scale businesses in terms profitability

<table>
<thead>
<tr>
<th>RESPONSES</th>
<th>FREQUENCIES</th>
<th>PERCENTAGES</th>
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<tbody>
<tr>
<td>Concordance</td>
<td>14</td>
<td>70%</td>
</tr>
<tr>
<td>Discordance</td>
<td>02</td>
<td>10%</td>
</tr>
<tr>
<td>Indifference</td>
<td>04</td>
<td>20%</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Field Survey, 2013

From Table 3.2, 14 respondents (70%) concords that TIS is instrumental to performance SSBs in terms of profitability. Two (10%) disagrees with that view while another four (20%) remain indifferent. This is largely in consonance with Triple Helix model, which support the interplay among universities, business, and government as yet another element of the national systems of innovation literature that focuses on the new emerging mission for research universities.

Conclusion And Recommendations

It could be concluded at this juncture that Entrepreneurial activities, knowledge development and diffusion through networks, market formation and resource mobilization are a good platform upon which nation’s innovation can thrive. This is where public entities play a significant role. They contribute to the supply of ideas through the funding of research and development activities and the performance of research, though, private firms are the largest providers of R&D funding. Universities and government labs are important external partners that provide access to complementary knowledge that may extend both the exploratory ability as well as the capacity of the firm to exploit abundant opportunities (Leonard-Barton, 1995). In regards to technology market, series of government initiatives attempt to address market failures through direct funding of research and R&D subsidies that lower the cost of R&D to firms. This way, significant success has been registered and is being registered by SSBs that enjoy this attention. Nigerian government should endeavour to follow suit in other to align her SSBs with the global technological trend with a view to enhancing their performance generally.
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