

EVALUATING THE INFLUENCE OF TECHNOLOGY INCUBATION CENTERS ON INNOVATION IN SOUTH WEST NIGERIA

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Abstract: Business incubators play a vital role in nurturing and fostering the growth of new startups. Numerous international organizations have recognized the importance of these incubation programs, such as the United Kingdom Business Incubation (UKBI), The European Business and Innovation Network, United States National Business Incubator Association (NBIA), and others. These organizations have focused on implementing incubation and innovation programs to stimulate economic and social development.

One of the key areas where business incubators have made a significant impact is in technology business incubation (TBI). This approach has been widely adopted by developed and emerging economies as well as developing countries due to its remarkable success rate in creating new technology-based firms. The benefits of TBI extend beyond new venture creation, encompassing technology and knowledge transfer, employment generation, and wealth creation.

Industrialization is a fundamental component of economic success, and business incubators contribute significantly to this process. By providing a nurturing environment for new business startups, incubators serve as crucial players in the entrepreneurial ecosystem, facilitating the connection of talent, technology, capital, and know-how. Business incubators offer resources like counseling and office space while also fostering internal networking and knowledge exchange among entrepreneurial start-up firms.

Keywords: business incubation, technology business incubation, economic development, entrepreneurial ecosystem, knowledge exchange.

Introduction

Most popular international organizations like United Kingdom Business Incubation (UKBI), The European Business and Innovation Network, and European Commission (EC), United States National Business Incubator Association (NBIA), Organization for Economic Cooperation and Development (OECD) and Info Dev, an arm of the World Bank Group (Info Dev) focused on the implementation of incubation and innovation programs to strengthen the successful growth of economic and social development (Al-mubarak & Schrod, 2017). Most developed and emerging economies and developing countries have adopted Technology Business Incubation (TBI) to quicken the creation of new technology-based firms because of its more than 80% success rate of new venture creation, and have consequently benefited from its multiplier effects such as technology/knowledge transfer, employment generation and wealth creation (Bubou, Amassoma, & Okrigwe, 2011).

Industrialization is key to the success of any economy, and the policy efforts at industrialization entail introducing systems and wholesale plans that can assist in accelerating the process of industrialization, including the SME sector. (Ayatse, Kwahar, & Iyortsuun, 2017). The business incubator is generally thought to offer a nurturing environment for new business startups (Abraham, 2017). Incubators are an important participant in the entrepreneurial ecosystem by linking talent, technology, capital, and know-how (Levakova, 2012; Al-Mubarak, Busler, Al-Ajmei, & Aruna, 2013). A business incubator is defined as a formal firm with an infrastructure meant to groom incubated start-up firms with important resources in the pursuit of survival and growth (Pettersen, Aarstad, Høvig, & Tobiassen, 2016). The word incubator was taken from the basic meaning of the word nurturing, which is to develop, small companies in a protected environment (Thobekan & Robertson, 2015). Business incubation can provide the startups with resources like counseling, office space, and other basic amenities, but

business incubation purpose is also to stimulate internal networking and exchange of knowledge between entrepreneurial start-up firms (Kitagawa & Robertson, 2012; Sa & Lee, 2012).

Incubator programs assist in developing new entrepreneurs and enterprises as well as provide start-up business to survive and to continue in business on a sustainable basis (Baljeet, 2014). Business incubators act as an active tool to support the structure of new businesses and give them assistance and support to grow (Al-mubarak & Busler, 2012). According to Adelowo, Olaopa & Siyanbola (2012), the main objective of technology incubators in developing countries is to foster economic development by accelerating the growth of the entrepreneurial and technological base by supporting technological-base SMEs.

Research scholars consider business incubators as establishments that focus on increasing the operational stability and growth of entrepreneurial start-up firms by offering them targeted services and support (Levakova, 2012; Moreira, Marta, & Carvalho, 2012; Masutha & Rogerson, 2014). Business incubation is a tool for promoting innovation and economic development (Bergek & Noman, 2008; Al-mubarak & Busler, 2011). Many researchers seem to agree that incubation is related to the early phase of a venture's life (Grimaldi & Grandi, 2005; Lindelof & Lofsten, 2004; Bhabra-Remedios & Cornelius, 2003). Business incubation is believed to be a powerful tool in developed and developing countries. Business incubators (BI) are among a series of efforts to galvanize and stimulate economic development by promoting the creation and growth of innovative companies (Al-Mubarak, & Busler, 2015). Incubators have now become part and parcel of the new entrepreneurial ecosystem, assisting the growth of new firms based on a broad range of measures (Hausberg & Korreck, 2018). Some researchers have asserted that incubator objectives can be summarized as follows (1) job creation; (2) fostering entrepreneurship climate, (3) commercialize technology and transfer; and (4) economic growth (Akcomak & Taymaz, 2007; Abetti 2004; Adegbite, 2001). The Nigerian government has seen the need to promote and support start-up enterprises through various policies and programs, including the creation of technology business incubation programs.

Background of the Study

Incubation is an enterprise that facilitates the early-stage development of firms by providing office space, shared services, and business assistance (Hackett & Dils, 2004). Phillips (2002) asserted that technology business incubators had not had a high level of technology transfer in spite of the reason that many were established with that objective. This finding supports the reason not to stop investigating the challenges that obstruct the technology transfer arrangement because most technology incubator programs state as their objective the transfer and commercialization of technology (Elena, 2015). In a seventeen (17) study reviewed by Ayatse, Kwahar and Iyotsuun titled —Business Incubation process and firm performance: an empirical review in 2017, three (3) studies argued that business incubation process contribute little or nothing positive to enhancing tenants or graduated firm performance, while fourteen (14) studies support the position that incubation brings about an entrepreneurial spirit that assists business ventures and lead to creation of new ventures, have positive impact on economic growth and development. While Siehitoglu & Ozdemir (2013); Voisey, Jones & Thomas (2013) and Al-mubarak & Busler (2011) concluded that incubators have positive impact on firm survival, turnover, employment, and job creation, studies conducted by Schwartz (2012) and Amezcua (2010) suggested that incubation has not contributed majorly to the survival, employment and sales growth of incubated firms. There is no standard method for measuring incubator performance, which makes a comparison between studies difficult (Harper-Anderson, & Lewis, 2018).

Considering the large amounts of money invested in incubators by Governments, universities, research institutions, municipal agencies, and other interested parties, the question of what return society gets on these investments has been raised (Bergek & Norrman, 2008). Business Incubators have been receiving an increasing interest as a means of promoting new business, prevention of business failures and establishment of a active entrepreneurship sector both in developed countries and also developing countries in recent years (Ratinho, Harms, & Groen, 2010; Scillitoe & Chakrabarti (2010), Aerts, Matthyssens & Vandenbempt (2006) and Bruneel et al. (2012). Vijah Manimala (2012) sounded a note of warning to developing nations against copying verbatim the models adopted by developed countries because of social, cultural, economic, and political diversities.

Nonetheless, Akcomak (2009) noted that the models used by developed countries can still be useful to the developing countries if the models are modified to meet the specific needs of the incubates firms and the economic situation of the developing countries adopting the developed countries model. The government has to show strong evidence that the resources being allocated to incubators are worth the investment. There is a need for every stakeholder to know how technology incubation centers are performing. (Azih & Inanga, 2014).

This paper will be of use to a wide range of stakeholders that are involved in the promotion of Business incubators, including government, industries, universities, research institutes, students, communities, potential entrepreneurs, financial institutions, etc.

Objective of the Study

The objectives of this study is to appraise the performance of Technological incubation Centres (TIC) in South West, Nigeria,

Literature Review

Theoretical Framework

Quantitative research strength depends on a sound theoretical base. A theory consists of a body of principles used to explain phenomena. It is derived from the Greek word "therein", which means "to look at" (*Mackinnon, 2004*). There are some theories that guide the conceptualization of incubation. They include resource-based view, creation theory, mechanism-driven theory, social network theory, real options theory, dyadic theory, stakeholders' view, structural contingency theory, institutional theory, and virtual incubation view. Two of these theories of conceptualization of incubation shall be discussed in this paper.

Mechanisms-Driven Theory

The mechanisms-driven theory includes the linkage of the real causes, events before, or necessary conditions having an effect on the dynamics of the process of incubation (Hedstrom & Swedberg, 1998). Mechanism driven theory is concerned with how are the incubator and client firm linked, based on what relational aspects? (Ali, 2014). The incubator puts into operation its own in house policies based on an understanding of the relationship that is value loaded and context-based contained in the incubator organization (Ali, 2014).

Resource-Based Value

Resource-based value theory of incubation sees incubation as a mechanism of awarding a stock of tangible and intangible resources to client enterprises resulting in, in addition to other benefits, client firm growth (Mc Adam & Mc Adam, 2008; Patton, Warren, & Bream, 2009; Todorovic & Moenter, 2010). Resource-based view shifts attention to the internal resources or strengths within an organization to manage uncertainty, rather than taking advantage of the opportunities available by the changing external environment (Burton & Rycroft-Malone, 2014).

The Concept of Incubation

The first private incubator was set up in New York in 1959 (Lewis 2001), while the first public incubator was started in Philadelphia in 1964 (Campbell & Allen, 1987). The incubation process is comprised of three main levels, starting with the entrance of the entrepreneur in the incubator; the processing of the company's product and development of the organization; and the exit of the company from the incubator, as soon as it is ready to compete and grow in the open market (Abraham, 2017). Incubators are tools for promoting the development of technologybased growth firms (Bergek & Norrman, 2008). Business incubation can be defined as a business support process that increases the successful development of start-up firm and up and coming companies by providing entrepreneurs, with an array of targeted resources and services (Kathleen, 2006). Incubators are mainly divided into three categories: Mixed-use incubators, technology incubators, and economic development incubators. Mixed-use incubators support continuous regional industrial and economic growth through general business development. Economic development incubators reduce the development gaps by industrial restructuring and job creation (Aernoudt, 2004).

Technology incubators assist in transforming research and technology-based ideas into commercial products and services by fostering the creation and growth of start-up companies (Khorsheed, Al-Fawzan & Al-Hargan, 2014). The two main types of goals of incubation centers are (a) enhancing economic development and/or reduce

unemployment in a region by facilitating the start-up of new companies, increasing their survival rate and growth and, more generally by training entrepreneurs, and (b) stimulating firms involved in emerging technologies or the commercialization (or transfer) of research done in universities, research institutes and firms (Peters, Rice & Sundararajan, 2004; Phillips, 2002; Bhabra-Remedios & Cornelius, 2003). Akçomak (2009) demonstrated that incubators are effective tools for entrepreneurship promotion in developing countries.

Technology Business Incubators (TBI) are seen as a means of tackling developmental challenges (Bubou, Amassoma, & Okrigwe, 2011). Though technology incubators share the same general goals as business incubators, they focus more on the commercialization and diffusion of technology by firms. They nurture hi-tech startups and present a technology-oriented variant of business incubators (Stefanović, Devedžić, & Eric, 2008). Entrepreneurs require help from business incubators and other businesses within the same sector in order to transfer knowledge and shared experience (Dey, 2012).

Business incubation programs combine resources of place, people, and process with helping new companies survive and thrive from the time of their conceptualization to their launch as successful graduate companies that can contribute positively to economic growth and job creation (Almubarak & Busler, 2015).

The main goal of BIs is to produce successful firms that are economically viable and self-sustaining within a reasonable time (Yee, 2009). The main objectives for establishing BI, include job creation, entrepreneurship stimulation, technology innovation, and economic development (Caiazza, 2014; Theodorakopoulos, Kakabadse, & McGowan, 2014; Anderson & Al-mubarak, 2012). Technology Business Incubators are generally established through public-private collaborations among universities, industry, and all levels of government (Etzkowicz, 2002). Wiggins & Gibson (2003) identified five tasks business incubators must accomplish in order to be classified as successful: (1) Provision of entrepreneurial leadership (2) establishment of clear metrics for success (3) develop a rational-new selection process (4) develop and deliver value-added services to member companies (5) ensure that constituent firms gain access to necessary human and financial resources. While Al-mubarak & Schrod (2012) used four indicators to measure the performance of incubators (1) graduation of businesses from incubators (2) success of businesses incubated (3) jobs created by incubation (4) salaries paid by incubator clients. According to Azih & Inanga (2014), the following factors contribute to the performance of the Technology incubation center: Networking and mentoring, technology transfer program, physical space and other facilities, information asymmetry, monitoring and reporting, collaboration and benchmarking, advertisement and promotion, fundraising. Incubators' local environment, age, and size have an influence on its success (Ayatse, Kwahar, & Iyortsuun, 2017). There are many measures of incubation performance or outcomes such as occupancy rate, the added value of incubator service, the number of proportion of firms graduated, growth of the tenant firms, jobs and wealth created, number of patent applications per firm (Özdemir & Şehitoğlu, 2013). Few studies explore post incubator performance (Dee, Livesey, & Minshall, 2011). Success Factors: According to infoDev (2009) a number of factors are critical to the success of Business incubators: There is no one-size-fits-all business incubator model that will work in all contexts; a thorough feasibility assessment, founders of business incubators must ensure that managers have the right skills and mentality for the job and that there is sufficient incentive for the managers to stay; Business incubators must be set up in such a way that they can operate in a business-minded fashion; Business incubators must ensure that their selection criteria for incubates are in line with the core objectives of the business incubators; adequate space, and private sector partnership (infoDev (2009).

Technology Business incubators are operationalized as some parks technology incubators, innovation centers, and accelerators, technology business incubation. They are believed to be promising policy tools that support innovation and technology-oriented entrepreneurial growth (Mian, Lamine, & Fayolle, 2016; Bergek & Norman, 2008; Hackett & Dilts, 2004).

Business incubation centers and technology incubation centers will be used interchangeably in this study.

In this paper, the term business incubator will be used interchangeably with technological business incubation centers. This is because technological business incubation centers are firms that promote technological –oriented

products within business incubators. The terms science parks, research parks, technology parks, technology incubators, technology innovation centers, and technology business incubators are used interchangeably in many countries (Adelowo, Olaopa & Siyanbola, 2012)

Scholars have not yet agreed on a single definition of an ideal type incubator (Albort-Morant & RibeiroSoriano, 2016). There is no universally accepted definition of business incubation and incubator (Theodorakopoulos, et.al, 2014). However, Table 4.2 gives various definitions of BIs, while Figure 4.1 shows the Incubation Process.

Table 4.1: Definitions of Business Incubators

Definition	References
"A facility which promotes the early-stage development of a for-profit enterprise within the confines of a building (...)"	Plosila and Allen (1985)
__Real estate projects with shared space and administrative arrangements [and] organize the business development process."	Campbell et al. (1985)
"Seeks to effectively link talent, technology, capital, and know-how in order to leverage entrepreneurial talent and to accelerate the development of new companies."	Mcadam and Marlow (2007), Smilor and Gill (1986)
__A facility with adaptable space which small businesses can lease on flexible terms and reduced rents [where] Support services are available and shared‘	Kuratko and LaFollette (1987)
"Large buildings operated to nurture young companies by providing lowrent space, shared office services, and management advice."	Lumpkin and Ireland (1988)
__Centralized physical facilities that __incubate‘ new and small ventures by providing them with varying support services and other assistance.“	Udell (1990)
__Are multi-tenant buildings providing affordable, flexible space, and a variety of office and support services which share a common purpose: to nurture small fledgling firms into healthy businesses‘	Weinberg et al. (1991)
"Locally based institutions that provide shared physical space and business support services to new and young firms."	Markley and McNamara (1995)
__Organizations that offer fledgling companies a number of benefits—office space, funding, and basic services such as recruiting, accounting, and legal—usually in exchange for equity stakes."	Hansen et al. (2000)
__Producer‘ of business assistance programs. (...) companies and the incubator staff are co-located in the same facility."	Rice (2002)
"An enterprise that facilitates the early-stage development of firms by providing office space shared services and business assistance."	Hackett and Dilts (2004)
__Evolving innovative organizational form that is a vehicle for enterprise development“	Peters et al. (2004)
"Any organization that provides access to affordable office space and shared administrative services."	Bollingthoft and Ulhoi (2005)

"Property-based organizations with identifiable administrative centers focused on the mission of business acceleration through knowledge agglomeration and resource sharing."	Phan et al. (2005)
"Organisations that supply joint location, services, business support and networks to early-stage ventures."	Bergek and Norrman (2008)
"Organizations whose purpose it is to support the creation and growth of new businesses, by supplying a shared office environment and agglomeration of new and small businesses."	Honig and Karlsson (2010)
"Tools to accelerate the creation of successful entrepreneurial companies"	Bruneel et al. (2012)
'Business Incubator is a scheme organized to increase the growth and success of entrepreneurial firms through a different business support resources and services that could include physical space, capital, coaching, common services, and networking connections	Entrepreneur (2014, p. 1)

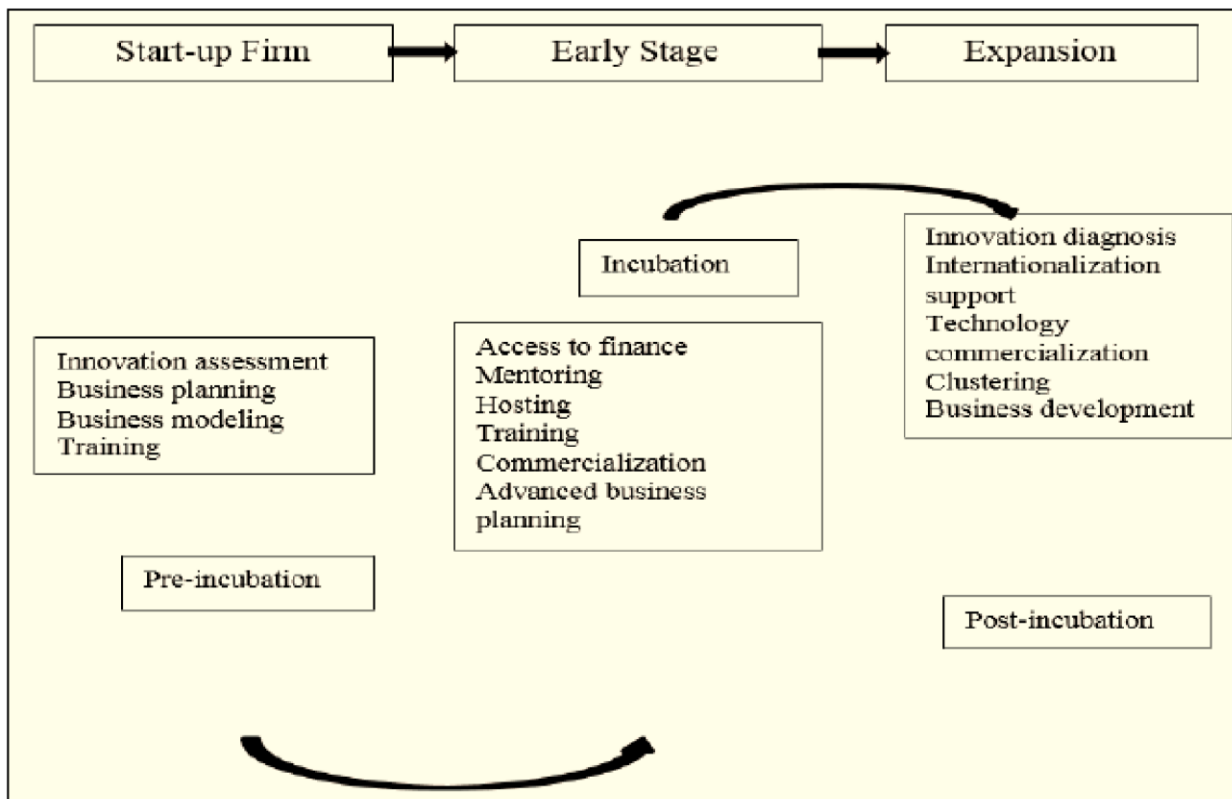


Figure 4.1: The Incubation Process

Source: Adapted from “The Smart Guide to Innovation-Based Incubators (IBI)”, European Union, Regional Policy, 2010, Luxembourg: Publications Office of the European Union.

History of Incubation

According to Abraham (2017), the three major periods of business incubation evolution are First Generation: Initiation and development of the concept (the late 1950s – mid-1980s). This can be termed "Infrastructure: Economies of scale" period. Second Generation: Active growth and development (the mid-1980s –mid-1990s).

"Business support: accelerating the learning curve" is the name of that period. Third Generation: Industry maturity and new leaps of development (the mid-1990s –present). "Networks and value chains" are the major features of this period. Batavia Industrial Centre was the first business incubator opened in New York in 1959. The maiden national study of business incubators was conducted in 1984, while the Business incubation got to China in 1987 with Wuhan business incubator being the first. As of 1980, there were just 12 incubators in the United States, but by October 2012, the United States had over 1,250 incubators. International Business Innovation Association estimates that there are about 7,000 business incubators worldwide (Abraham, 2017).

History of Incubation in Nigeria

Technology business incubators started in Nigeria in 1993, when the first technology incubation center was commissioned in Agege, Lagos. This was followed by a formal program of technology incubation in Nigeria with the promulgation of Decree No 5 of 1995, which gave the supervision and coordination of the program to the Federal Ministry of Science and Technology with effect from July 1995 (FMST, 2005). According to Adelowo, Olaopa, and

Siyanbola (2012), the concept of Technology Incubation was introduced to the Nigerian Government by UNDP & UNFSTD in 1988. The Federal Government of Nigeria then commissioned a consortium of 3 firms to advise on the desirability and implementation modality. This led to the formation of the first TBI in Nigeria at Agege, Lagos in 1993, followed by the TBI in Kano 1994 and Aba in 1996 (Adelowo et al., 2012).

According to Adegbite (2001), the first sets of Incubator centers in Nigeria are Yaba Industrial Estate, Yaba Lagos-1958; Matori SME Estate Fatai Atere way Mushin, Lagos – 1975; Isolo SME Industrial Estate, Isolo - 1993;

Eastern Nigeria Industrial Estate, Enugu-1964; Technology Business Incubators, Agege, Lagos-1993; Kano Technology Incubator Centre, Kano-1996 and Aba Technology Incubator Centre, Abia State -1996. The first three were sponsored by Lagos State Ministry of Commerce and Industry. Eastern Nigeria Industrial Estate sponsored by Enugu State ministry of commerce and industry, Enugu, while the last three were sponsored by the Federal Ministry of Science and Technology. Technology incubation centers are non-profit, making government organizations. The funding comes from the Federal Government of Nigeria through the Federal Ministry of Science and Technology.

National Board for Technology Incubation

The National Board for Technology Incubation (NBTI) is under the Federal Ministry of Science and Technology. NBTI has incubation centers in the six geopolitical zones of the nation. The following information is extracted from the website of NBTI:

—NBTI was instituted by the Nigerian government to implement Technology Incubation Programme (TIP) in all the 36 states of the federation. The Incubation Centres are located in the six geo-political zones of the country.

The following are the objectives of the Nigerian technology incubation program as gleaned from their website:

1. Improvement and enhancement of indigenous technologies.
2. Establishment and management of incubators, promotion of industrial base of the country by commercializing research and development.
3. Promotion of Nigeria's local potentials for economic development through activities relating to technology.
4. Practical demonstration of Research and development outcomes in important areas like the utilization of waste and energy saving.
5. Provision of frequently used facilities like testing, castings, machine, quality control laboratories, and electroplating.
6. Solution to particular process problems for incubatees.
7. Promote the fabrication of equipment and machines complete or partly as requested by the market.
8. Contact Centres and Research Institutions in the design, development, and production of enhanced tools for use by artisans, for increased productivity and earnings.

9. Monitoring the improvement of prototype machines, tools, and equipment that could be used for commercial production.

The expected benefits of the Technology Incubation Program, according to the NBTI, include Improvement in the chances of entrepreneurs success, better skills, mentoring of incubatees, access to seed capital, and information. The government, too, is expected to benefit by promotion of regional development, job creation, income from taxes, overcoming market failures, and showing of government political assurance to small businesses. Also, tertiary institutions and research institutes are expected to benefit by collaboration between the industries and the knowledge base; research results commercialization, provision of a conducive environment for both students and faculties to optimize their capabilities while the community will benefit by the creation of entrepreneurial culture generation of local incomes for businesses within their environment.

Resources / Services Expected In an Incubation Centre

According to Kalidas & Mahendran (2016), the rationale of incubation is to assist in the provision of services and facilities that gives value to selected ventures at reduced costs, so as to assist the ventures in surviving and flourishing. The following services are basically provided, based on needs:

- inexpensive space on flexible rent, and internet connectivity
- facility sharing, like a receptionist, office equipment, conference room, facilities to commence a business plan
- accounting, business planning, and legal advisory services
- technology and trade information services
- facilitation to assist in overcoming barriers like regulation one-on-one mentoring by specialists and board members possibly in-house access to seed capital and angel investors marketing and skills development in business management Help in staff recruitment
- outreach training/counseling for associate-businesses outside the incubator
- contact with university students, faculty, facilities
- legal assistance on the protection of copyright
- opportunities for public relations and business promotion
- opportunity to access national and international support groups.

Expected Benefits of Incubation Centres

Business incubators offer a complete set of services to support entrepreneurial skills and to help nascent entrepreneurs in shaping their ideas, skills, and knowledge (Abdullahi, 2017). Business incubation has been recognized as an effectual support infrastructure for the new businesses (or SMEs) and entrepreneurship across the world because, with the help of targeted business assistance, entrepreneurs are better prepared to transform business ideas into successful new ventures (Lewis, Harper-Anderson & Molnar, 2011). The main role of a Business incubator is to help emerging entrepreneurs by assisting them with the easy availability of capital, technical know-how, expertise, and infrastructure (Kalidas & Mahendran, 2016). Business incubations have been proven to provide the platform for nurturing businesses (Al-mubarak, Busler, Al-Ajmei & Aruna, 2013; Lose & Tengeh, 2015) and also to be an appropriate policy tool for entrepreneurial skills development and promotion (Jibrin, Makoyo & Amony, 2013). According to Abdullahi (2017), there are twelve potential benefits indicators for business incubators: stakeholder support, capacity building, Access to science and technology expertise and facilities, quality of entrepreneur, Availability of funding, Comprehensive business plan, Incubator facility, Networking, availability of funding, financial sustainability, graduation or post-incubation facility, supportive government policies, and competitive and motivated management. Business incubators provide an important service network for new and fledging small and fledging small and medium enterprises (SMEs)- (Meru, & Struwig, 2011). A business incubator can bridge the gap between the business idea and the real-time market (Kalimuthu, & Mahendran, 2016).

Business incubators (BI) have been established around the world to stimulate new business creation (Bruneel, Ratinho, Clarysse, & Groen, 2011). Business incubators (BIs) are popular tools to accelerate the creation of

successful entrepreneurial companies (Bruneel et al., 2011). Incubators are meant to act as a solid foundation for start-ups by offering them experienced monitoring skills; however, the ability of incubators to perform their role is often questionable, especially in the area of performance effectiveness. Developing countries can use business incubation as a tool to help bring new ideas to the market and thereby create social and economic wealth (Khalil, & Olafsen, 2010). Revenue growth, venture funding networking, and alliance building employment or job creation are the performance indices most impacted by the business incubation process. (Ayatse, Kwahar, & Iyortsuun, 2017). Business Incubators can be sound platforms to bring about economic development in any economy. They help mitigate several avoidable risks in an early stage start-up, there increasing the rate of success of start-ups as well as the time taken to gain traction (*National Entrepreneurship Network, 2013*). The appraisal of the global best practices has shown that the programs of

Technology Incubation in Nigeria have fallen short of the expectations for which it was conceived (Adelowo, Olaopa & Siyanbola, 2012). Compared with Business Incubation Centres in countries like the USA, Germany, China, Brazil, Korea, e.t.c. The business of incubation is far behind in Nigeria (Pompa, 2013).

The Challenges of Incubation Centres

In developing countries, business incubators and SMEs still face a number of barriers. This is true of Nigeria, where business failure and high unemployment is rampant. (Statistics of unemployment rate in Nigeria; Lose & Tengah, 2015). According to Khalil, & Olafsen (2010), Business Incubators are faced with a lot of challenges most business incubators find it difficult to reach financial sustainability, finding and retaining management teams with the right mentality and skills set. Rustan (2006) asserted that typically, those in the developing countries face unique problems due to subdued entrepreneurial attitudes, lack of support from government relatively weak infrastructure, and other factors related to their history, geography, culture, and other conditions. Incubators face some challenges in developing countries: poor growth rate, lack of entrepreneurial skills, dwindling productivity, lack of venture capital, aging population, and the lack of true entrepreneurship (Stefanović, Devedžić & Eric, 2008; Hutabarat, & Pandin, 2014).

The business incubators in developing countries were found to lack the fundamental skills to fully contribute to the development of SMEs or small business ventures (Akcomak, 2009). Business incubators in most cases lack the essential skills to contribute fully to the development SMEs (Akçomak, 2009). According to Thobekan & Robertson (2015), business incubators face a number of challenges in both developed and developing countries: Access to entrepreneurial management: Every business incubator faces the challenges of attracting skilled professionals to manage incubator centers (Cullen, Calitz, & Chandler, 2014). Human resources are vital to the productivity of any organization (Nieman & Nieuwenhuizen, 2009).

Lack of entrepreneurial skills: (Grimaldi & Grandit, 2005) asserted that many times the coordinating members at the business incubator might not have sufficient managerial and financial skills and the resources to manage the incubator to achieve its mission. The failure of business incubators to perform can be partly explained by the fact that the managerial team does not come from an entrepreneurial background, and hence, unable to deliver the adequate support required by SMEs (Lalkaka, 2006).

Sustainability: Sustainability and lack of business growth could lead to a Business incubator, not achieving its set goals (Scaramuzzi, 2002). Lack of sustainability is when the incubator cannot maintain and sustain itself, while lack of growth is determined by the total annual turnover and an overall number of graduates in the incubation program (Thobekan & Robertson, 2015).

Access to Technological Based Facilities: Caleb, Olaopa & Siyanbola (2012) observed that limited access of firms to technology-based facilities and problems in accessing tangible and intangible resources further limits the activities of firms. Access to funding and sponsorship: The management of a good incubator should be able to attract sponsors, raise funds, and mobilize resources that incubatees can utilize to boost their businesses. Grimaldi and Grandit (2005) observed that public incubators are non-profit making organizations; thus, they normally get funds through government agencies and collect standard fees from incubatees.

Empirical Reviews

Incubator – Incubator research started in 1984, with the release of the results of Business Incubator Profiles: A National Survey (Temali & Cambell, 1984). Subsequently, two literature reviews were generated by Cambell & Allen (1987) and Kuratko and Lofollette (1987).

Totterman and Sten (2005) discussed the case study of three incubators, three managers, nine tenants, and nine post-incubated clients in Finland. They found that incubator support and networking are important for client firms (incubates) to benefit from incubator resources. Concluding that incubator managers should focus on strategic business rather than providing infrastructure and physical capital to entrepreneurs.

In the United Kingdom, Wynarc Zyk and Raine (2005) carried out, analyzed, and talk about surveys of 17 UK incubators. Quantitative and qualitative evaluations revealed that incubators do play a vital role in bringing up businesses and job creation. The hands-on support lent by the incubator and advisors were found to be important for firm survival, especially in the early stages of the business.

Methodology

Questionnaires designed to examine the performance and impact of Technology Incubation Centres (TICs) on small businesses were distributed in six (6) states in South West Nigeria (Ekiti, Lagos, Ogun, Ondo, Osun, and Oyo states). One hundred and six (106) questionnaires were viable amongst SMEs operating under TICs in these states. The questionnaire was formulated using a Likert scale ranging from Strongly Agree (5) to Strongly Disagree

Results

Table 5.1: Characteristics of Entrepreneurs

Characteristic	Frequency	Percentage
Age		
20 – 30	18	16.98%
31 – 40	33	31.13%
41 – 50	24	22.64%
51 – 60	28	26.42%
Above 60	3	2.83%
Total	106	100%
Number of Years at TIC		
1 – 3	53	50.00%
4 - 6	43	40.57%
7	10	9.43%
Number of Distinct Products		
1 – 5	52	49.06%
6 – 10	25	23.58%
>10	29	27.36%
Number of Employees		
0 – 3	58	54.72%
4 – 7	46	43.40%
8 – 12	2	1.89%
Industry:		
Agribusiness	12	11.32%
Art	1	0.94%
Cosmetics	9	8.49%
Event Management	7	6.60%
Fashion Design	14	13.21%
Food Processing	20	18.87%

Health (Herbal)	14	13.21%
Leather works	6	5.66%
Packaging	9	8.49%
Paints & Chemicals	9	8.49%
Photography	5	4.72%
TIC State:		
Ekiti	17	16.04%
Lagos	21	19.81%
Ogun	21	19.81%
Ondo	12	11.32%
Osun	16	15.09%
Oyo	19	17.93%
Total	106	100%

The table above shows the characteristics of the SME businesses operating under TIC centers in 6 states in southwest Nigeria. The highest number of viable responses (21 each) were collected from Lagos and Ogun state, followed by Oyo state with 19 viable responses, Ekiti state with 17 viable responses, Osun state with 16 viable responses and Ondo state with 12 viable responses. Majority of the SME business owners were within the ages of 31 years to 40 years (31.13%), 26.42% were within the ages of 51 years to 60 years, 22.64% were within the ages of 41 years to 50 years, 16.98% were within the ages of 20 years to 30 years while 2.83% was above 60 years old. Most of the entrepreneurs had operated under TIC for one year to 3 years (50%), 40.57% had been with them for 4 years to 6 years, while 6.60% had been with them for 7 years. A large majority of the entrepreneurs (49.06%) had one to five distinct products or services, while 27.36% had ten or more products, and 23.59% had six to ten distinct products. In addition, the majority of the entrepreneurs (54.72%) had between zero to three employees, 43.40% had four to seven employees, while 1.89% had between eight to twelve employees.

The businesses were seen to operate in various sectors of the economy with Food processing taking the lead at 18.87%, followed by the Health (herbal) industry and Fashion industry (both 13.21%), Agribusiness (11.32%), Cosmetics (8.49%), Packaging (8.49%), Paints & Chemicals (8.49%), Event management (6.60%), Leather works (5.66%), Photography (4.72%) and Art (0.94%).

Table 5.2: Statements on Performance and Impact of TIC

S/N	VARIABLE	MEAN	STD
DEVIATION			
1	Subsidized services	3.53	1.09
2	Entrepreneurial development	3.56	1.25
3	Enhancement of success	3.63	0.95
4	Start-up business creation services	3.50	1.38
5	Skills Improvement	3.51	1.33
6	Access to seed capital	2.66	1.58
7	Working space	4.54	0.62
8	Access to mentors	4.00	1.04
9	Physical safety and security	4.49	0.64
10	Enhanced visibility	3.88	0.90
11	Access to information	3.67	1.19
12	Regular Training	3.19	1.09
13	Exhibition of products	3.66	1.05
14	Back office support	3.69	1.01

15	Access to finance	2.72	1.39				
16	Bookkeeping services		3.59	1.20			
17	Support through early stages of development				3.58	1.32	
18	Internet services	2.46	1.12				
19	Technology transfer	2.85	1.34				
20	Patent and copyright protection		3.39	1.46			
21	Production/operations equipment		2.74	1.39			
22	Expansion facilities	2.99	1.30				
23	Assistance to overcome initial hurdles of business		3.26	1.35			
24	Counseling services	3.94	0.83				
25	Business collaboration within the incubator	3.79	1.21				
26	Business advise regularly	3.89	1.09				

The respondents were asked to rank their level of agreement to statements on the performance and impact of TICs on their businesses. Results from analysis of their responses showed means ranging from 2.46 to 4.54 with standard deviations between 0.62 and 1.58. The top three most agreed impacts of TICs were "Working Space" (4.59), Physical safety and security (4.49), and Access to mentors (4.00). The least agreed impacts were "Access to Funds" (2.72), "Access to Seed Capital" (2.66), and "Internet Services" (2.46). Impacts which gave negative means were: "Internet Services" (2.46), "Access to Seed Capital" (2.66), "Access to Funds" (2.72), "Production/operations equipment" (2.74), "Technology Transfer" (2.85) and "Expansion Facilities" (2.99).

Table 5.3: Comparing Means amongst States

S/N VARIABLE

Ekiti Lagos Ogun Ondo Osun Oyo

1	Subsidized services	3.35	3.57	3.48	3.67	3.69	3.47		
2	Entrepreneurial development	3.24	3.48	3.33	3.42	4.63	3.37		
3	Enhancement of success	3.41	3.52	3.43	3.50	4.56	3.47		
4	Start-up business creation services	3.41	3.57	3.48	3.50	3.63	3.42		
5	Skills Improvement	3.29	3.33	3.33	3.42	4.56	3.26		
6	Access to seed capital		2.18	2.33	2.33	2.50	4.69	2.21	
7	Working space	4.47	4.48	4.43	4.50	4.88	4.53		
8	Access to mentors	3.71	3.86	3.95	3.92	4.94	3.74		
9	Physical safety and security	4.47	4.38	4.48	4.50	4.69	4.47		
10	Enhanced visibility	3.71	3.76	3.71	3.67	4.69	3.79		
11	Access to information		3.35	3.57	3.48	3.50	4.81	3.42	
12	Training regularly	2.94	3.14	3.24	3.08	3.69	3.05		
13	Exhibition of products		3.41	3.67	3.52	3.42	4.50	3.47	
14	Back office support	3.47	3.62	3.48	3.58	4.56	3.53		
15	Access to finance	2.18	2.43	2.33	2.50	4.81	2.32		
16	Bookkeeping services		3.29	3.43	3.43	3.50	4.81	3.26	
17	Support through early stages of development		3.29	3.48	3.38	3.50	4.63	3.32	
18	Internet services	2.06	2.24	2.19	2.25	4.19	2.05		
19	Technology transfer	2.47	2.71	2.67	2.83	4.25	2.37		
20	Patent and copyright protection		3.12	3.19	3.19	3.33	4.56	3.11	
21	Production/operations equipment		2.29	2.52	2.48	2.67	4.44	2.26	
22	Expansion facilities	2.65	2.81	2.71	2.92	4.38	2.68		
23	Assistance to overcome initial hurdles of business			2.88	3.10	3.05	3.17	4.69	2.89

24	Counselling services	3.82	3.90	3.86	3.92	4.44	3.79	
25	Business collaboration within the incubator			3.59	3.76	3.62	3.75	4.56 3.58
26	Business advice regularly	3.71	3.76	3.76	3.75	4.75	3.68	

Responses from each state were analysed to get their individual means on each impact, as presented in Table 3 above. The top agreed with the impacts of TICs on small businesses deferred across states, as explained below. Negative means were seen in all states except Osun state

Ekiti: Responses from entrepreneurs operating under TIC in Ekiti state gave means ranging from 2.06 to 4.47.—Physical safety and security(4.47) and —Working Space(4.47) had the highest means. Less than average means reflecting negative opinions about impact were seen in the analysis of responses from Ekiti state, the statements with the least means were: —Access to Finance(2.18), —Access to Seed Capital(2.18) and —Internet Services(2.06).

Lagos: Responses from entrepreneurs operating under TIC in Lagos state gave means ranging from 2.24 to 4.48.—Working Space(4.48) and —Physical safety and security(4.38) had the highest means. Less than average means reflecting negative opinions about impact were seen in the analysis of responses from Lagos state, the statements with the least means were: —Access to Finance(2.43), —Access to Seed Capital(2.33) and —Internet Services(2.24).

Ogun: Responses from entrepreneurs operating under TIC in Ogun state gave means ranging from 2.19 to 4.48.—Physical safety and security(4.48) and —Working Space(4.43) had the highest means. Less than average means reflecting negative opinions about impact were seen in the analysis of responses from Ogun state; the statements with the least means were: —Access to Finance(2.33), —Access to Seed Capital(2.33) and —Internet Services(2.19).

Ondo: Responses from entrepreneurs operating under TIC in Ondo state gave means ranging from 2.25 to 4.50.—Physical safety and security(4.50) and —Working Space(4.50) had the highest means. Less than average means reflecting negative opinions about impact were seen in the analysis of responses from Ondo state; the statements with the least means were: —Access to Finance(2.50), —Access to Seed Capital(2.50) and —Internet Services(2.25).

Osun: Responses from entrepreneurs operating under TIC in Osun state gave positive means ranging from 3.63 to 4.94.—Access to mentors(4.94) and —Working space(4.88) had the highest means. There was no negative mean in this state.

Oyo: Responses from entrepreneurs operating under TIC in Oyo state gave means ranging from 2.05 to 4.53.—Physical safety and security(4.47) and —Working Space(4.53) had the highest means. Less than average means reflecting negative opinions about impact were seen in the analysis of responses from Oyo state; the statements with the least means were: —Access to Finance(2.32), —Access to Seed Capital(2.21) and —Internet Services(2.05).

Discussion and Conclusion

The results of the analysis show a general overview of the performance of TICs in southwest Nigeria with "Working Space" and "Physical safety and security" being the most agreed to in terms of their impact on small businesses. Six out of the 26 impacts showed negative means with "Access to Seed Capital," "Access to Funds" and "Internet Services" being the least agreed to. A closer look at the performance of TICs in individual states showed that only Osun state reflected an all-round positive outlook on TIC performance/impact. All other states revealed certain areas TICs need to improve on, most especially "Access to Seed Capital", "Access to Funds" and "Internet Services" which were consistently the least agreed impacts across these states.

It is recommended that TICs in each state be audited regularly and closely monitored to ensure they have a continuous positive impact on small businesses; the statements used in the questionnaire of this study are recommended as yardsticks for such audit. SME funding opportunities should also be provided through TICs. Internet services are obviously non-functional in TICs based on the responses; internet-enabled resource centers

should be made available in TICs to enable entrepreneurs to gain more knowledge of their products and carry out adequate research necessary for their businesses.

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