Technology Incubation Programme for Development of Sustainable Entrepreneurial Skills in Nigeria

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Abstract

Technology incubation have been employed to promote technology-based enterprises in developed nations such as Japan, USA, UK etc. as well as in developing nations such as China, Brazil, India etc. Similarly the Nigerian Government has been implementing this concept since the 1990s with the establishment of Technology Incubation Centres in the country. This paper presents how technology incubation programme has been used to develop sustainable entrepreneurial skills for communities in developing economies such as Nigeria. Technology business incubation is a public and/or private, entrepreneurial, economic and social development processes designed to nurture technology-based business ideas and start-up firms and through a comprehensive business support programme, help them establish and accelerate their growth and success [17]. The concept of technology incubation programme in Nigeria and the role of the National Board for Technology Incubation, the agency responsible for implementing the programme were presented. Based on assessment and performances of the programme in Nigeria, the technology incubation programme has proven to be an appropriate policy tool for entrepreneurial skills development and promotion in developing economies such as Nigeria.

Keywords: technology incubation, technology incubation programme, technology incubation centre, entrepreneurial skills, business incubation.

1. Introduction

In both developed and developing economies, economic policies supporting Small and Medium Enterprises (SMEs) are widely promoted as their role in economic and social development is universally recognized [7]. In most developing countries such as Nigeria, SMEs account for the majority of firms, provide a large share of employment and play a crucial role for economic growth [8]. It is believed that the new possibilities for growth, innovation and job creation will come from them [9]. They play a vital role in achieving economic growth of many developing countries including Nigeria.

However SMEs have several challenges e.g. their small size is an important constraint for process and product innovation, problems in gaining access to resources, problems in the R&D development initiatives, limited links with knowledge sources, financial constraints etc. In dealing with the above challenges facing SMEs, one of the mechanisms employed by many governments to assist them so that they will not fail at early stage is the "Business Incubation". Business incubation is considered as a remedy to the challenges that SMEs are encountering by providing numerous business support services. Business incubation is useful in fostering technological innovation. It is a mechanism for new venture creation and technology-based entrepreneurship. It is an initiative to deal with market failures related to innovation process and is a mechanism that supports regional development [10, 11].

Based on the above reasons, many countries in the world including Nigeria have increasingly being engaged in establishing business incubators, namely the Technology Incubation Centres.

According to the National Business Incubators Association (NBIA) "Business Incubation catalyze the process of starting and growing companies, providing entrepreneurs with the expertise, networks and tools they need to make their ventures successful. Incubation programs diversify economies, commercialize technologies create jobs and build wealth [12].

Technology Incubators (Technology Incubation Centres in Nigeria) are types of business incubators whose primary goal is to promote the development of technology-based firms, assist in completion of the technologies under development, promote technology transfer, technology commercialization, technology diffusion and encourage entrepreneurship among researchers, academics, engineers etc. Technology Incubators are located at or near universities, R&D institutions, science and Technology parks etc. They are characterized by institutionalized linkages to knowledge sources including universities, technology transfer agencies, research institutions, laboratories, skilled R&D personnel etc. [13].

2. Technology Incubation Programme (TIP) in Nigeria

The Technology Incubation Programme (TIP) in Nigeria is an integrated support programme provided by governments, academic institutions and private sector either individually or in partnership with the intention of creating and nurturing of budding value-added and technology-based enterprises. It is designed to speed up the commercialization of technologies by effectively linking talents, technology, capital and know-how in order to accelerate development of new enterprises. The goal of the programme is to assist small scale budding entrepreneurs to overcome the initial hurdles of carrying viable Research and Development results as well as innovative efforts into profitable enterprises. [1, 5, 6].

2.1 Technology Incubation Programme scheme

To ensure the availability of value-added commercially viable technologies to incubate as well as expanding the reach of the programme across the country, the following schemes have been included in the TIP implementation in Nigeria.

- **Pre-incubation:** Pre-incubation is for a period of 6 months covering the activities of the entrepreneur prior to admission into the 3-years incubation programme. The activities include admission mentoring, business planning coaching etc.
- **Incubation**: when an entrepreneur admitted into pre-incubation successfully completes the six months pre-incubation, he/she may be admitted into the ***Resident incubation*** in which the entrepreneur is allocated an incubation unit at the Technology Incubation Centre (TIC) for a maximum of 3years or ***Non-Resident incubation*** (virtual incubation) in which incubation services such as access to knowledge providers, finance, linkages/networking etc are extended to the entrepreneur outside the TICs.
- **Post-incubation**: Entrepreneurs under the programme graduate after 3 years. To ensure survival and sustained competitive growth of graduates some intervention measures are required. These include:

a) Establishment of a technology park as integral part of every TIC
b) Offer to extended support services in mentoring, linkages to knowledge providers et

2.2 Benefits of Technology Incubation Programme

The benefits of TIP (when best practices are employed) to the different stakeholders include:

a. *For the Entrepreneurs:* It enhances the chances of success, raises credibility, helps improve skills, creates synergy among client-firms and facilitates access to mentors, information and capital.
b. *For the Government:* It would help overcome market failures, promote regional development, generates jobs, incomes and taxes and becomes a demonstration of political commitment to small businesses
c. *For the Research Institutes and Tertiary Institutions:* It helps strengthen interactions and collaboration between the knowledge-base and the industries, promote the commercialization of research results and fosters enabling environment which encourages Faculties and students to maximize their potentials/capabilities
d. *For the Local Community:* It enhances the creation of entrepreneurial culture as well as local incomes and jobs with majority of graduating businesses settling within the area.

3. National Board for Technology Incubation (NBTI)

The Federal Government has been encouraging entrepreneurship development through a number of institutional mechanisms which have been set-up to encourage entrepreneurship among the citizens. The National Board for Technology Incubation (NBTI) established under the Federal Ministry of Science and Technology in 2005 is one of the institutional mechanisms set-up by the Government to speed up the commercialization of technologies by effectively linking talents, technology, capital and know-how in order to accelerate the development of new innovation-based enterprises [1, 5, 6]. The major activities of the NBTI that have evolved during the years of its existence include.

- Providing institutional infrastructure and mechanism for development and commercializing of R&D outputs and inventions.
- Subsidizing all services provided by the TIP in order to reduce the overhead burdens of start-up enterprises.
- Involving all relevant stakeholders in the establishment of Technology Incubation Centre arises the country and to ensure effective compliance with policy and regulations of TIP.
- Sourcing and developing commercially viable indigenous and foreign technologies.
- Sourcing entrepreneurs and investors for the commercialization of chosen technologies.
- Sourcing funds for implementation of the TIP.
- Ensuring competitiveness of products of the programme through

value—added service support and effective linkages to knowledge providers to ensure continuous injection of innovation in materials processing and/or equipment.

- Ensuring efficient and effective performance leading to accelerated growth of entrepreneurs in the program.
- Providing post-incubation survival scheme for the graduated enterprises from the program.
- Ensuring value re-orientation in business operations for innovation which value addition.

4. Technology Incubation Centres (TICs)

In Nigeria, the Government's effort towards the development of SMEs can be said to have relied on an array of structure and mechanisms, with the establishment and operations of industrial estates, industrial nurseries, Industrial Development Centres (IDCs), Entrepreneurship Development Centres (EDCs), Technology Incubation Centres (TICs) etc. The TICs are specialized form of business incubators, an expression which serves as structures for facilitating the effort of technology-based entrepreneurs towards the development of business ideas into commercially viable enterprises [2]. They also serve as facilities for the commercialization of R&D results from academic and research institutions. Efforts to establish incubators in Nigeria began with the United Nations Fund for Science and Technology for Development (UNSFTD) attempt to establish a pilot Centre in Lagos State in 1989. After several years of little or no action, incubators (TICs) were eventually established under two umbrella organizations created for their development. The organizations are the Nigerian Incubator System Foundation Board and the Implementing Committee which were created in 1993 by the government to develop and implement the Technology Incubation project in Nigeria. The Foundation Board and Implementing Committee consist of representatives from the private sector, Federal and State Governments [4]. They were charged with the responsibility of establishing the first TIC to be located in Agege, Lagos (1993). The second in Kano (1994) while the third one in Aba (1994). Presently there are 29 TICs located in various States of the Federation and effort towards the establishment of TICs in all the States is in progress. **Fig.1** below shows the spread of the TICs across Nigeria.

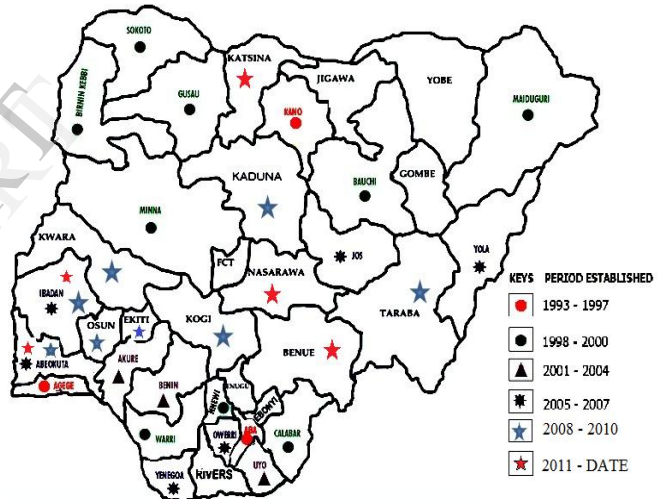

Fig.1: Spread of Technology Incubation Centres (TICs) in Nigeria.

The functions of the TICs are:

1. Admission and graduation of Entrepreneur in accordance with TIP policy guidelines.
2. Provision and maintenance of infrastructures such as incubation units, offices, water electricity, communication etc.
3. Technical support such as technology transfer, technology commercialization, product design and development etc.

4. Human resources development such as skills acquisition, entrepreneurship development etc.
5. Linkage and collaboration with R&D provider, Universities, Research Institutes, inventors/innovators, SMEs, States & Local Governments, NGOs etc.
6. Provision of financial support, legal services etc to the entrepreneurs.
7. Product registration and standardization.
8. Monitoring and evaluation of entrepreneur's performance in the centre.
9. Ensuring industrial safety and security in the Centres
10. Services delivery to the entrepreneur.

5. Role of TIP in developing entrepreneurial skills

In both developed and developing economies, SMEs are considered crucial in fostering economic and social development. The failure rate of small new businesses in the initial stage is high both in developed and developing economies particularly in Africa where there is a higher percentage of inexperienced people starting businesses. The failures may arise from challenges such as the competitive environment within which the businesses are launched, lack of experience of the entrepreneur who is launching the business, lack of entrepreneurial skills of the business owner, lack of financial resources, lack of legal support information, little access to technology etc. [14]

5.1 Entrepreneurial skills

Entrepreneurship is an activity that involves the discovery, evaluation and exploitation of opportunities to introduce new goods and services, ways of organizing markets, process and raw materials through organizing efforts that previously had not existed [15]. The Entrepreneur is the agent of change who identifies an innovation to match a market opportunity and mobilizes the human and financial resources to deliver the product at competitive costs and quality, in order to meet (or create) the customer's needs [20]. Entrepreneurial skills are the basic skills necessary to enable an Entrepreneurial to start, develop, finance and succeed in a business [16]. The skills are:

- *Planning Skills*: The ability to plan is a key skill for entrepreneurs. They must be able to develop plans to meet goals in a variety of areas including technology, finance, marketing, production, sales, personal etc.
- *Communication Skills*: Entrepreneurs should be able to explain, discuss, sell and market their goods and services. Entrepreneurs need to be able to express themselves clearly both verbally and in writing.
- *Marketing Skills*: A business success or failure is dependent on whether the business reaches the market (its potential customer) interests the market and results in those that the market decided to buy. Good marketing skills results in people wanting to buy your goods or services. This is also very critical for entrepreneurial success.
- *Interpersonal Skills*: Entrepreneurs constantly interact with people including customer and clients, employees, investors etc. The ability to establish and maintain positive relationship is crucial to success of the business.
- *Basic Management Skills*: The entrepreneur must be able to manage every component of the business. The business must have the right

resources and the resources are being used effectively.

- *Personal Effectiveness*: Entrepreneurs must have the ability to manage time well and to take care of personal business effectively. They benefit greatly by being aware of their own strength and weakness.
- *Team Building Skills*: The entrepreneurs must be able to effectively develop and manage the team who helped them in achieving their business success.
- *Leadership Skills*: One of the most important leadership skills an entrepreneur must have is the ability to develop a vision for the business and to inspire the employees to pursue that vision as a team.

Few Entrepreneurs posses every skills needed to ensure business success. Entrepreneurs often look to experts for help in areas such as business planning, accounting and finances, legal issues, marketing strategy etc [18]. The business incubator (TICs) is one of the environments where the Entrepreneurs can be assisted to improve his/her entrepreneurial skills.

5.2 Developing entrepreneurial skills through technology incubation

One of the major goals of the TICs is to promote successful entrepreneurship and to improve business environment for SMEs so that they can overcome the challenges facing them and also to assist them in utilizing their full potentials in their businesses. TICs provide focused support services to entrepreneurs through a supportive environment that help them to establish their business ideas and develop their concepts into market ready products, facilitate the raising of necessary finance etc, all of which are targeted towards reducing their failure at early stage [19]. The services and facilities provided in the TICs for the development of entrepreneurial skills to the SMEs are:

- *Business planning and skills development*: The TICs provide training in business planning and skills development in order to help its tenants to overcome the common barriers to start-up, survival of their products and to attract investor who may be willing to invest as business partner in the tenants' businesses. The Centre provides a range of business planning advices and basic business skills training such as preparation of business plans, financial documentation, market research, feasibility studies for business development, management skills training etc.
- *Business training*: is offered in the TICs include management skills training, marketing skills training, knowledge transfer etc.
- *Business information services*: The TICs provides its tenants with information such as tax information, information on new innovations and technology, intellectual property rights, information on financial sources etc.
- *ICT facilities*: The Centres are equipped with ICT facilities such as access to internet, design of website, e-mails, e-library etc.
- *Seminars*: The TICs usually organize seminars on topic of special interest such as emerging technology, entrepreneurial skills or any other topics based on the needs of the tenants and invite guest speakers to deliver lectures on the topic.
- *Professional consulting services*: The TICs also provide professional consultancy services to individuals intending to start their business. These services include basic

advisory services such as marketing advice, legal advice, financial advice etc.

- *Common Facility Services*: The tenants of the TICs benefit from affordable access to various types of production and office equipments and services. These services include physical and industrial infrastructure, conference hall, seminar rooms, meeting rooms, computer laboratory, quality control laboratory, workshops etc.
- *Financial networking*: The TICs establish and maintain relationships with a network of banks, funders, associations, investors, government agencies to acquire capital, grants, loans, equity etc for the tenant companies.
- *Professional networking:* The TICs develop a network of professionals and business owners that have the technical, legal and business skills needed to support their tenants' businesses. The interaction between the professionals and the tenants is meant to assist the tenants in product, business and other skills development through mentoring, coaching and counseling.
- *Educational institution networking*: The TICs establish linkages with educational institutions which can provide technology, research resources and R&D outputs for their tenants. The TICs are located in cities where there are colleges, training institutions, vocational institutions, universities, polytechnics etc.
- *Networks of suppliers, customers and investors*: The TIC facilitates interaction between its tenants and key industrial sector players of the locality in areas of raw material sourcing, machines and equipments supply, potential users and buyers of tenant's product, stock brokers etc.

Plates 1 and 2 below show some of the common facilities available in the Technology Incubation Centres.

Plate 1: Product Quality Control Laboratory in TIC Nnewi

Plate 2: Seminar/Conference hall in TIC Kano

6. Achievements of TIP in developing entrepreneurial skills

The TICs since their establishment in Nigeria have graduated over 5000 technolgy-based SMEs who have created over one million jobs across the country and generated wealth of about N2bn [3]. Currently there are over 300 entrepreneurs in the TICs with total net-worth of over N1bn and jobs of over 3000. In 2012, the TICs graduated 43 entrepreneurs who have created 501 jobs and generated wealth of N648.5m. In 2013, TIC Minna graduated 11 entrepreneurs who have created 54 jobs with a total net-worth of N33.44m and TIC Calabar graduated 15 SMEs.

Some of the achievements of the TIP are also shown below in the successes of some Entrepreneurs in the TICs:

- Fatima Shekarau, Managing Director of Naffy Fibers, a company that produces bumpers for automobiles dreams to be the one of the richest women in the world. - *Reported by Nigerian Daily Sun of 13th May, 2008.*
- Mustapha, Managing Director of Fijir Addabashir Company started chalk business with an employee using a locally fabricated machine in TIC Kano. Now comfortably relocated to his building and employs over 30 people including numerous dealers, sub dealers and distributors. In 2012, the company was selected by the Kano State Government to empower 440 youths.

- Messrs Dandago Agricultural Machinery Company who is into fabrication of agro-allied machinery came into the TIC Kano 4 years ago with with very little working capital and few equipment for a start-up. Presently, the current monthly transaction record of this entrepreneur runs into some millions of naira. He has 33 staff and has created over 1,500 direct and in-direct jobs. The Enterprise was selected under the Kano State Government-NEPAD-TIC Tripartite Agreement to empower 200 youths in Kano.

Table 1 below shows the performance in terms of wealth generated and jobs created of one of the Entrepreneurs undergoing incubation in the TICs:

Table 1: ***Performance of one of the TIC Entrepreneur***

Initial starting capital = N210, 000 during admission into the TIC in 2009

S/N	Fabrications	Wealth generated (N=Naira)	Number of jobs created
1	186 Grain threshers	186 Threshers@ N284,000/Each =N52, 824,000	186x8= 1488
2	162 Stalk Grinding Machines	162 machines@ N128,000/Each = N20,736,000	162X5= 810
3	187 Oil Extraction Machines	187 machines @N96,000/Each = N17,952,000	187X3= 561
4	77 Rice Processing plants	77 plants@ N420,000.00/Each = N32,340,000	77X10= 770
5	42 Tractor Traction Aids	42 Aids@ N120,000.00/Each = N5,040,000	42X4= 168
6	Fabrications from Malaysia, Ethiopia & JAICA	N6,740,000	-
7	TICs, Students & Other Subsidized Projects	N8,126,000	-
	TOTAL	**N143,758,000**	**1649**

Plates 3, 4, 5, 6 and 7 show some of the products produced at the TICs. While plates 8, 9 and 10 shows the pictures of participants of skills training programmes conducted at the TICs.

Plate 3: Neem products

Plate 4: Small-scale industrial processing plants.

Plate 5: Electrical products

Plate 6: Agro-processing machines

Plate 7: Avian egg hatcheries

Plate 8: Youth skills training programme on metal fabrication.

Plate 9: Youth skills training programme on leather products manufacturing.

Plate 10: Women empowerment programmes.

7. Conclusion

The Technology Incubation Programme (TIP) in Nigeria have proven to: be an effective policy tool for empowering SMEs, increase survival rates of SMEs at early and high risk growth stage, help them to manage risks and build competitive entrepreneurial skills. In this respect the TIP plays a very important role in providing the necessary entrepreneurial skills for SMEs in Nigeria.

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