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REDUCING UNEMPLOYMENT IN NIGERIA – THE ROLE OF TERTIARY INSTITUTIONS IN THE ENTREPRENEURIAL DEVELOPMENT OF ENGINEERING GRADUATES

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ABSTRACT

In Nigeria, the number of unemployed persons in recent times increased to 23,187,000 in the fourth quarter of 2020 from 21,765,000 in the second quarter of 2020, hence this paper is an exposition on the role of tertiary institutions in the entrepreneurial development of engineering graduates most of whom are unemployed. A brief discuss on the need for engineering-based entrepreneurship is presented. The key challenges hindering engineering entrepreneurship in Nigeria are highlighted. Some of the roles and strategies which the tertiary institutions in Nigeria can deploy to foster entrepreneurship amongst engineering graduates are presented and include; highly functional and strategic entrepreneurship development centers with think tanks, funding support for the most promising business ideas of students, business and entrepreneurship-motivated research, engaging with government and policymakers to make entrepreneurship fostering policies and minimize bottlenecks to business amongst others. Edo State University Uzairue is presented as a case study of a tertiary institution in Nigeria that has taken some steps in the right direction as regards entrepreneurial development. It is concluded that all stakeholders such as the government, industry, NGOs, and the students/graduates must partner with the tertiary institutions to achieve commendable results on the uphill task under consideration.

Keywords: *Entrepreneurship, tertiary institutions, engineering, unemployment, development, Nigeria.*

1.0 INTRODUCTION

Engineers are expected to be innovative, problem solvers, and highly resourceful. Entrepreneurship on the other hand entails identifying a gap and/or a problem and establishing a business to bridge the identified gap or solve the problem in return for profit. It is glaring that Nigeria has a plethora of challenges and problems to be solved. Challenges such as insecurity, food shortage, water shortages, poor power supply, and over-reliance on import-based products amongst many others are some of the challenges to be tackled via engineering entrepreneurship. It is thus superfluous to mention that a well-trained engineer with adequate exposure and training in business and entrepreneurship skills will find Nigeria a goldmine, a place with ample business opportunities. Some of the many challenges bedeviling Nigeria are opportunities in disguise. However, the potentials of these opportunities will never be realized without entrepreneurial strides (Nnanna & Opara, 2012; Fulgence, 2015).

The Chemical Engineering curriculum, for example, covers the core areas of Chemical Engineering such as chemical reaction engineering, chemical engineering design, transport phenomena, biochemical engineering, environmental engineering, engineering economics, software application in chemical engineering, etc. as well as the required foundational courses (Aluyor et al., 2019). This is comparable to other engineering curriculums from a variety of engineering divisions, however, they have failed to address the country's severe unemployment problem.

The Malaysia Education Blueprint 2015 – 2025 (Higher Education) (MEB 2015-2025), for example, was launched by the Ministry of Education in recognition of the importance of entrepreneurship development in the country. It requires academic programs in institutions of higher learning (IHL) to include entrepreneurship education to produce graduates with entrepreneurial skills (Karim, 2016). The Ministry of Education wants all IHL graduates to be employment creators rather than job seekers. Even before they graduate, students should be encouraged to establish their businesses (Ministry of Education Malaysia, 2015). This new direction by the Malaysian Ministry of Education has paved the way for a review and modification of the Bachelor of Civil Engineering (Honours) program (BCE (Hons)) at Universiti Tenaga Nasional (UNITEN) to promote entrepreneurship education and foster entrepreneurial

capabilities among its alumni (Karim, 2016).

The Massachusetts Institute of Technology (MIT) was also studied for the economic impact of entrepreneurship and it was discovered that 50 to 100 percent more engineering than science alumni went on to establish companies. Researchers found that engineering students were just as likely to start their businesses than business majors were and that more than 20 percent of MIT's total founders were from the electrical engineering and computer science department amongst others (Roberts & Eesley, 2009). Thus, the number of courses, programs, and experiential learning opportunities that teach engineering students about entrepreneurship has increased significantly. This initiative has received support from influential publications and professional organizations such as the National Academy for Engineering (NAE) and the American Society for Engineering Education (ASEE) (Rover, 2005).

Not many engineering-based entrepreneurial initiatives and support, however, have been witnessed amongst the graduates of engineering programs in Nigeria. The most popular career path amongst these graduates is to seek white-collar or blue-collar employment in already established firms or companies. Most engineering graduates end up underemployed, working in non-engineering positions in these companies, receiving paltry salaries, and may never get to apply the many years of core engineering training received, yet many others remain unemployed (Dean & Rubrica, 2018). The number of unemployed persons in Nigeria increased to 23,187,000 in the fourth quarter of 2020 from 21,765,000 in the second quarter of 2020 (NBS, 2021).

What are the key challenges inhibiting engineering entrepreneurship in Nigeria? What are some of the things that the tertiary institutions in Nigeria can do to help to surmount these challenges? This paper attempts to presents some answers to these questions.

2.0 ENTREPRENEURSHIP IN ENGINEERING

Most engineering graduates who have ventured into businesses and entrepreneurial activities have not done so in areas that utilize their technical engineering training. It is not uncommon to see a trained/training engineer going to also train as a barber or tailor for some months either *pari passu* or post their engineering training in the tertiary institutions. These engineering graduates then begin a barber's shop or practice tailoring (sometimes packaged as fashion designing) as entrepreneurship. So when the average engineering graduate is asked about entrepreneurship, what readily comes to her/his mind is starting a trading business or learning a semi-skilled craft which they will then practice, usually as a backup plan to landing some white-collar job in a large multi-national corporation. This level of entrepreneurial engagement is not out of place as it also serves to mitigate the endemic unemployment challenge along with its attendant consequences in the country. The thrust of this paper, however, is to go beyond this surface-level scope and understanding of entrepreneurship to explore entrepreneurial possibilities and efforts based on the application of core engineering training, technical know-how, and business competence.

The major challenges to engineering-based entrepreneurship activities include; lack of awareness or deficiency in ideas for entrepreneurship in engineering, difficulty in accessing business capital, and a foreboding business environment in Nigeria. A 2019 World Bank Report ranked Nigeria 131st economies in the world for ease of doing business an improvement from the 146th that was recorded in 2018, policies that create bottlenecks for entrepreneurial-minded persons, an educational system that is not entrepreneurship-focused but rather overly employee production focused, high cost of capital for business amongst several other issues make fostering engineering entrepreneurship in Nigeria an uphill task (Metu and Nwokoye, 2014; Ofili, 2014; Okeke and I, 2014).

3.0 THE ROLE OF TERTIARY INSTITUTIONS

In tackling the challenges itemized in the previous section, the tertiary institutions should do the following;

i. Institute or revolutionize entrepreneurship development centers.

All world-class institutions of higher learning in developed countries have highly functional entrepreneurship development centers. These centers which come in different names for different institutions provide training to students on how to translate ideas to viable businesses. They provide consultancy services to both staff and students to translate their business ideas into actual businesses. These centers oversee annual entrepreneurship ideas competitions amongst university students, sourcing and providing funds to students with the best business ideas. These centers are in constant

dialogue with industry, government, and NGOs to generate funding as well as identify key areas for business development, they provide mentorship and guidance for business start-ups by students or recent graduates. They are at the heart of the entrepreneurial strides and engagements of the top universities. Many universities in Nigeria already have such centers instituted but these centers do not do more than administering a 2-credit unit course to 3rd or 4th-year students. Furthermore, the design and assessment of these courses are such that the students could earn credit without a practical understanding of entrepreneurship. The activities of these centers cannot be said to have translated to significant entrepreneurial breakthroughs especially with regards to entrepreneurship in engineering and technology with which this paper is concerned.

The operations of these centers should be expanded to accommodate more deliverables and services. The entrepreneurship courses should run through the curriculum from the first year to the final year with the first-year entrepreneurship courses providing general training in entrepreneurship and business and the higher-level courses between the third and fifth years providing robust and pragmatic training on entrepreneurship in engineering and technology. These courses may further be narrowed down to provide discipline-specific training on how the core technical knowledge from a given engineering discipline can be translated into entrepreneurial engagements. Engineering students should be trained to see entrepreneurial opportunities within their specific disciplines as well as in collaboration with other engineering and even non-engineering disciplines. In reality, no business can be established on the strength of a single discipline, a synergy amongst several disciplines is required to tackle the multi-faceted challenges in Nigeria and Africa at large and create businesses by so doing.

ii. A specially designed final-year entrepreneurship course project

Project-based learning is a key strategy for transferring and imbuing skills in students (Harmer, 2014). It is suggested that a good way to prod would be engineering graduates to begin to seriously consider and generate ideas for entrepreneurial exploits is to base the assessment of the final-year course on entrepreneurship on a detailed end-of-course business plan project. This business plan project should be undertaken by an interdisciplinary team of students with each member of the team contributing her/his technical know-how to the business idea and the plan for its execution. The business idea from engineering students should serve to tackle a local prevalent technological challenge like, as an example, developing and delivering affordable and scalable solar power solutions to homes to tackle the national energy crisis, not setting up a barber's shop, well maybe there is some engineering challenges in setting up a barber's shop but such should not be the type of engineering entrepreneurship breakthroughs and engagements that should be encouraged amongst engineering graduates who have undergone a 5-year rigorous training.

Furthermore, the plan should address pertinent issues such as sourcing for start-up funds, the techno-economic challenges to be faced, and how they will be surmounted amongst other issues. The best business plans amongst the pool of submissions could be supported with grants from the institutions of higher learning. This project should be carried out in partnership with industry and other businesses that may want to buy into or invest in some of the developed business ideas. Also, the higher-level courses in entrepreneurship should be delivered by not just academics (who have probably never established an engineering and/or technological based business or venture)

iii. Provide support on accessing capital for engineering and technological business solutions.

One of the biggest challenges to entrepreneurship in engineering is the huge start-up capital required. Institutions of higher learning could assist by serving as venture capitalists and also helping to engage and secure other investors for the most promising business ideas presented by engineering students. These businesses when successful will yield a good return on investment (ROI) to the institutions of higher learning and other investors while curbing the unemployment menace and solving a real-life problem based on applied engineering and technology. It becomes a win-win for all parties involved and for society at large.

Furthermore, the institutions of higher learning can leverage their strong rapport with banks and other financial institutions to secure healthy loans for these businesses with the institutions of higher learning serving as guarantors of the loan in exchange for some financial benefits from the businesses. The institutions of higher learning can engage in dialogue with funding organizations such as TETFund, NGOs, and private companies on funding for the best business proposals identified.

iv. Instill a possibility mentality in the engineering students

The average engineering student and recent graduate does not think much of the possibility for engineering and technology-based entrepreneurship exploits from a student or recent graduate. The mindset is that there are just too many challenges militating against the successful operation of an engineering and technology-based business in Nigeria. The poor state of infrastructural development, perceived inadequacy of government support, socio-economic instability, and the constant & complex interplay of political interests and powers in the country portends engineering entrepreneurship as a foreboding endeavor to undertake. The level of self-belief and motivation for engineering entrepreneurship is very low, hence the average engineering graduate will almost always run after paid employment positions rather than attempting to venture into the uncertain waters of entrepreneurship. The institutions of higher learning have a key role to play in creating a positive mindset concerning entrepreneurship and awakening the entrepreneurial spirit amongst students and recent graduates of engineering disciplines. Playing roles like normalizing struggles, simulating real-life challenges, and encouraging engagements with several methods of tackling them, mindset restructuring, and close mentorship as practical as the use of "possibility phrases words" like "not yet", "not entirely", demonstrating mistakes and embracing and celebrating corrections, etc. among numerous other proven steps can instill a "possiblilty mentality".

v. Core engineering courses should be delivered with a bias towards industrial practice, entrepreneurship, and soft skill development.

Students should be made to see and understand the practical applications of the core concepts that they learn in class. One cannot normally conceive a business idea from a potpourri of theoretical and mathematical abstractions without any link to real-life applications (Aluyor, Otoikhian, and Agbodekhe, 2019).

Furthermore, there is a need for the transfer of soft skills necessary for the successful management of people and resources as would be expected of any successful entrepreneur to be imbued in the delivery of the core engineering courses. There is a growing requirement for entrepreneurs and workers to exhibit a broad repertoire of soft skills such as excellent communication skills, strong leadership abilities, teamwork, adaptability, conflict resolution, problem-solving, etc. as the global business sector undergoes a rapid transformation. (Chikumba, 2011; Lowden *et al.*, 2011; Pitan and Adedeji, 2012; Choudary, 2014; Bakhshi *et al.*, 2017; Oloyede, Ajimotokan and Faruk, 2018).

vi. Creation of think tanks within the entrepreneurship development centers

The entrepreneurship centers should have as a core unit within it a think tank made up of the most forward and astute thinkers drawn from across the breadth and depth of the university community including academics, non-academics, and even specially selected students themselves. The functions of this think tank should include frequent brainstorming sessions/meetings on identifying, analyzing, and characterizing the myriads of challenges facing entrepreneurial developments amongst graduates coupled with well-thought-out potential and pragmatic solutions to these challenges. The reports and recommendations of such think tanks should be made available to the university community, relevant government organizations, NGOs, and industry with input welcome from all stakeholders. This think tank should also be responsible for research and studies on the state of entrepreneurial developments amongst graduates of the given institution of higher learning. A key factor in the success of any strategy is a firm establishment of robust feedback, monitoring, and evaluation (FME) system. The think tank should spearhead the FME of the entrepreneurial development initiatives of the institutions of higher learning.

vii. Engage with the government on engineering entrepreneurship friendly policies

The institutions of higher learning as citadels of knowledge should be at the forefront in engaging with government and policymakers to foster the creation and promotion of policies that enhance and incentivizes engineering entrepreneurship while putting away needless bottlenecks to smooth business operations in Nigeria.

viii. Research should be driven by their potential for commercialization

There is a need for more of the research activity by academia and students in the institutions of higher learning to be guided and motivated by the potential(s) of the results of these research (if successful) to be commercialized. This will result in researching business and entrepreneurship coupled with innovative solutions to real-life problems in mind.

ix. Outcome-Based Education as a driver for entrepreneurship

Outcome-Based Education (OBE) is a strategic approach to education that entails a clear definition of

the intended destination (outcomes) of the educational process before the journey is started. Outcome-Based Education (OBE) can be deployed by tertiary institutions to develop graduates that are poised to take up entrepreneurial initiatives. The OBE requires that students be given ample hands-on experience, projects, and tasks to develop core as well as soft skills. The OBE is well fitted to be tooled and used as a driver of entrepreneurial development in Nigerian tertiary institutions.

4.0 THE EDO STATE UNIVERSITY EXAMPLE.

At Edo State University, there is a highly functional entrepreneurship department. Entrepreneurship courses are imbued into the curriculum from the first year to the final year and are compulsory for all students. Furthermore, there is an annual business plan competition for final-year students and successful contestants are awarded business grants worth five million nairas (₦5 000 000) to support the execution of the best business plans.

Also, the students are exposed at the lower levels to various handcrafts to enhance the establishment of small and medium scale enterprises by students. For engineering students at the higher levels, the entrepreneurship course is taught by seasoned engineers with entrepreneurial exposure. Students are provided with the necessary guidance and mentoring to enable them to translate their business ideas into viable business solutions.

4.1 The Entrepreneurship Curriculum at Edo State University

The entrepreneurship curriculum at Edo State University is made up of three (3) courses spread over six semesters from the second year. One course per semester. The courses are; Introduction to entrepreneurial studies I & II, Entrepreneurial skills I & II, and Entrepreneurial development I & II.

4.1.1 Introduction to entrepreneurial studies I & II

The courses introduce students to the definitions, functions, types, and characteristics of entrepreneurship, entrepreneurship, and ethics, entrepreneurship theories, and practice. These courses further expose students to new venture creation; forms of business, business opportunities, starting a new business, innovation, legal issues in business, insurance, and environmental considerations, introduction to biographies of successful entrepreneurs, etc. (Edo State University, 2021).

4.1.2 Entrepreneurial skills I & II

These courses which are typically offered in the third year of studies at EDSU, train and equip students with practical skills and crafts for business creation. Students are required to select two categories/business areas in which they will be trained. The business areas on offer include; Agriculture/agro-allied businesses, Manufacturing, Information Communication Technology (ICT) amongst many others. The students are trained with abundant hands-on experience on how to make different products or render different services in their selected business areas. They are also further exposed to the business prospects and dynamics in their chosen business areas.

4.1.3 Entrepreneurial Development I & II

These courses are the final set of courses in the entrepreneurship training at EDSU. Students are exposed to the entrepreneurial process of writing feasibility studies and business plans. The students are required to form cooperative societies to collaboratively generate business ideas and funds. Course modules include; models of wealth creation, sustainability strategies, financial/ investment intelligence, and international business. The program involves Recognition, Rewards, and Awards (RRAs) and Mentorship. The training ends with the annual business plan competition in which the winners receive five million naira (₦5 000 000) worth of business grants.

5.0 CONCLUSION

The paper has examined the role of tertiary institutions in curbing unemployment through fostering entrepreneurship amongst engineering graduates. It is concluded that even though the task ahead of the tertiary institution is enormous, the tertiary institutions have what it takes to achieve much greater results in the successful undertaking of entrepreneurship amongst engineering graduates.

It is posited that the recommendations and ideas presented in this paper will serve to help tertiary institutions to achieve this uphill task. All stakeholders involved including government agencies, industry, NGOs, academia, and even the students themselves must all synergize in working to foster entrepreneurial exploits amongst engineering graduates

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