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Biotechnology and Performance of SMEs in Nigeria

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Abstract

Nigerian SMEs suffers greatly in terms of struggling for survival. Access to finance is seen as the root of the major constrains including; limited access to water and power supply, good and quality raw-materials as well as modern infrastructures and processing methods. This paper adopts the desk research approach to review the cause and possible solutions and alternatives that can by-pass such constraints. Biotechnology, due to its natural and broad spectrum of application is seen as the potential solution to many of the problems that paralyses performance of Nigerian SMEs. When applied responsibly, the technology has potential of providing alternative source of; sufficient and high quality raw-materials, water and power supply as well as processing methods for industries at a considerably low price, thus, enhancing environmental friendliness, besides improving opportunities for new initiatives, and also enhancing performance efficiency of existing firms.

Keywords: Biotechnology; SMEs; Nigeria.

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1. Introduction

Small and medium enterprises (SMEs) are considered one of the most important initiatives required by developed and most importantly developing countries for sustainable economic development through harnessing potentials of generation of employment opportunities, improving local technology, output diversification, development of indigenous entrepreneurship and forward integration with large-scale industries [1].

Different approaches have been adopted by different countries in defining / classifying small and medium enterprises, thus, there is no single definition/ classification of SMEs [1]. In many developed countries like USA, Britain and other European countries, turnover and number of employees are the major criteria used in defining of SMEs. Nigeria on the other hand uses capital employed in addition to turnover and number of employees in defining SMEs, where many of such definitions are identified, among which, the Small and Medium Enterprises Credit Guarantee Scheme (SMECGS) adopted the definition which describe SMEs as any enterprise that has an asset base (excluding land) between N5 million to N500 million and labor force between 11 and 300. While Small and Medium Enterprises Equity Investment Scheme (SMEEIS) broadly defines SMEs as: any enterprise with a maximum asset base of N1.5 billion (excluding land and working capital) and a turnover of less than N100million, with no lower or upper limit of staff [1].

2. SMEs in Nigeria

Nigerian SMEs faces a lot of challenges to the extent that only about 5% survive their first year of initiatives [2]. This results in the impaired contribution of the SMEs to the country's economic development.

The historical background of small and medium scale enterprises in Nigeria can be traced back to 1946 when the essential paper No. 24 of 1945 on -A Ten-year plan of development and welfare of Nigeria was presented, ever since, SMEs have gained prominence and mention as a seed bed of innovations, inventions and employment generation or creation [3]. SMEs in Nigeria are seen as the backbone of the economy and a key source of economic growth, dynamism and flexibility [4]. The SME sector provides, on average, 50% of Nigeria's employment, and 50% of its industrial output. Indeed, there appears to be an agreement that the development of SMEs in Nigeria is a step towards building a vibrant and diversified economy [5]. This explains why successive Nigerian governments have been spending an immense amount of money obtained from internal and external funding institutions for entrepreneurial and small business development programmes [4]. Previous initiatives designed to assist SMEs in Nigeria included; Mandatory minimum credit allocation by banks to small scale enterprises; the World Bank SME I and SME II loan programmes, the Agricultural Credit Guarantee Scheme Fund (ACGSF) and the Small and Medium Industries Equity

Investment Scheme (SMIEIS). The most ambitious move ever made by the government was the establishment of the Small and Medium Enterprise Development Agency of Nigeria (SMEDAN) to facilitating access to credit, technology and market for the SMEs [6].

The contribution of Nigerian SMEs to the economic development is rather less than satisfactory, which is broadly related to the poor performance of most manufacturing enterprises, where the capacity of utilization falls as low as 30%. The major constrains to industrial performances were believed to include;

2.1. Limited access to power supply

Access to sustainable power (Electricity) supply is vital for socio- economic development. In Nigeria, power supply has been down for long time, due to low efficiency and performance, security of fuel source for power generation, regulatory devices, among many others [7]. Energy consumers, therefore, do not get electricity supplied to them because the local utility companies do not get enough power from the electric grid. The managers of electric transmission in many instances accuse the generating stations of generating insufficient MW capacity. The generating stations, in-turn, either complains of insufficient gas to power their plants or claim that the transmission companies themselves cannot boast of a strong transmission backbone to transmit what is being generated. This makes it necessary for the SMEs to provide a back-up energy (partly infrastructural) which sometimes is as critical as three times the cost of publicly supplied electricity [8].

2.1.1. Low Quality and High Cost of Agricultural Raw Materials

Agricultural sector serves as the major source of income for Nigeria before and immediately after the independence, until oil boom in 1970. Subsequent increase in foreign exchange earnings from crude oil make it dominant in the Nigeria’s economy, which renders agricultural sector less competitive overtime, due to over-valued currency, inappropriate pricing policies and death of labor as a result of increased rate of rural-to-urban migration. These alongside many other factors such as; declining arable land area, irregular rainfall, poor input (fertilizer) supply and poor financial resources, significantly reduces agricultural output in the country [9].

Unpredictable nature of Nigerian climate also contributes to low agricultural productivity, which is due to variation in rainfall trend pattern and to a lesser extent, the temperature [10].

2.1.2. Problems associated with processing methods

Conventional processing methods employed by many chemical industries involve use of chemicals and unsustainable energy which adversely affects thermo-labile compounds in food [11]. In addition, these

methods result in depletion of freshwater reserve, destruction of habitat and overall global health risk due to pollution [12]. The major concern associated with these industries include; excessive reliance on nonrenewable energy and resources, environmentally damaging processes that can be unsafe and production of toxic non-recyclable and non-biodegradable waste product [12].

Federal government of Nigeria in association with the CBN has established many credit institutions with the aim of enhancing SMEs financial access. These initiatives appear to be ineffective as the SMEs still contribute well below 5% to the gross domestic product (GDP) [1], which is seen as a consequence of dreadful conditions put forth by the finance houses prior to getting access to financial support [13].

3. Role of Biotechnology

Modern biotechnology, in respect of its advances and wide range of application is seen as a potentially promising solution to the major consequences and constrains that paralyze the growth and performance of SMEs in Nigeria. Biotechnology has touched almost all aspect of life including; Health (Medical) care, agricultural system, industrial and even the environment in which we live, improving not only the quality of our lives but also maintaining our living standard at reasonably high level [14].

The contribution of biotechnology to the society cannot be over stated, this can be testified by considering its impact in our daily activities like; use of genetically engineered microorganisms such as pseudomonas putida, dechloromonas aromatica [15] for; industrial processes, clearing of hazardous environmental pollutant often converting it to useful substances (e.g. Biofuel), production of commercially important protein (E.g. Enzymes) as well as in designing plants and animal with noble characteristics, to enhance production, nutritional composition, beside improving their shelf life [16].

Biotechnology, when properly applied can provide alternatives that can by-pass constrains faced by majority of our SMEs, including;

3.1. Water and Power supply

Industrial processes, both chemical and biological, requires the supply of large amount of water, especially for biological and cooling processes. In regions where water is scarce and expensive, continuous supply of fresh water at such large scale may be tedious, inappropriate and uneconomical. Shortage of water on the other hand may adversely affect biological as well as many physical and chemical processes [17]. To alleviate such, constrain, it is essential and often inevitable to consider recycling of water. Waste water from the industry and other sources can be efficiently remediated using genetically engineered bacteria, a process

termed Bioremediation [18]. This enables efficient removal of industrial and food wastes, thus allowing non-portable reuse of waste water [19].

The wastes removed in this process can be converted to biofuels and biodiesel which can be used as an alternative source of power to run electric generators. The microbes used in remediation processes can be engineered to produce important by-products such as methane, an important gas used as fuel for energy generation as well as other industrial processes [20].

This alternative minimizes environmental pollution beside ensuring a continuous supply of adequate water and power in the most economically and eco-friendly manner, thus, improving the performance and turnover of SMEs all over the country.

3.1.2. Raw Materials

The impact of biotechnology in the field of agriculture (Green Biotechnology) has changed the face of agriculture [21]. Genetic engineering allows development of plants and plant products with desirable and often noble characteristics, such as disease, herbicide and pest resistance, improved nutritional content, enhanced growth and maturation rate, increased yield and shelf life of product among numerous others [22]. This technique also allows development of genetically modified organisms (GMOs), organisms engineered with gene that increase their disease resistance, productivity, hardiness, and feed efficiency for better yields of meat, eggs, and milk [21].

In this way, modern biotechnology can greatly enhance the supply, diversity and quality of industrial raw materials for SMEs at a considerably lower cost, thereby improving efficiency, quality, quantity and overall acceptability of industrial products besides reducing environmental degradation.

3.1.3 Other Applications

Biotechnology, through immobilization technology can as well improve the efficiency and reduce the environmental impacts of industrial processes like textile, paper and pulp, and chemical manufacturing as well as waste treatment [20]. For example, mixed microbial culture, isolated cell lines or cell free enzymes can be engineered to substitute traditional chemicals in production processes; this will reduce the energy requirement and production of undesirable by-products like HCl, in addition to increased production efficiency and specificity [23].

The unique ability of plants such as Brassica juncea, Brassica chinensis [24], Vetiverca zizonioides, Eluesine indica, Agerntum conyzoides, Euphorbia hirta and Chromolaena odorata [25], Corn (Zea mays) [26], among numerous others to extract minerals from their environment, have been employed in extraction

(Phytoextraction) of useful heavy metals such as Zinc, Cadmium, Lead and Arsenic [27] among others. This has been used as alternative to traditional process of mining for easier and more economical means of retrieving useful metals from underground deposit or contaminated soil [28].

Advances in medical genetics have also enable medical and pharmaceutical firms in early diagnosis and treatment of many detrimental and life-threatening diseases such as cancer, insulin- dependent diabetes, dwarfism among numerous others. The approach which involves insertion of a desirable gene into a harmless strain of bacteria (mostly Escherichia coli) allows commercial production of vaccines [29] and important Human proteins (such as Insulin) for prognosis and treatment of many diseases that could not be treated through conventional approach [30].

4. Conclusion

The field of biotechnology, due to its broad spectrum of application, is seen as the ultimate solution to the problem and constraint faced by majority of Nigerian SMEs. When applied responsibly, biotechnology can provide reliable alternative source of power and continuous supply of raw materials at a reasonably lower price. It can also ensure sufficient and continuous supply of water through recycling of waste water. Biotechnology, through immobilization technology can increase efficiency and specificity of industrial processes, besides reducing the production of toxic industrial by-products, thus reducing energy consumption as well as the detrimental destructive effect of industrial waste products on the environment.

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