

The Effect of competitive advantage on the growth of biotechnology industries in Nigeria

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Abstract: Biotechnology industries constitute a very important segment of the economy. This industrial sector is a major drive that promotes productivity and the growth of jobs in a country. The development of a country has been linked to the strengthening and enhancement of the private sector where biotechnology industries play an important role. The growth of biotechnology industries in agriculture, healthcare, bioenergy has been considered as an engine growth and has been attributable to presence of competitive advantage. Competitive advantage is the ability of an organization or economic sector to produce goods or services more effectively than competitors, thereby outperforming them. Sustainable growth and the increase of biotechnology industries competitiveness has been shown provide the environment for investment and employment. However, the biotechnology industrial sector especially in presence of competitive advantage has not been fully harnessed in Nigeria due to multi-factorial reasons. In view of these, the present study sought to emphasize the growing importance of sustainable competitive advantage on the growth of BIs in Nigeria. This paper offers some guidelines for biotechnology industries, in order to achieve competitive advantage. In a broader view, this paper will serve as source of information that will promote and orient BIs towards competitive advantage in Nigeria. In this way, it will contribute to the continuous growth and dynamic development, as well as increased productivity and biotechnology businesses in Nigeria.

[Shukurat M. Bello, Ibrahim Adamu Ibrahim, Isah Ahmed Waziri, Yusuf Yakubu Adamu, Sani Muhammad Sade, Idris Abdullahi Nasir. **The Effect of competitive advantage on the growth of biotechnology industries in Nigeria.** *N Y Sci J* 2017;10(11):52-57]. ISSN 1554-0200 (print); ISSN 2375-723X (online). <http://www.sciencepub.net/newyork>. 7. doi: [10.7537/marsnys101117.07](https://doi.org/10.7537/marsnys101117.07).

Key words: Biotechnology; Economic growth; Competitive advantage; Nigeria

1.0 Introduction

Biotechnology is a continuum of technologies, ranging from traditional to modern biotechnology (Opabode and Adebooye, 2005). Biotechnology has been defined as any technique that uses living organisms or substances from those organisms, to make or modify a product, to improve plants or animals or to develop microorganisms with specific features for specific uses (Persley, 1992). Modern biotechnology has been useful in many endeavors of life, these include the capacity for improve food security, environmental protection and conservation through production of stress tolerant planting materials for re-vegetation, re-afforestation, soil binding for erosion control as well as genetically enhanced organisms for bioremediation of oil polluted sites, improvement in plants and animals yields as well as nutritional values, production of new breeds/varieties of animals and plants, reduction in the use of pesticides, reduction in farming land area with higher yields, facilitates job and wealth creation, leads to better health facilities, promotion of bioorganic fertilizer development and industrial growth through feedstock development, promotion and development of biopharmaceuticals production, stem cell

technology, biometrics, and biodiversity (Ogbadu, 2013).

Biotechnology is a field of study that has been misunderstood by many people because of some bioethical and biosafety issues, especially those that involve human cells, tissues, organs and life (Ogbonna, 1996). The relationships between human being and God, science and religion are very sensitive and very often interpreted from different angles depending on who, what, where, and why (Ogbonna, 1996). Genetic modification of organisms has been occurring naturally and what biotechnology is doing is to hasten the rate of such modifications (Ogbonna, 1996). However, those who oppose genetic engineering of organisms argue that nature should be allowed to continue at its pace. They refer to a statement that nature has solutions to all its problems. In other words, there are natural solutions to all natural problems. However, nature is no more natural and the present world problems can no longer be left for nature to solve (Ogbonna, 1996).

In recognition of the developmental achievement in science and technology of the 21st century, the Federal Government of Nigeria has put in place a Nigerian Biotechnology policy, and has also

established a Nigerian Biotechnology Development Agency to formulate policies towards accelerating the acquisition of biotechnology (Ogbadu, 2013). The pace at which the field of Biotechnology has been progressing is amazing even to Biotechnologists themselves. It is now obvious that the future of man on earth depends to a very great extent on biotechnology because it potentially has solutions to all human problems and can also create problems that will be difficult for man to handle (Ogbadu, 2013).

Biotechnology has been helping to increase crop and farm animal productivity and has the potential of producing enough food to feed the world (Ogbonna and Ogbonna, 2005). It is now possible to produce crops that are resistant to various diseases and pests; that can mature much faster and produce higher yields even on poor soils; crops that are more nutritious with much longer shelf-life, biofortified food crops, diet food stuff for diabetic patients and people that require special diets, edible vaccines from plant sources; farm animals that grow faster, produce better quality meat, cow and other animals that produce large quantities of good quality milk, birds that lay more than two eggs every day, sheep that produce more and better quality wool (Ogbonna and Ogbonna, 2005).

The human environment can be made much cleaner and safer through biotechnology. It is now possible to genetically manipulate microorganisms to degrade almost any type of environmental pollutants (Ogbonna and Tanaka, 2000). Plants have been genetically modified to fix more carbon dioxide and absorb other greenhouse and acidic gases, plants that can grow under water stress have been produced and used to prevent desertification, Microalgae have been genetically modified for increased bio-diesel oil, bio-gas and bio-ethanol production, genetic engineering has been used to produce second and third generation energy crops for efficient production of renewable energy which are environmentally friendly. In fact, most of our environmental problems can potentially be solved by biotechnology (Ogbonna *et al.*, 1995).

Biotechnology has been imparting positively on industrial sector. Most of bio-industries can now be made more efficient by genetic modification of the biological agents used. Many metabolites of industrial importance can now be efficiently produced by genetically modified microorganisms (Ogunseitan, 2003). Continuous production of better quality wine, beer and other alcoholic beverages have been achieved by genetic modification of microorganisms and bio-process improvements. Sustained development of the world economy must be based on renewable resources for which biotechnology is indispensable (Ogunseitan, 2003).

The importance of Biotechnology in health care delivery cannot be overemphasized. Microorganisms

have been genetically engineered to produce human and animal metabolites such as insulin and human growth hormones. These were being extracted from cadavers and animals with the attendant risks. Many pharmaceuticals, drugs, vaccines, diagnostics and other metabolites of medical importance are now efficiently produced by microorganisms and genetically modified plants (Ogunseitan, 2003).

An increasing number of studies and market analyses measure the economic impact of the industrial biotechnology sector and the biobased economy. Carlson (2016) estimates that the industrial biotechnology sector generated more than \$105 billion in direct Global revenue in 2012. Carlson draws estimate from a review of the total revenue for the biofuels, renewable chemicals, enzymes and biobased polymers industries, controlling for the costs of the non-biotech sectors (Carlson, 2016).

Despite the global utilization of so many biotechnological techniques, the Biotechnology industrial sector especially in presence of competitive advantage has not been fully harnessed in Nigeria due to multi-factorial reasons. In view of these, the present study sought to emphasize the growing importance of sustainable competitive advantage on the growth of BIs in Nigeria. This paper offers some guidelines for biotechnology industries, in order to achieve competitive advantage. In a broader view, this paper will serve as source of information that will promote and orient biotechnology industries towards competitive advantage in Nigeria. In this way, it will contribute to the continuous growth and dynamic development, as well as increased productivity and biotechnology businesses in Nigeria.

1.2 Industrial biotechnology in Nigeria

In simple words, industrial biotechnology is the application of biotechnology in industries. In that sense, commercialization of research results from other areas of biotechnology (i.e. medical, environmental, food and agricultural biotechnology) can also be considered industrial biotechnology. For the purpose of this review, it is rather necessary to restrict the discussion on industrial biotechnology to use of biotechnology to produce useful metabolites of industrial interest.

With huge biological resources, Nigeria is in a position to produce many biotechnological products at competitive prices. However, there is a need to develop technology and processes that are cheap, simple and sustainable in Nigeria. Biological agents in Biotechnology (microorganisms, plant cells, animal cells and their products) can be used to produce arrays of metabolites that are of industrial importance. For instance, enzymes, vitamins, amino acids, pharmaceuticals, functional proteins, food and beverages, organic acids, polymers, food additives

such as, colourants, taste enhancers, and preservatives (Ogbonna and Ogbonna, 2005).

Potentially, Nigeria has a lot of biomass resources that can be converted into value-added products. Unfortunately, these biomass resources are not readily available in the right quantity and quality to support industrial transformation (Ogunseitan, 2003). For instance, there is an impression that a lot of fruits most of which rot away because of poor storage qualities. However, a pure fruit juice production company failed because of lack of orange and mango to feed the company. Maintaining consistent quality of the juice was difficult because the company depended on purchase of the fruits from various markets. There was batch-to-batch variation both in chemical/nutritional composition and state of ripeness all of which affected the quality of the product. There is a need to establish plantations of the same variety of fruits to maintain a fairly uniform quality of the fruits. Nigeria has remained the world largest producer of cassava since 2004 but cassava is still too expensive in Nigeria.

The present average yield of 11 tons/hectare is still much lower than yields of more than 44 tons/hectare reported in China and Thailand (Ogbonna and Ogbonna, 2005). There is therefore a need to increase the agricultural output through increase in the yield per hectare (improved varieties and agronomic practices) and increase in the land area under cultivation (less than 40% of Nigeria's arable land is presently under cultivation). Workers in the agricultural sector would argue that once there is demand for these produce, production will increase to meet the demand but the industrialists argue that they would not invest without being sure that the raw materials will be available in the required quantity and quality (Ogbonna and Ogbonna, 2005).

Nigeria's abundant renewable biomass resources can be efficiently processed or converted to various useful metabolites. Development of processes for the efficient utilization and processing of the agricultural products will definitely help in the country's economic development. Efficient processing of agricultural products into value-added products will create demand for, and thus boost the agricultural sector. Furthermore, Nigeria has good solar radiation and temperature that can support photosynthetic cell culture throughout the year (Ogbonna and Ogbonna, 2005).

Photosynthetic cell cultivation can be used to convert the abundant and clean solar energy into many useful metabolites. This technology has been extensively explored in developed countries but in the whole of Africa, there is almost no industry that is engaged in commercial cultivation of photosynthetic cells (Ogbonna and Ogbonna, 2005). This is due to

lack of appropriate technology that can be sustained in the region. Many fermentation and cell cultivation processes can be done without the need for very high-level technologies. Thus many bioindustries based on fermentation or cell cultivation can be sustained in developing countries (Ogbonna and Ogbonna, 2005).

1.3 Competitive advantage and its effects on biotechnology industries in Nigeria

Strategy is an organization's action plan to achieve the mission. Each strategy provides an opportunity for operations managers to achieve competitive advantage (Ghasemi *et al.*, 2015). Competitive advantage is used for acquiring superior position in the world from different angles of science, economics and technologies. This was mentioned by Ansoff *et al* (1991) and later accomplished the definition by Porter (1985). Generally, competitive advantage are considered as strategic management or paradigm management. Hence, the performances of organizations or manufactures are pertained to the relevant theories from competitive advantage which is crucial points to compete and take advantage from new technology.

Porter (1985) and Barney (1995) stated that competitive advantage strategy could be considered as valuable as an economic performance. While, hypercompetitive model versus of sustainable competitive advantage can be as a powerful strategy for higher performances (D' Aveni, 1994). In addition, Sargent (2008) determined that competitive advantage is the capability of the competitors to gain more profits by giving more services and benefits to the customers.

Since competitiveness is accounted as a fundamental role in industrial activities for achieving goals, so governments and researchers have more intervention in the developing strategies. Additionally, improving researches, economic prosperity and quality of products can be considered as competitive advantage abilities through each company. Therefore, the framework of competitive advantage should be contemplated more for research issues and its applications. Recently, many companies and manufactures are in the same level of competitive advantage strategy as the performance. Therefore, utilizing biotechnology in the process of competition in the future is very sustainable to the big companies or manufacturers.

Halawi *et al* (2006) reported that the competition of industries is based on five forces: new products, giving more services, replacing products or services, and trickery works through competitors. While, the best way to reach the competition in the global market is deducing planning and developing core of competition. Hence, knowledge management can support competitive advantage as a major factor in

competition of global market. In fact, knowledge management helps to produce new strategies for competitive advantage. So, the mentioned five forces can be obtained through knowledge management by SWOT (Strength, Weakness, Opportunity and Threat) analysis from internal weaknesses and external threats.

Porter (1985) was mentioned five forces model two decades ago which dominated on the SWOT analysis. This model has planned on the base of five forces as the threats of new competitors, the capability of competitors like promotion, quality, or lower price, replacing products by innovation, supplying new products with new technology, and jockeying within competitors. In addition, Halawi *et al.* (2006) emphasized more about influencing knowledge management on competitive advantage. For instance, internal strength of firms exploits more from external circumstances and neutralizing environmental threats. In addition, the firm would be followed competitive advantage strategies for reducing internal weakness versus of competitors.

Another strategy of competitive advantage is based on the theory of resource based view (Wernerfelt, 1984) which has been focused on firm resources and capabilities for growth of performance. In addition, Barney (1991) proposed that companies should employ strategies which can create more values, rarely imitable. Moreover, this theory focused on the strategies for sustainable competitive advantage. Hence, more practitioners used this theory for sustainable competitive advantage for producing high profits, non-substitutable and imitable products. Further, Barney (1991) propounded four criteria in order to assess sustainable competitive advantage through the products which are (i) creating value for consumers, (ii) variety compared with competitors' products, (iii) inimitability and (iv) substitutability. In general, competitive advantage is as a strategy that actually is pertained to SWOT from outside and inside of organization to achieve the goals of company (Barney, 1995). A company's competitive advantage defines, relative to its competitors, the set of customer needs that it seeks to satisfy through its products and services. A company can choose a suitable competitive advantage in order to complete among other competitors. There are different strategies that a company can be set based on its situation.

According to Kessler and Charles (2007), estimating the position of a company through itself can affect its success in the future. Hence, the leader of company should reflect to the factors like existing opportunities, competition strategies, the best model of business, and modifying processes. The function of R & D can be used determine to find the best solution for competition. The most goals of company are to

gain more profits from flourishing way. Hence, finding new features cause to invest in R & D when the firm can enlarge that time by having more income without market sharing. Therefore, company should be considered the opportunities and potentials of markets as well as flexible strategies (Kessler & Charles, 2007).

The majority categories of competitive advantage are cost saving, concentration and differentiation (Porter, 1985). In general, the firms can be classified according to Porter's (1996) generic strategies. Porter (1985) offered a model which is viewed in three different strategic groups namely differentiation, cost leadership, and focus strategies. It can be considered as a framework strategy within different industries and companies. Also, porter's generic strategies and competitive facets can be determined variety clusters among the competitors in specific industry or market. In addition, different strategies would be considered in different areas for the research issues. Consequently, selecting strategy would be depended on the firm's competitors.

In another strategy called the defensive strategy, it serve as another way to improve a competitive advantage for a business to use. One of the advantages of utilizing this strategy is to make distance between business and from its competition by keeping a competitive advantage. On the other hand, this strategy is very closely to cost leadership and differentiations in case of both methods are used by businesses to keep those advantages where once they have been gained but they are more aggressive in nature. The actual advantage of defensive strategies is increasingly difficult for in completion area to recommend real opposition to the business (Slack and Lewis, 2008).

In an alliances strategy, Slack and Lewis (2008), referred to it as a way where businesses can increase the competitive advantage; it means that business tries to find strategic alliances with other businesses in same or related industries. The connection of collusion and alliances should not to be irritated by businesses. Therefore, when businesses within the same industry work together, the collusion occurs to control prices artificially. On the other hand, strategic alliances are alongside these lines that businesses utilize it to pool resources.

In addition, the term of competition refers to the capability and the ability of a company or industry to bring products or services to markets based on nanotechnology. Revenues, trade, and market share are some indices of competitive assessments (Sargent, 2008). Today, the world is indicating with the high and continues speed of change. It is also a considerable demand in the existing market for the various goods and services that end up to the

extensive competition between different industries and companies. Mostly the competitiveness of each company relies on the competition between the companies through the industry. Although the competitiveness of economy not only depends on the average and collective of competitiveness between the firms, it also relates to other critical issues as well. Competitiveness is a relative concept, it will be more important when it uses for the international market. Therefore, it indicates the capabilities of a firm to create more profit in comparison with its competitors in the market, more wealth, more value, more revenue through its ability (Shurchuluu, 2002).

The interaction between product market and capabilities of firm would be contemplated as abilities of firm like physical infrastructure, technology, financial ability, and work forces. Also, they can assist transferring the asset to the products and services. At the framework, the quality indicates that product and services come out to the market due to the global standardization; meanwhile innovation can bring new ideas to the market. The competitiveness framework should be supported by another suitable collection of resources that is name economic structure (Shurchuluu, 2002).

In general, competition is the name of the game, so organizations try to find a supportable improvement of competitive advantage. According to Kinicki and Williams (2006), competitive advantage is “the ability of an organization to produce goods or services more effectively than competitors, thereby outperforming them.” Thus competitive advantage is not talk about differences. This competitive is reached when the organization enhance real value to the customers. So the expanse of organization resources is required, it means that resources of the companies must be used more efficiently. Meanwhile, the innovation and cost saving also must be accrued in companies. Through the using of two strategies i.e. differentiation and cost leadership strategies, sustainable competitive advantage also can be developed (Porter, 1985).

1.4 Conclusion

It's clear that no Nation can develop or maintain its present state of development without investing much in biotechnology research and development through sustained competitive advantage. In these regards, Nigeria is still lagging behind. Although, Nigeria has made commendable efforts on policy issues but much is expected on research, development and marketing through competitive advantage. If fully considered, the Nigerian biotechnology industries will largely thrive and flourish to the satisfaction of human needs.

Conflict of interest

None

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11/4/2017