

**KAUNAS UNIVERSITY OF TECHNOLOGY
SCHOOL OF ECONOMICS AND BUSINESS**

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**EVALUATION OF TECHNOLOGICAL INNOVATIONS IMPACT ON
DEVELOPMENT OF FOOD INDUSTRY IN NIGERIA**

MASTER THESIS

Supervisor Assoc. Prof. Jovita Vasauskaitė

Kaunas 2017

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Business Economics (621L17001)

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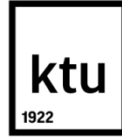
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„Evaluation of Technological Innovations Impact on development of food industry in Nigeria“

DECLARATION OF ACADEMIC INTEGRITY

19 December 2016

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SUMMARY

The evaluation of technological innovation and its impact on development of food industry in Nigeria has become very important at this moment considering its importance to the entire Nigerian economy and its potentials to reduce waste of harvested agricultural products and power to reduce unemployment in the country.

This research was carried out using a carefully structured methodology through employees of various SMEs holding key positions in order to derive the data needed to determine the problems and challenges faced by the industry and then creating a model that will help solve most of the problems and challenges. The IBM program SPSS was used for the analysis of the collected data and the results were derived. To evaluate and identify the problems related to technological innovation implementation within the food industry, analyse and state the most effective, economic and financial ways of solving those problems.

The main aim of the thesis: To evaluate the impact of technological innovation on development of food industry in Nigeria.

Main Results of the Study: The research is able to create a model that fits SMEs solutions for successful implementation of innovation and also recommend more strategic ways of solving the problems based on the study and analysis which includes, product analysis, technological capacity analysis, competitor's analysis, financial analysis and human resource analysis. The author explained and summarized Bio Yam flour processing economic and financial indicators based on assumption of the successful implementation of the model and recommendations which are likely to improve the overall activities of the company.

The thesis consists of 68 pages exclusive of the entire appendix. sixteen (16) figures, seven (7) tables were used in the study to explain the results in a more simplifying manner.

Table of Contents

INTRODUCTION	8
1. PROBLEM ANALYSIS ON INNOVATION IMPLIMENTATION IN FOOD INDUSTRY 10	
1.1. Situation Analysis of Nigerian Agricultural sector.....	12
1.2. Analysis of research on innovation in food industry.....	14
1.2.1. Innovation in food sector SMEs.....	14
1.2.2. Case analysis of innovations implementation in food industry	16
2. THEORETICAL SOLUTIONS OF TECHNOLOGICAL INNOVATION IN FOOD INDUSTRY.....	18
2.1. Definition of innovations and food processing.....	18
2.2. Classification of technological innovations.....	21
2.2.1. Low tech.....	21
2.2.2. Medium Tech	23
2.2.3. High Tech.....	24
2.3. Technological innovations impact on SME's.....	26
2.4. Factors for SME's Technological Innovation Implementation	29
2.5. Problems and challenges of Implementing Technological Innovations	34
2.6. The analysis of models and methods for innovation implementation in SMEs	37
3. RESEARCH METHODOLOGY FOR EVALUATION OF TECHNOLOGICAL INNOVATIONS IMPACT ON FOOD INDUSTRY DEVELOPMENT.....	44
3.1. Research Approach.....	44
3.2. Data collection and research significance analysis.....	45
4. RESEARCH FINDINGS OF TECHNOLOGICAL INNOVATION IMPACT ON FOOD INDUSTRY IN NIGERIA	47
4.1. Analysis of the results.....	47
4.2. Research findings and discussions	51
4.3. Factors to improvement in technological innovation implementation process in SMEs ...	53
4.4. Case Study on Bio Yam Processing in Nigeria.	55
CONCLUSIONS AND RECOMMENDATIONS	62
LIST OF REFERENCES.....	65
ANNEXES.....	71

INTRODUCTION

The food industry has evolved over the years since the human civilization; many innovative processes of producing more quality foods and its market has improved greatly during the past years. During the industrial revolution, the food industry became more advanced and noticeable. Thorne (1986) points the beginning of the industry to the first heat sterilisation plant which was developed by Appert in France in the early 1980s. Since then, the food industry grew to become very diverse and large and most importantly a major contributor to economic growth to various nations. For example, Agric food chain industries in the UK employed 3.9 million people which amounts to 14% of the total UK workforce in 2015; contributed 109 billion pounds to the national gross value in 2014; (gov.uk 2016). Likewise, in 2014/2015 the Australian processed food industry employed over 700,500 people and contributed about 53.9 billion Australian dollars added value in which is approximately 3.3% of the total GDP. In Nigeria, the situation remains the same due to innovative technologies, the Agric food industry have been able to generate over 1.5 million jobs and also contributing about 22.55 billion US dollars to the economy which amounts to 4.6% GDP of the country. This makes the sector very important to the overall Nigerian economy.

The increase in population and urbanisation in Nigeria over the past fifteen years has brought about an increase in demand of high quality and more hygienic processed foods. This has brought about the need for transformation within the Nigerian Agricultural industrial in both micro and macro levels to meet the challenge of processed food within the country. To meet up with the new requirements, there is a need to focus on using the most innovative technologies to increase outputs of high quality foods and also how efficiently those produce will be distributed across the country to reach the final consumer at the affordable rates and time.

Small and medium enterprises (SME's) across the country has to play a vital role in providing a sustainable solution to the problem by taking advantage of the available innovative technologies to increase their outputs and food quality within the industry. This will also include, making the best use of their organisational resources to improve their organizational and marketing structure for maximum benefits. SMEs have to device all the necessary means available to explore the available innovative technologies to impact positively on the agricultural sector within the country. This will bring about the rise of profits within their various companies and reduce unemployment rate in the country and contributes to the overall Gross Domestic Product (GDP) of the country.

The gap that exist in fixing the problem of high quality foods and their market is lack of research and development within the sector, lack of implementation of most innovative idea and the right strategies on

how to evaluate the impact of those innovative technologies that will lead to increase in profits of the various SMEs within the country. It is the desire of the researcher to use this thesis as a medium to research and prove the great benefits these innovative technologies will bring to the Agricultural based SMEs and the overall impact they will have on the entire economy of Nigeria.

This project is meant to research, analyse and provide solutions using innovative technologies on critical issues Bio Yam Pando company will face prior to their lunch through their sustainability strategy. It is important to note that, this master's thesis project has outlined the main objectives as listed below

The main thesis problem: How can innovative technologies improve processed food quality and output for SME's within the Nigerian Agricultural sector?

The question is formed based on the basic principles of innovation. Innovation must be created to solve problems and absolutely work to improve people's standard of living. This represent the ideologies of this thesis which is focus on researching and developing products that will make life easier or more convenient and add high value added products to the market.

The main Object: Technological innovation in food industry.

The main aim: To evaluate the impact of technological innovation on development of food industry in Nigeria.

Thesis Objectives:

1. To examine the problems and challenges faced by SMEs in food industry in Nigeria
2. To define and evaluate the types of innovations implemented in SMEs within the food industry
3. To design a model and suggest potential solutions to problems faced by food industry SMEs
4. To analyse and evaluate the impact of technological innovation implementation in Nigerian food industry SMEs

Methods of research: Systemic, comparative and structural analysis of scientific literature, graphical modelling. Empirical research is based on qualitative methodological approach. Processing the results of research SPSS and Microsoft Excel software were used.

This research will focus on how innovative technologies will impact SMEs within the food industry using Bio Yam Pando company as case study.

1. PROBLEM ANALYSIS ON INNOVATION IMPLEMENTATION IN FOOD INDUSTRY

Food processing makes use of several units, time and resources are committed to get this process done successful. It has been like this for ages till recently food processing processes got to tap into innovative technologies to change comparatively large quantities of perishable and naturally inedible raw materials into more valuable, shelf-stable and edible foods or potable beverages. The main aim of processing those foods contributes to food security and massively minimizes waste and losses in the food production value chain and also increases food accessibility and marketability. Food is also processed to improve its quality and safety. Food safety must provide assurance to the consumer that it won't cause any harm to them when it is prepared and eaten according to its intended use.

The use of biotechnology for food processing in most countries tend to makes use of microbial inoculants to improve properties such as the aroma, taste, texture, shelf-life and nutritional value of foods. The use of micro-organisms and their enzymes to bring about those desirable changes in food products is known as fermentation. The process of fermentation is also extensively applied in the production of enzymes, microbial cultures, fragrances, flavours, food additives and a variety of other high value-added products. Those high value-added products are produced in more technologically advanced countries for the use in their food and non-food processing methods.

The use of innovative technologies in processing foods must assure quality and ultimate safety of those foods. This means that, the final processed foods must have all the food properties and nutrients as supposed. It also means that, all the microbiological or chemical and physical hazards present are rationed at a level that will not cause any health and environmental risks. It is important for manufacturers of processed foods to stick to the standards and laws abiding those foods and in general the words health standards of safe and quality food. The exploitation of these technologies must not be abuse during the process of food processing.

In developing countries, such as Nigeria, SMEs in food processing are finding it very difficult to succeed due to lack of government support among several other factors. The industrialization of Nigeria is considered to be so backward by many experts and investors when compared to other developing countries around the world. Take for example, South Korea, Malesia, India and Brazil which were almost on the same level in term of economic standards, today all those countries mentioned are far above Nigeria in terms of

economic development and industrial standards. This has led to stringent process of development among SMEs in all sectors across the country.

The lack of industrial development has made it very difficult for machineries to be produced within the country in order to boost manufacturing and enhance food processing among SMEs. In recent years, new technologies have made things a lot easier in the developed countries especially in the area of Agriculture and processed food products. Innovative technologies in these countries have contributed so much to their various gross domestic product (GDP) and employed millions of people.

Innovative technologies have been recognised by Nigerian producers as one of the most important aspects of improving productivity and highly competitive industries. Even at that, they are still restrained by several factors beyond their immediate control. Some have actually taken a bold step to innovate and voiced out their idea on the importance of transforming the industries but all their efforts have not yielded reasonable results. The lack of constant power supply which apparently makes production cost unnecessarily high has also contributed to most of the closures of these SMEs. The non-availability of those machineries within the country also creates a room for high cost of importing them from the developed countries which in most cases discourages entrepreneurs to invest in those innovative technologies in order to increase their output and profit margins.

There is a growing need for innovative technologies in the Nigerian Agricultural industry to save the population growth and the fast-growing rate of urbanization. Consumers are beginning to demand more quality and hygienic food which creates a large vacuum for innovative technologies to fill and improve the standard of life across the country. This thesis is meant to research and suggest most economically, effective and efficient ways of evaluating the benefits and profit within the food processing industry in Nigeria, it will also look at the economic impact these technologies will have on the Nigerian economy.

The research will explore all the effective and efficient ways of improving the manufacturing, distribution, marketing and preserving all the produced products for longer shelf-life. This is another issue faced by SMEs within the industry. Many entrepreneurs are not academically equipped with all the knowledge and experience needed to develop business models that will help their business succeed in a harsh business environment like Nigeria. This will be designed in a way it will fit most SMEs but especially SMEs within the agricultural industry. It is the desire of the research to analyse the business environment and all the factors within and outside the companies and devise a perfect fit for the model to help businesses meet their seasonal targets and contribute massively to the Nigerian economy.

1.1. Situation Analysis of Nigerian Agricultural sector

Straightening the technological ability and innovative capabilities is of strategic importance in developing countries. This is seen by many experts as a great tool for reduction of poverty and improvement of standard of life among citizens of a given country. In Nigeria, the issue of adaptation of technological innovative machineries is a key factor for economic growth in the recent years. This is seen as a factor for sustainable development among several industrial sectors including the Agricultural sector. These technologies have a significant impact on the entire economic growth of Nigeria. Unfortunately, the innovative capacity in the country is very weak which placed limitations on opportunities for growth and development in key sectors of the economy.

In a national system of innovative, firms, which make up the industry, are known to be the centre of technological innovation that sustain economic growth (Freeman et al 1995). Also, it has been demonstrated several times from economic theories and empirical studies that, technological innovation is the engine of economic growth (Freeman et al 1995). Technological innovations are not just limited just to secondary sector of the economy. It is to my understanding that Technological innovations should be perceived as the engine of economic growth that cut across almost all the sectors of the economy.

Technology, innovation and Science in the primary and tertiary sectors have great influence on the economy as much as innovation has in the secondary sector. Nevertheless, because of late industrializer such as Nigeria, the process of transitioning from dependence from the primary to the secondary and then further to the tertiary sectors has been delayed partially because of relatively poor local technological capacity. Nigeria's technological capability is not just limited in its performance and functions but also has lack of significant capacity to integrate, adapt or absorb the foreign technologies (Okejiri, 2000; Adeoti, 2002).

Most part of the Nigerian agricultural economy is largely subsistence and efforts at capacity building for innovations are yet to achieve significant results. A recent study conducted by Adeoti et al (2010) revealed that tackling innovation shortfall in the Agro-food processing sector in Nigeria remains a challenge in spite of improved contribution of agriculture to gross domestic product (GDP) in recent years. The empirical research results from the analysis done by Adeoti et al demonstrated that, building innovation capacity in the Nigeria Agro-industry is highly restricted as a result of poor infrastructure, improper planning and inappropriate attitude of key innovative agents. Subsequently, there has been limited firm-level R&D capability, and knowledge institutions such as research centres and universities have also been unable to reach the level of commercialisation of inventions that could lead to or develop innovation in Agro-industry.

Nigerian Agro Industry and The State of Industrial Development

Industrial development is proven to be the engine of sustained long-term economic development. It also represents a deliberate and a sustained application and combination innovative technology, management techniques, human resources, and other resources that help improve the production system. The economic reason for embarking on industrial development is that, rising production in the economy depend mostly on the industrial performances which is most of the times gotten through technological innovations, which comes as a result of the improved factors input combination. The higher workers' wages associated with the modern industrial sector create excess labour from the subsistence traditional sectors. In well advanced countries where technological innovations in both primary and secondary sectors are of high advances level, the industrial development has produces collaboration between the two sectors, and net economic wellbeing has improved considerably for every group of the population.

The main features on Industrial development in Nigeria may be listed as follows:

1. Low capacity utilization by companies: Capacity utilization which was recorded very high as 70% in the 1970s has significantly declined as low as 32% in the 1990s and is presently recorded to be 44.3% as of 2010 and about 46.2% in 2011.
2. Low contribution to the Gross Domestic Product (GDP). The contribution of industrial sector has been only approximately 4% in the recent years. The low industrial value addition and high dependent on imports production system.
3. Low contribution of SMEs to the total industrial production, and weak relationships between SMEs and large-sized firms.
4. The lack of local industrial R&D: industry is largely use of results of foreign R&D. Multinational associates are seen to mostly dependent on their parent companies for R&D while local companies lack the funds or have little interest in investing in R&D. Subsequently, this leads to lack of locally based technology-intensive companies.
5. Low employment in the industrial sector which has risen from industrial closures due to the high cost manufacturing environment. For instance, the textile companies in the sector, which was the biggest employer of labour in the private sector in the 1970s. has completely wound up. Government and investors efforts to revive the sector is still not successful.
6. Limited exports of industrial goods which is significantly low (less than 1% of the total exports).

This analysis clearly shows how things have gone wrong in the Nigerian industrial sector and also notably the current poor state of industrial development in the country. The agricultural sector which was the most

vibrant and supporter of the Nigerian economy in the 1970s is now seemed to be at its lowest point since Nigerian independence.

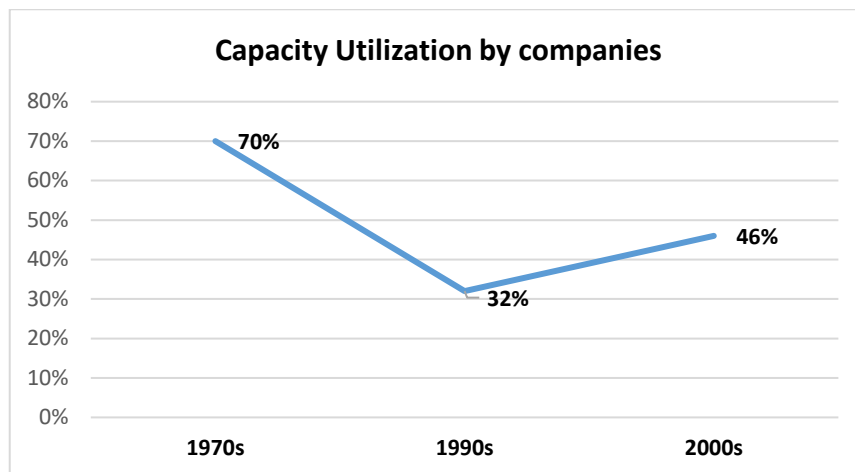


Figure 1: Company capacity utilization

The above figures prove how bad the situation has become in Nigeria. From very high company utilization capacity in the 1970s of about 70% to a low 32% and 46% presently. The exports figures are not better either and subsequently the industrial contribution to the GDP and employment level in the country. The lack of institutions that will or would have impacted greatly on the economy's overall performance have been neglected for a very long time now since Nigeria's oil exploration took off in the early 1970s which led to this significant level of SMEs and the entire industrial low performance over the years.

1.2. Analysis of research on innovation in food industry

Research in technological Innovation has been an interesting and valuable area of study for the past fifteen years. This is due to the importance and opportunities technology innovations have brought to humanity across the globe. In the area of food processing and its value chain, thousands of research has been carried out by experts and companies around the world in order to improve how the entire manufacturing, marketing and distribution process are carried out. This has also shown significant improvements as well as challenges on how business is done within the industry. In this section of the thesis, we are going to look at various research carried out by experts from different countries on innovation in food processing.

1.2.1. Innovation in food sector SMEs

This research was aimed at presenting the profile of innovation in food sector SMEs in the UK, it explores specifically the types and degree at which innovation is employed, and engagement with the activities that

supports innovation orientation and organisational innovativeness. The researcher used the type and categorizations of innovation to carry out the studies on managers across SMEs in UK to understand their behaviours on innovation patterns. To be more specific, the objectives of the study was to profile SME managers' perceptions of their relative commitment to:

1. Radical versus incremental innovation;
2. Different types of innovation; and
3. Encouraging the development of the characteristics of an innovative organisation.

To have a clear understanding of the above-mentioned types of innovations, the researcher went on to explain briefly the types of innovation he applied in the study as follows.

The nature or degree of innovation refers to completely new idea or the degree of novelty of an innovation. A radical innovation results in something new, while an incremental innovation results in something been improved. Radical innovations are mostly associated with the fundamental change, such as a new process or product, and are sometimes implemented through a specific innovation project. Incremental innovations are simply as “add-ons” to the previous innovation, such as changing of the used materials to make a product, or rather improving the service operations (Bessant and Tidd, 2007).

The food sector SMEs in this study shows a similar level of engagement with all of the process, product, and position innovation. Levels of engagement with paradigm innovation are considered to be lower, but still substantial. This is consistent with the research that proposes that SMEs engage in a series of different types of innovation (e.g. Avermaete et al., 2010; Menrad, 2004) and counters research that proposes that one form of innovation is more or less important than the other type for SMEs (e.g. Oke et al., 2007; La Foret and Tann, 2006). Most importantly, hence these food sector SMEs do not just engage in both product and process innovation, they also engage in paradigm and position innovation, any research that restricts its analysis to just one type of innovation can only achieve a very limited insight into innovation in the organisations under study.

The study was aimed at profiling innovation in food SMEs within the UK, this study reviewed the level of firms' engagement with several innovation activities, processes and types which was based on the responses of the participating managers of food SMEs. To compare this study with other studies, the main focus should be lean towards on incremental, radical, product or process innovation, this study includes all of incremental, radical, product, process, paradigm innovation, packaging, position and in additionally considered engagement with a broad range of innovation orientation activities. Subsequently, it also considers food SMEs' engagement with product, process, paradigm innovation and position. The findings of the study

show a positive engagement of food processing SMEs with innovative activities and product, process and position innovation.

1.2.2. Case analysis of innovations implementation in food industry

This study was designed to study food manufacturers in Sweden and it was flagged off in 2007/2008. The main purpose of the research group was to derive information from manufacturers about their innovation strategies and also identify issues and important aspects in the entire Swedish food manufacturing sector concerning innovations, such as behaviour among different actors, methods of working, collaboration, etc. on like the first study conducted in UK SMEs, this study focused on three particular aspects of innovation which are similar but aimed at different results. The three aspect that where involved in research are as follows.

Open innovation mindset: (Chesbrough, 2003) as opposed to the closed innovation model (in-house). General Mills in 2005 acknowledged open innovation as a key strategic importance (Erickson, 2008) in fostering innovation in product and process development. To give an example, the firm allows her consumers to develop their own cereal mix, then have it packed and delivered. In the recent years, a Swedish cereal producer, Salta Kvarn, applied the same principle (Packmonitor, 2009). Proctor & Gamble came together and created their model for innovation by including external groups and individuals around the world (Huston and Sakkab, 2006), which also has proven very successful.

Proctor & Gamble claimed that their innovation success rate has doubled more while their cost of innovation has dramatically fallen. Still Fortuin and Omta (2009) argued that open innovation is not commonly used in the food industry in The Netherlands, although it could have been potential. In the UK, some studies found that retailers exploit open innovation and their degree of innovation increased from 40 percent in a survey conducted in 2002/2004 to over 50 percent as of 2004/2006, depending on sources such as customers and suppliers (Reynolds and Hristov, 2009).

User-oriented innovation in the food industry: Grunert et al. (2008) gives an overview of user-oriented innovation, defining it as:

“a process towards the development of a new product or service in which an integrated analysis and understanding of the users’ needs, wants, and preference formation play a key role”.

As users can be both direct customers and end-users, this concept is wider than that of consumer-oriented innovations and also affects multiple actors of the value chain. Grunert et al. (2008) described three types of user-oriented innovations in the food sector: Type I, the classical new product development which is

carried out in-house by the producer; Type II, the retailer takes the initiative to acquire products for his individual brand and interacts with the producer; the Type III, the whole value chain is involved and the initiative can come from many actors in the chain. It is observed that, there is a more trend towards Type III innovations, which is driven by demands from the end-users for differentiation. Where a lot of actors are involved, interaction and collaboration becomes necessary in order to create trust (Grunert et al., 2008).

Value creation: Mascarenhas et al. (2004) concluded that the product is no longer the basis of value creation, but the experience by the consumer. Customer satisfaction can be influenced not just by past experience but also by expected future experiences associated to consumer delight. This is the main reason why food products should be co-created with customers/consumers.

At the end of all the interviews that were conducted during the study, it seems that manufacturers define innovations in concordance with other previous researchers (Kotler in Grunert et al., 1997; Deschamps, 2008; Garcia and Calantone, 2002). Take a Look at the given examples, it is crystal clear that only few innovations on the Swedish market are radical, comparable to what Costa and Jongen (2006) discovered in the European food industry during their study, or market driving (Kumar et al., 2000). The only one exception is the case of Nespresso system by Nestle that is not either produced nor invented in Sweden and which has created an entirely new way of preparing/consuming coffee with a new machine for doing so, and also continuous purchasing of capsules by consumers through emails. Subsequently, a new way of doing business has been created that drives the coffee consumption market (Deschamps, 2008).

2. THEORETICAL SOLUTIONS OF TECHNOLOGICAL INNOVATION IN FOOD INDUSTRY

2.1. Definition of innovations and food processing

Definition of Innovation

Innovation is viewed in so many ways and on different levels both in knowledge institutions and business environment. For instance, innovation can be local and on a small scale or it may involve a whole change in strategy direction in organizational. The idea of “newness” is regularly at the core of definitions of innovation, as is the notion that innovation will somehow improve things or make them better. In the area of food processing, companies see innovation as game changer for business. This is because it has massive impact on how food is produced with the use of new technologies. Whether innovation is seen as change or new. Below are some few noted definitions of Innovation according to a General Electric (GE) survey.

Table 1: Definitions of Innovation
Source: GE survey, 2012

Definition	Top Choice	Total mentions
The implementation of new processes, products, organizational changes or marketing changes	35%	47%
An environment/culture that embraces positive change, creativity and continuous improvement	27%	42%
Research and development, new intellectual property (IP), and inventions	17%	41%
Staying ahead in the market and being a market leader	12%	32%
Solutions that benefit society and societal outcomes (including environmental outcomes)	9%	29%
None of the aspects above is close to my personal definition of innovation	1%	10%

Another survey question asked those respondents to describe Business Innovation in few words based on their perception (GE survey 2012) and below are some of the responses

- “New products/those not seen before/invention/ creativity”
- “Evolving/adapting current products”
- “Brand new technologies/working with technology/technology improving”

- “New ways of solving problems”
- “Continuous improvement/developing processes/ products”
- “Specifically, high-tech, e.g. IT/machinery”
- “Change/harnessing change”
- “New thinking/new philosophies/harnessing IP/ idea creation”
- “Reducing costs/becoming more profitable/bettering what has been done before/creating value/ improving processes”
- “Responding to customer needs/meeting market demand”
- “Activities/products that benefit society”
- “Combination—products, processes, thinking”
- “Improving/increasing efficiency”
- “Making life better for people”

All the above definitions show clearly how businesses view Innovations. The first and the most selected definition fits more to the concept of innovation but only if those changes add significant value and are truly unique and new and also important and relevant to the consumer or the customer. Despite their different perceptions, the fact remains that they all see innovations as something new designed or created to enhance business outcomes whether in areas of production or business dealing within and outside the organisational structure. It is important to understand that innovation in whichever way is defined, the most important keywords should be present.

Definition of Technological Innovation

Technological innovation is a concept developed within the scientific field of innovation studies which helps in explaining the nature and rate of technological change (Smith, 2002). Technological Innovation can be defined as “a vibrant network of agents interacting in a specific economic/industrial area under a particular institutional infrastructure and involved in the generation, diffusion, and utilization of technology” (Carlsson, Stankiewicz. 1991)

We can also say Technological innovation can be seems to be encompassing product and process innovation. Mostly people view Technological innovation as innovations that are mainly focused on machinery, software, electronics, automobiles, and things that are more technically operated within and out of industries. Technological innovation can also be seen as machineries designed to significantly improve industrial process of production and making the entire processes more economically vibrant, safe, unique and sometimes completely new.

Food Processing

Food processing can be defined as set of activities associated to the transformation of agricultural products or any other kind of activity producing edible matter (Boujut, J. F., & Lincas, C. 2009)

Another definition of food processing say, it is the transformation of raw ingredients through the use of chemical or physical means into food or the transformation of food in other forms. This means food processing is made up of raw food ingredient into marketable food products that are easier to prepare and served by the customer or the consumer.

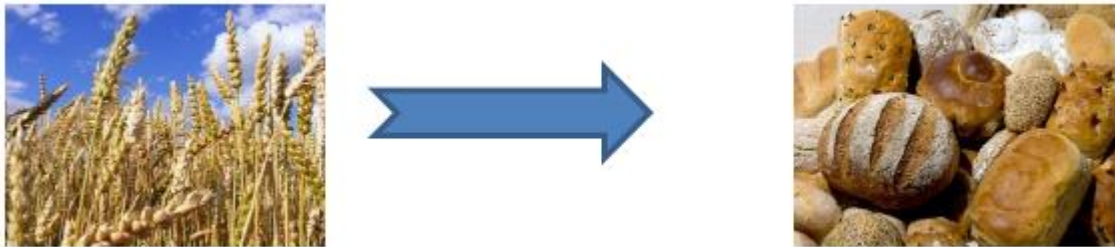


Figure 2: Raw ingredient to processed food

It can also be said to be a process of turning agricultural produce to edible and marketable products either by mass production in the factories or by natural methods like sun drying and grinding or simply by cooking and serving as food. Food processing goes through a lot of staged in most cases before it becomes edible, raw ingredients goes through changes in size and shape, chemical composition, colour and structure before they are ready to be consumed as final food.

Food processing has been made easier and cheaper nowadays due to the development of new and highly advanced technologies which contribute greatly to the problem of food security and unemployment levels in many countries. Having understood what innovation, technological innovation and food processing as defined above, the next focus will be on the classification of technological innovations. This will give more insight in understanding how these technologies are specifically categorized based on their functions and applications.

2.2. Classification of technological innovations

The classification of technological innovations has been classified based on the products produced by these technologies. The world investment report of 2002 (UNCTAD) has classified them as low tech, medium tech and finally high tech. this classification is also based on the required skills, level of research and development (R&D) and equipment involved in the production of goods mostly in the manufacturing industry. These classifications will be shown in the table below to give more insight the classification.

Table 2: Technological Classification of Manufacturing Industry
Source: OECD Science, Technology and Industry Scoreboard, 2001

Technology Category	Industry
Low Tech	1. Food, beverages & tobacco products 2. Textiles, leather & footwear 3. Wood, paper & paper products 4. Rubber & plastic products
Medium-low Tech	5. Other non-metallic mineral products 6. Cement & glass 7. Basic metal & metal products 8. Chemicals excl. pharmaceuticals 9. Electrical machinery
Medium-high Tech	10. Non-electrical machinery 11. Transport equipment
High Tech	12. Pharmaceutical 13. Electronics

2.2.1. Low tech

The state of low tech in Nigeria is at its lowest since the 1970s. As described in the above table, these products had a slight growth rate of about 5.4% per annum in the early 1990s more the resource based industry even though it's still considered as been below the world average. As of 2000, the total low tech industry accounted for about 15% of the world trade, this was a decline from 1990 16.6%. In the developing countries, Low tech represent the main manufacturing industry because of their stable, well-diffused technologies embodied in capital equipment. Because low tech has low R&D expenditures, skill requirement and cost of labour are easy to meet. Because of low barriers to entry, the competition to in this

particular industry is aggressive. It was recorded that, between 1996 and 2000, the Nigerian low tech export massively declined from US\$58 million to US\$21 million which represent an annual decline of about 22% for a four-year period. This made Nigerian reputation as a low-tech competitor within the region and the global community to stand at its lowest. Nowadays neighbouring countries like Ghana and Senegal export more products from their low tech compare to Nigeria even though we are bigger than the two countries combined both in size and economy. As a result of Nigeria’s poor performance in low exports and also the emergence of competition from other developing countries and south east Asia and China, Nigeria’s share in low tech industry has seriously declined which allow other sub Saharan African countries and others like Egypt, Zimbabwe, Kenya are now moving to the same part, though their low-tech exports levels are still higher than Nigeria as represented in the chart below.

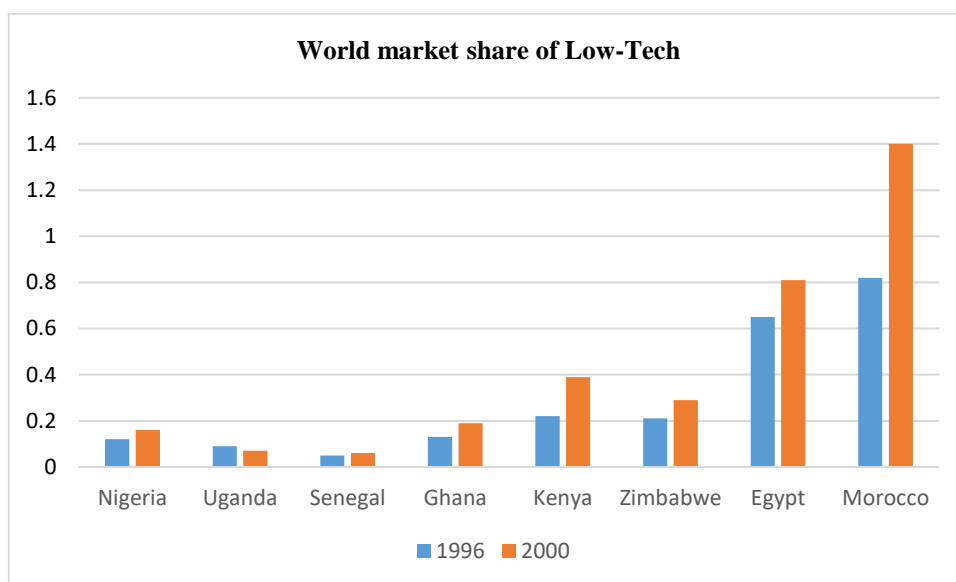


Figure 3: World market share of low- tech products for the Nigeria and selected African countries, 1996 and 2000
Source: Calculated from UN Comtrade

The Agric and food industry has traditionally served the domestic needs of the fast-growing population in Nigeria. Food exports are exanimated to account for US\$4.6 million in the year 2000, which is still considered the lowest in Africa considering the size and potential of the country. Sugar and honey, wheat butter, flour and meats, fixed vegetable oil accounts for more than 90 percent of Nigeria’s food exports. Among these, sugar and honey and butter have significantly grown at an annual rate of more than 80 percent between 1996 and 2000. The figures are however so small that the gains in world market share are little (less than 0.1 percent in 4 years). Fixed vegetable oil, by contrary, is facing downward growth trends as exports have plunged from US\$3.2 million in 1996 to only US\$1.6 million in 2000.

The basic reason why the situation has gone from bad to worst is because of the low performance of the Low-Tech industry which primarily support the Agricultural industry and other associated sectors in manufacturing and employment creation within the country.

2.2.2. Medium Tech

Medium tech industries are considered the heartland of industrial activities in developed economies, they are made up of high skills and intensive technologies in the capital goods market and the intermediates. This industry comprises of automotive products such as motorcycles and parts, passenger vehicles, process products like chemicals, paints, synthetic fibres, plastics and fertilizer and engineering products such as motors, engines and industrial machines.

Medium tech industry is usually capital intensive and require more complex technologies, they also need more sophisticated skills and high level of research and development (R&D) expenditure. Most of their skills require long leaning periods to master their various technologies. Barriers to enter these industries may seems high especially where large capital is required. There is a high demand for technical skills, and extended learning periods in product development and design. Barriers to entry are lower in the labour-intensive processes of medium-tech industry for instance, assembly in the automobile industry. Only few developing countries, predominantly in Latin America and East Asia, have benefited from the relocation of assembly operations to low wage regions.

In 1990 to 2000, the medium tech exports were recorded to grow approximately 5.5 percent per annum, and they continue to account for over 31.4 percent because the industry lost ground to High tech within the last decade. Consequently, High tech production grew at 11.2 percent per annum from 1990 to 2000 and rapidly increasing their market share to 24.3 percent. If this trends continue, High tech industry will be the largest product export in the world trade.

The Nigeria Medium tech industry is far behind the international standard and competitively in the global market but has managed to cope with the global pressure better than expected. Medium-tech exports dropped by only US\$3 million from 1996 to 2000 (from \$55 million to \$52 million). This 1 percent decline can be seen with a certain degree of assurance if we consider that total manufactured exports in Nigeria plummeted by 14 percent in only four years. Yet, as in many other economies within Sub-Saharan Africa, Nigeria's world market share in medium-tech industries is still considered dismal. This can be seen in the chart below.

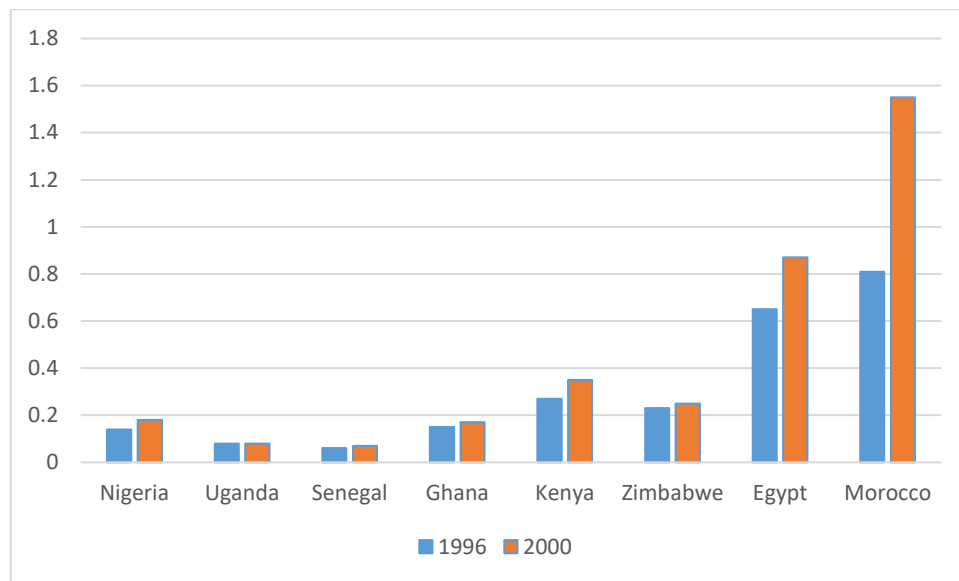


Figure 4: World market share of medium- tech products for the Nigeria and selected African countries, 1996 and 2000

Sources: Calculated from UN Comtrade

2.2.3. High Tech

The development of any country today depends highly on their high technological development and a percent of exports from the high-tech industries. This proven in the developed countries like USA for example, high tech industry is considered to be one of the most important sector for economic growth. The industry alone employed close to 17 million people in 2014 which consist of 12 percent of the total employment. The high-tech industry also contributed for about 23 percent out of the total production in the same year.

According to a study funded by the Workforce Information Council, the high-tech sector can be defined as industries having high concentrations of workers in STEM (Science, Engineering, Technology, and Mathematics) occupations.

The high-tech industry has a seen a significant growth within the last few years, with an 18 percent raise in the total global exports of high-tech products since 2000, this makes all developing countries combined together accounting for 52 percent of the worlds trade products in 2004. The recent study by UNCTAD innovation and technology reports that, even though African countries continue to lack behind, they manage to contribute only 0.3 percent of the total global exports. Another report that examines how African countries can better implement technology, Science and innovation strategies and also coordinate them with industrial policies and development those plans.

The report discovered that, because of the lack of coordination of those two policy frameworks, It was also noted that, even some African countries that spend some part of their GDP on research and development

does not export more high tech products than other African countries that do not have expenditures on research and development. Similarly, the report also provides an in-depth analyses of technology, industrial and science and innovation policies in Nigeria, Ethiopia and Tanzania, alongside with regional trends and initiatives in policies in other African countries.

The Nigeria’s export performance in high tech has been even more disappointing. Manufactured exports have plunged from US\$ 217 million in 1985 to as little as US\$ 89 million in 2000. Only Algeria has experienced a decrease of manufactured exports in the region within that period. This makes Nigeria one of the lowest high tech export oriented economies in the region. High tech manufactured exports in Nigeria only accounted for about 0.2percent of the total exports in 2000, dropping from already low 1.5percent in 1985. This is among the lowest manufacturing propensity ratios in Sub-Saharan Africa, and is the result not only of declining manufactured exports but also an increased dependency on primary exports, particularly oil. Indeed, Nigeria’s share of oil exports in total exports has increased from 95.4% in 1996 to almost 99.6% in 2000, making it one of the less diversified economies within the region and in the world.

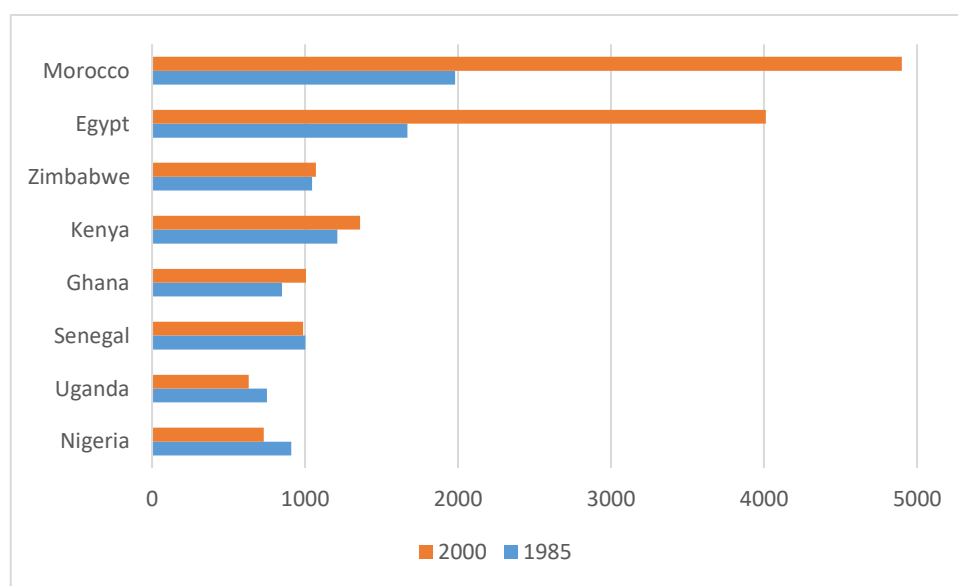


Figure 5: Manufactured Exports for Nigeria and Selected African Comparators (US\$ million)
Source: Calculated from UN Comtrade

The overall performance of Nigerian high tech is not impressive in anyway but surely with the new government policies, it might be better in the coming years. Stability of democracy and an increase in foreign investments have shown a little improvement in the recent years and hopefully the country will keep with the up trends of high tech production and exports.

2.3. Technological innovations impact on SME's

Technological changes have become a norm in today 's business world. In a recent global study with the Oxford Economics, about 2,310 Small and Medium Enterprises (SMEs) senior managers were asked to evaluate key elements of managing a successful enterprise. Virtually 60% of the respondents agreed that technology is a key differentiator for their companies and more than one third of SMEs actually stated that creating a principle of innovation is a top strategic importance in driving growth. Basically, the study revealed that staying ahead of innovation is essential to establishing and extending a competitive advantage for SMEs, in addition, they stated that technology is key in innovation strategy. But the speed of change has accelerated, giving SMEs an unprecedented range of options to help them drive growth, while staying resilient and receptive to customer demands. Failing to adapt to the changing technological landscape will make a business to be doomed to extinction.

In the developing economies, Small and Medium Enterprises (SMEs) have been recognized as one of the driving force due to their multi faced contributions especially in the area of technological innovations, exports and trade promotions, creation of employment, contributions to GDP and many others. Because of these, the ability of SMEs to innovate seems to have significant impact on the overall international business environment. Therefore, adopting to those modern technologies has the potential to increase growth of individual SMEs at the micro level with also a possible ripple effects at the macro level.

In a developing country like Nigeria, SMEs plays an important role in changing the social-economic situation of the country. These SMEs represent a stage in the transitioning the industries from the old traditional to the modern technologies. This varies based on the level and diversification of the transition of the individual enterprise. In most cases, these SMEs uses simple skills and locally produced machineries coupled with locally sourced raw materials.

The significant roles played by these SMEs in Nigeria include: utilisation of scarce available resources, creation of employment, reduce the problems associated with rural-urban migration, critical background and nurturing grounds for domestic entrepreneurial capacities, improve technical skills, aiding technological innovativeness and managerial skills, wealth creation, utilization of locally made technologies and raw materials, and also representing as change agent in economic transformation. SMEs are said to hold the key to economic development and especially if they are known to emerged through innovative products and services. Technological innovations are also noted to have the largest share of all the innovative SMEs within the country and on a global scare promoting globalisation and international trade in emerging economies.

With the above steps, this section of the thesis will discuss how technological Innovations impact on SMEs in Nigeria and the overall Nigerian economy.

Technological innovation is a key factor in company's competitive advantage and the right strategy in ensuring success of a business. Technological innovation cannot be avoided by any company that longs to develop and maintain a competitive edge over competitors or gain entry into new markets. (Bogliacino, Piva, and Vivarelli, 2012). Generally, SMEs are known among all other companies to be more adaptive and flexible and better staged to develop and implement new ideas based on their less-complex organizational structure, receptivity and low risk are some of the few essential features facilitating SMEs to be innovative (Harrison and Watson, 1998). Consequently, SMEs across industries have the unrealized innovation possibilities (Chaminade and Vang, 2006).

In recent years, Innovations are not seen or perceived as new product development or process innovation but also there is a perception and evidence that non-technological innovations also play a vital role in firm's success. Non-technological factors such organizational strategies and marketing also contributes greatly to firm's achievement of technological innovation. This proves that companies that engage in technological innovation benefits greatly in the areas like higher margin returns in their business and positive business outcomes. This helps maintain a competitive edge within the manufacturing SMEs especially in the developed countries with higher performance. Innovative manufacturing companies are more likely to enjoy price premium, higher profitability levels, and generate growth in turnovers with higher margins as a result of their new product development which may possibly have explicit benefits over already existing products in the markets.

Technological Innovation create an enabling environment for sustainable growth and profitability through focussed control perspectives. Manufacturing Small and Medium Enterprises are usually known for introducing innovative and unique products which often open up new market niches and serves as a backbone for their survival. Presently, SMEs in the manufacturing industry are threatened with stiff competition and fast growing demand for higher quality products, services and market which is categorized by reliable deliveries, fast response time and new product functions in the globalized economy. In such hostile business environment, innovation especially technological innovations are considered to be key strategic factor for those SMEs in the manufacturing industry. According to the theory of growth, the benefits or profits derived by company's innovation investments are said to be proportional to the amount of resources spent on the product development, since firms' innovation is expected to reinforce growth.

Substantially, there are evidence that technological innovation plays a vital role in influencing the growth, competitiveness of companies, industries and countries as a whole however at the firm level,

innovation is connected to competitiveness and performance. Innovative manufacturing companies are proficient in responding to changes of any sort in their environments and are categorized by creative individuals developing new and unique products and services.

Nevertheless, the manufacturing sector in Nigeria which is mainly dominated by the SMEs has been going through a continuous drop in productivity. Their contribution to the real GDP has been constantly reducing for a long time now as against the current global trend. The manufacturing industries contribution to the county's real GDP before the new rebase system stood at only 4% between the years of 2005 and 2015 without any major improvement in the manufacturing sector productivity as shown in the figure below.

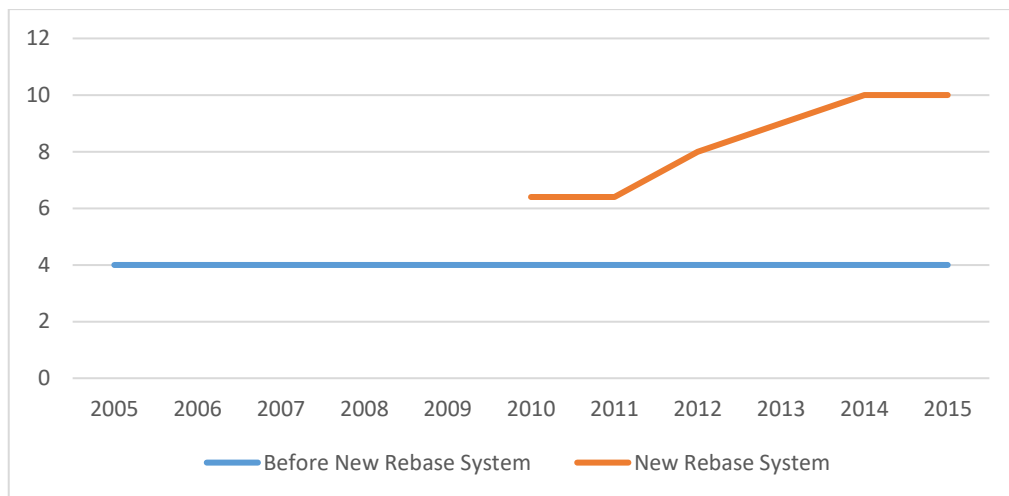


Figure 6: Contribution of Manufacturing Sector to Gross Domestic Product from year 2005 to 2015.

Source: Central Bank of Nigeria Statistical Bulletin, 2015

In consideration on the current rebase system in the Nigerian economy, the manufacturing sector contributes between 7% and 10% from 2010 to 2015. All this poor performance is attributed to the various challenges faced by the industry such as poor infrastructural facilities e.g. Electricity, poor credit facilities for SMEs and low investment in R&D activities within the industry. The key roles played by innovation cannot be undermined due to the activities technological innovations and R&D has significantly contributed to the growth of the Nigerian economy. To sustain the impact felt by Innovation and R&D activities should also create room for other activities such as developing strong institutions and more concrete relationship between industries and academia. Studies on SMEs Innovations in Nigeria are very few as almost all the studies are particularly focusing on either the entire manufacturing industry or just some aspect of innovation while some only focus on technological innovations. Also, some of the studies are either too specific or too general on innovation or a particular sector. This study seeks to focus on technological and

non-technological innovations and their effects on Small and Medium Enterprises contributions and profitability in the Nigerian manufacturing sector using qualitative and quantitative analysis.

2.4. Factors for SME's Technological Innovation Implementation

Firms strategic policies and operating environment affect innovation and because of this, companies place a greater emphasis on innovation in their operating environments which is most often characterized by short product life cycle, fast technological change and intense competition (Laforet, 2011) innovation give companies the opportunity to compete better, meet their customers' needs better, capitalise on strategic market opportunities and align their organizational strengths with the opportunities presented in the markets. (Rujirawanich et al., 2011). Because of these reasons, some experts conducted a detailed research and determined most crucial implementation factors influencing technological innovation in SMEs. Those critical factors are given as follows.

Financial Factor (FF): According to Lecerf, Financial strength of SMEs will determine the success of their innovation. Financial resources are the key levers of innovation (Lecerf, 2012). He further stated that, Innovation can only take place or happen if the capacity to innovate exist in the company. Innovation capacity here is referring to the availability of resources, a process to solve problems and a collaborative structure. In SMEs, this will translate to financial capital as a factor and skilled labour force (Laforet, 2011). Financial resources are recognised as one of the key resources required by a firm to start and grow (Xie at al. 2013) it is very important for SMEs to have adequate financial resources for their technological innovation to be successful. Finance is required at almost every level or step of the process of innovation and it should be viewed as the most important aspect or resources needed by SMEs to successfully manage their innovation project.

Firm Size (FS): The size of the firm also matters a lot for the innovative ideas to be diffused (Davenport and Bibby, 1999). Most experts believed that the adaptation and absorption of technological innovation seems to relate to the size of the firm. In general, the traditional innovation is better benefited by larger firms. This is based on the arguments that larger firms have the financial capacity to fund their innovation ideas, they also have larger assets to be used as collateral for loans if needed. Secondly, because larger firms have a larger sales capacity, they have the ability to also spread the fixed cost of innovation. Thirdly, they also have larger human resources which are considered a prerequisite for innovation (O'cass and Weerawardena, 2009). There is also a notion that larger firms may have more resources needed to implement technological and non-technological innovation. In most cases, SMEs are perceived to lack those resources and are forced to trade-off their innovation ideas because they cannot afford the expensive cost of implementing them.

Institutional Factor (IF): Institutional factors play an important role for successful implementation of innovation in SMEs because the institutional environment affects the performance of the innovation. In environments where there are no strong institutional structures, innovation could be affected by violation of intellectual property rights, lack of political and economic stability and ineffective enforcement of contracts. (Volchek et al., 2013)

Technological Capability (TC): Because of the cost involved in developing new technologies and products, competing firms are sometimes forced to bring their ideas and resources together to combine them in order to be able to speed up the process of product development. This sometimes includes unique products and services or new technologies. The issue to be concerned here about is that, competitive relationships are very difficult to manage and involve a high amount of risk. (Gynawali and Park, 2009). Subrahmanya stated that, the technological innovations of most enterprises were based on in-house technological capability. Furthermore, it is important that in-house training of labour was a continuous process (Subrahmanya, 2009).

Consumer Preferences (CP): Customers have the ability to influence innovative products as they have the capacity to drive innovation in SMEs. Because of this, companies need to work closely with customers to be able to understand their requirements and develop products and services that meet the needs of the customers. Working with customers may help SMEs develop better products to meet their needs, sometimes working with customers directly may even result in developing products from customers' ideas. Customer influence is predominantly important in new product designs, process innovation, new product launches, interdepartmental connection, cross-functional teamwork, and to a lesser degree, in business strategy (Laforet, 2011). Indicators like a strong brand awareness, high levels of market share and expressions of consumer preference are important factors for the overall performance in the SMEs (Lamprinopoulou and Tregar, 2011)

Economic Factor (EF): The economic structure plays a vital role in technological innovation (Rujirawanich et al., 2011). The recent economic and financial crisis has had a huge impact on almost all areas of businesses which resulted in problems for SMEs to access funds from banks for business investments especially for innovations (Lesakova, 2014). Additionally, Gross National Product (GNP) affects the development of SMEs (Karpak, 2010). If SMEs are encouraged to grow, it eventually leads to innovation, growth and employment in the economy (Volchek et al., 2013). SMEs are considered to be very important in achieving economic growth and creating new more employment opportunities.

Cultural Factor (CF): Schein (1992), described organizational culture as values and beliefs that provide norms of expected behaviours that employees follow. Values are social principles and acts or philosophies that guide employee's behaviours and set a framework for the company's routines and

practices. Organizational values give the guide for managerial behaviours that are convincing and have effective influence to employee's values. Norms and values guide the organizational ceremonies, language and rituals which are artefacts that direct the desired behaviour of employees such as innovation (Hogan and Coote, 2013).

Organizational culture that encourages the employees' innovation capacity, supports personal growth tolerates risk and development, is an important antecedent for innovativeness (Menzel et al., 2007). Such cultures' may be considered as an 'innovation culture' (Castro et al, 2013). Such an innovation culture includes taking risks, creativity, worker participation, and shared responsibilities (Lau and Ngo, 2004). Dombrowski et al. (2007) identified eight elements of organizational innovative culture:

- Innovative mission and vision statements;
- A culture of democratic, lateral communication without the chains of hierarchy in order to entice and retain talented employees who are so necessary for pursuing experimentation and innovation;
- Forms of safe innovative environments which allows for the secretive innovation process;
- Flexibility;
- Collaboration with various organizational boundaries;
- Sharing and teaching among business units and coalitions can be an effective way of promoting collaborative innovation;
- Incentive schemes based in work teams can foster innovative culture; and
- Leadership is necessary to encourage innovation, which serves as an aspiration, a flexible definition of their businesses, and a habit of experimentation (Skerlavaja, et al., 2010)

Management Skills (MS): Leadership and management style plays an important role on the organizational innovative culture among employees. Managers plays an indirect role in encouraging innovation adaptation among employees, they should encourage experimentations, encourage open mindedness and collaboration among employees. Middle managers should communicate and reinforce objectives towards innovation. They should also promote and facilitate entrepreneurial activities within the firm, provide expertise and resources, reduce bureaucratic layers, and promote trust and understanding among employees. These broad actions can help shape the firm's culture and value systems, increasing its receptiveness for innovations (Kelley et al. 2011)

Learning Capability (LC): This is defined as a collective ability based on experiential and cognitive processes which involve knowledge acquisition, knowledge sharing and utilization. This knowledge

collectively inspires creativity, new ideas and knowledge and also increase abilities to understand and appropriately apply these knowledges (Aragón-Correa et al., 2007). These processes of learning at organizational level involves key components that support knowledge productivity processes, which include searching for information, assimilating, developing and creating new knowledge on process, products and services. (Günzel et al, 2011) Organizational learning creates a great relationship for innovative ideas to grow. With effective organizational learning, models are created which supports the implementation of innovation within SMEs across all industries. Learning capabilities are as important to SMEs as also helps the respond faster to markets and deliver customers' needs and improve competitiveness against competitors.

Market Orientation (MO): This refers to organizational research on market intelligence in relation to customer current and future needs, distribution of the intelligence across departments, and the company's wide responsiveness to it'' (Kohli and Jaworski, 1990). These marketing activities are based on the concept of promoting the integration of market information related to customers for better market prediction and meeting the needs of customers. This also means that market information should be used in creating new ideas that meets the market requirements. Some research has shown that, most of the innovative ideas comes from market orientation (Wang and Chung, 2013). Market orientation is believed to highly influence innovation within organization and companies that engage in market orientation significantly improve their level of innovation. Aldas-Manzano et al. (2005),

Competitive Advantage (CA): In competitive economies, innovation is seen as a key source of competitive advantages (Daghfous, 2004; Prajogo & Ahmed, 2006). According to some resource-based view, there are four indicators which are used in measuring the firm's potentials resources to create a sustainable competitive advantage such as value, imitability, rareness and substitutability (Barney, 1991). Therefore, if a company have valuable and rare resources like physical assets, organizational culture, trademarks, patents, information, and knowledge, it can use these resources in the implementation value-creating strategies that cannot be stolen by other firms to obtain sustainable competitive advantages. (Chen, 2009).

After the above discussed factors, the author created a model of most innovation factors shown below.

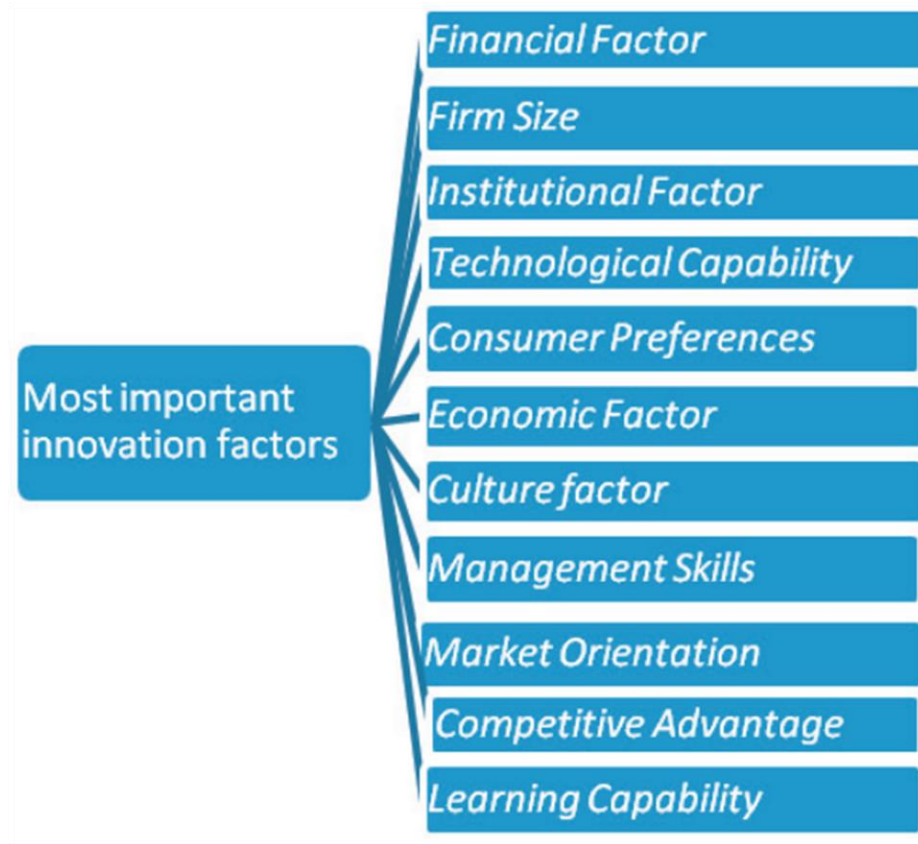


Figure 7: Factors for implementation of Innovation

The above mentioned and explained factors are crucial to the implementation of both technological and non-technological innovations in SMEs in Nigeria. It is very important for entrepreneurs and investors to pay attention to those factors in an attempt to implement innovations to SMEs.

2.5. Problems and challenges of Implementing Technological Innovations

Having great innovative ideas is one step, developing those ideas is another step and implementing them to actually become commercialized is another and the most important step which actually confirmed that innovation has taken place. SMEs across the country has been recognized to very helpful in developing the country in terms of income generation, employment opportunities and the entire GDP of the country. However, there known problems and challenges those SMEs face when trying to implement those technological innovations. This section categorized four main aspect of those problems such as, human aspects, general Problems and related to policies, problems that have evolved due to increased globalization and competition as shown in table below.

Table 3: problems and challenges of implementing technological innovation

Human Aspect	General Problems	Policy Problems	Competition Problems
Scarcity of skilled manpower	Lack of market demand (Low purchasing power of customers)	High cost of innovation	Increased quality of product/services
Scarcity of non-skilled manpower	Lack of skilled manpower	Lack of financing	Increased product differentiation
Low image of the profession	Too expensive manpower	High cost financing	Look for market niches (demand)
Low image of the sector	Lack of quality management personnel	Organisational rigidities	Increase marketing activities
Wage levels too expensive	Problems with administrative regulations	Lack of customer's responsiveness	Forming strategic partnerships
Unpleasant work	Problems with infrastructure (e.g., electricity, gas and Transport, communication, etc.)	Lack of knowledge to use new technologies	Reduced prices (prices of product/services)
Unpleasant working conditions	Problems with access to finance (other than interest rates)	Lack of information on market	Increase working hours
No problem with recruiting	High interest rates	Did not have any innovation plan	Look for other foreign market
	Lack of knowledge in implementing new form of technologies		Reduced production
	Lack of knowledge in implementing new form of organisation		
	Difficulty to protect intellectual property		
	Did not have any open innovation plan		

Human Aspects

In a scientific publication, Tuchman and Nadler (1986) suggests that visionary leadership plays a significant role in factors that leads to organizations benefiting from innovation. Subsequently, Ashurst, Freer, Ekdahl, and Gibbons (2012) lay emphasis on Tushman and Nadler's argument companies can gain complete advantage only if they are able to manage effectively their present situation, but at the same time trying to create innovation for the future and trying to advocate for that within the organization, there is conceivably no more pressing managerial problems than the sustained innovation management.

Scarcity of skilled man power across SMEs in the agricultural and many other industries is an issue for implementation of technological innovations as many of the technologies require long period of studies and experienced workers. But because of the lack of technical colleges and less technically trained people, some SMEs find it very difficult to get the right skilled workers to work in these SMEs. The few skilled workers at time are not willing to work in SMEs as they get paid better in bigger companies and often complain of working conditions in SMEs.

General Problems

Referring to present studies Abulrub and Lee (2011) argues that the degree of technological innovation depends on four environmental factors, such as the industry type (manufacturing industry, or service industry), the size of the company (SMEs or Large companies), the level of the technology (Low-tech industry or High-tech industry), and the market type (domestic markets or foreign markets). Nevertheless, when one examines challenges associated to SMEs development in utilizing of technological innovation, researches are limited and lead to scant human resources, misaligned consistency in the information about technological innovation strategies, lack of knowledge among SMEs about the actual benefits of technological innovation, and foremost, incompetency in handling intricate knowledge resources that are being treated as TI tools in the developing information era.

The various problems mentioned above are interrelated and are known to put a lot of limitation on the implementation of technological innovation in SMEs, issues like high cost of accessing loans, lack of knowledge in implementation and management of these technologies are few among many other challenges faced by SMEs in the implementation process. Infrastructure is a huge issue in Nigeria which also impacted a lot on SMEs prosperity, the lack of power supply, good and affordable transportation across many regions of the country has also heavily affected the implementation and sustenance on technological innovations within the Agricultural sector and beyond.

Policy Problems

Policy issues within SMEs managers differs mostly when compelling managers of different firms, this is one area there is not so much research on (Chesbrough Vanhaverbake, & West, 2006) On the contrary, the proximity research labs and universities, large companies and lead users may play a vital role in the implementation of technological innovation in SMEs. In addition, an innovation policy fostering transactions between these innovation partners may also play an important role in the development process (Van de Vrande, de Jong, Vanhaverbeke, & de Rochemont, 2008).

Policy making on strategic issues that are directly and indirectly related to the implantation of technological innovations carries heavy consequences and as such much be given obsolete attention from managers of SMEs. Policies on cost, market information, innovation planning, knowledge and new technologies must be carefully made in order to avoid creating problems that might complicate the process of implementing technological innovation in SMEs.

Competition

The success factor in founding a company is the ability to create a company that finds premium acceptance in the market. The inventor that achieve success is the one who happens to meet the conditions in terms of the motivational and exogenous factors, in addition to market or technology opportunity (Cardoso, Roldão, Espanha, & Castro, 2009). Furthermore, in the period of globalization, and the evolution of Internet, technologies initiatives have become much more competitive than before. Therefore, companies have to keep track of elements not just within the entities or local situations, but the required knowledge of global and regional markets is essential to keep up with the domestic market. In today's transforming world, competition and globalization, innovating is no more a luxury, but a necessity for SME.s and large companies to compete and survive, most business need technological innovation, despite its various norms or forms, from the steady improvement of an established product to the hike in the new when a novel idea is launched and exposed to the international market (Rahman, 2010).

2.6. The analysis of models and methods for innovation implementation in SMEs

This section seeks to create a conceptual system that best analysis and evaluate the innovative strategies that best fit and solve SMEs technological innovation implementation. The model's structure is represented by the relations between technology, the market and the firm's effective capacity to implement and manage technological innovations. These models are designed to help select the most suitable technologies that are most promising to ultimately help gain competitive advantage for the company. The four part of the model will be briefly discussed.

State 1: Selecting the technologies best able to improve the company market competitiveness intervention priorities (CIP), a short-term aspect). This is performed by assessing the position of product performance with respect to the two fundamental dimensions of the market, customers and competition, with the aim of identifying the features in need of improvement. Then, processes fulfilling these features are identified, and their influence (weight) measured. The last step in the stage then calls for identifying any technological alternative able to improve the given features and their weight with respect to the performance benefits they can offer.

State 2: Selecting the technologies able to improve the firm's technological capacity (evaluation of the technological intervention priorities (TIP), a medium to long term aspect). This consist of evaluating the company's position in the technologies selected in the previous state with respect to the competition, as well as the maturity of the technologies themselves (i.e. their state of development).

Stage 3: linking the two indicators (CIP and TIP) in order to evaluate the potential overall strategies benefits of implementing the selected technologies strategic value of the technologies (SV).

State 4: Evaluating the increase in company "value" (in the medium to long term) consequent on implementation on the technological innovation with the highest SVs (company performance index (CP)).

In brief, the first tow sub-models are aimed at analysing the technological factors that determined the company's strategic position, and therefore serve to identify the innovative strategies able to enhance the company's competitiveness and technological position (that is, improve the company's production and the overall technological capacity). The third sub model seeks to integrate the two previous selected choices separately for the two distinct dimensions, into a related indicator of the importance of the specific technology for the company's overall competitiveness, termed the "strategic value" of the innovation. Finally, through the fourth sub model, I seek to measure the effects of the highest-ranking potentials strategies (that is, with the highest SVs) on the company performance, in terms of the potential increase in "company value" in the medium to long term.

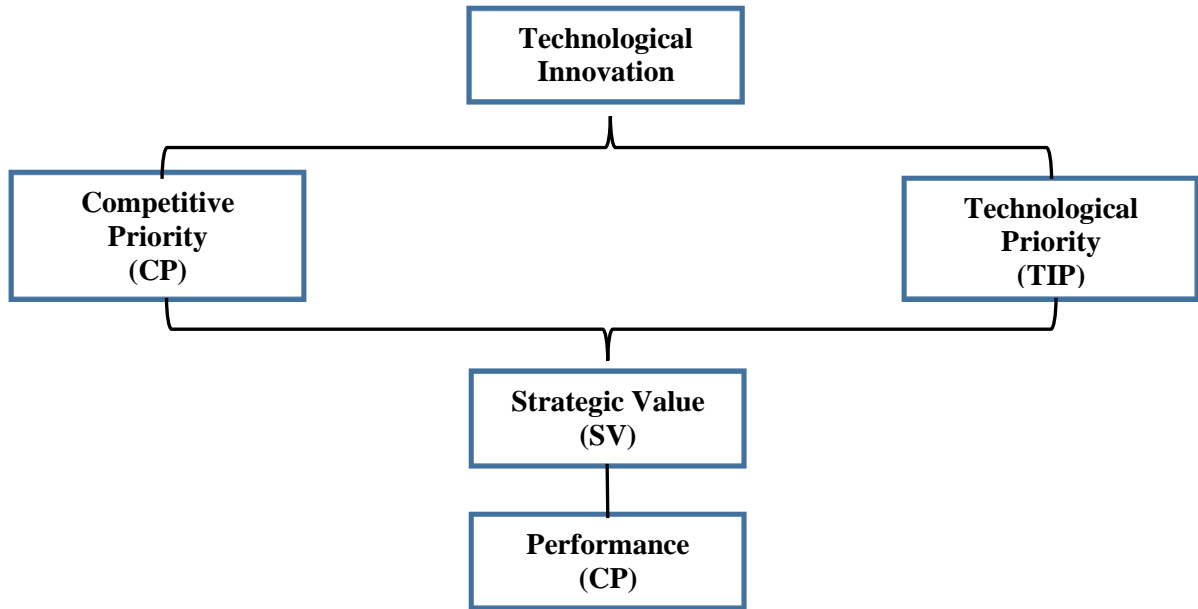


Figure 8: The four Sub-model

Sub-model 1: The competitive priority of technology

Analysis of competitiveness

These concerns the ability of the company to compete effectively in the market by offering products that have high performance features that corresponds to the market demand and other competition products present in the market. Defining performance signifies establishing the parameters that target customers equate with “quality”. This involve compelling a company ranking with regards to such parameters, a ranking within which the firm must then evaluate its position by determining the correspondence between the quality “demand’ and that which it “supplies” in considerations of customers and competitors. Therefore, the most important thing to take into consideration here is relationship between the company and the customers. This relationship is expressed by defining the variables in term the index of called for improvement (CI) which represent the quality gap between market demand and company offerings. The wider this gap, the worse will be the ability of company products to satisfy customers and, consequently, the greater the improvement called for by customers.

Analogously, the relationship between the company and its competitors, defined as the level of the competitive capacity (CC) can be analysed and estimated by comparing the level of quality offered by the company with that offered by the competition. Thus, the better the features (sought for by customers) offered by company products in comparison with those of the competition capacity. The figure 9 below illustrate the process by which the values of the two variables CI and CC are determined.

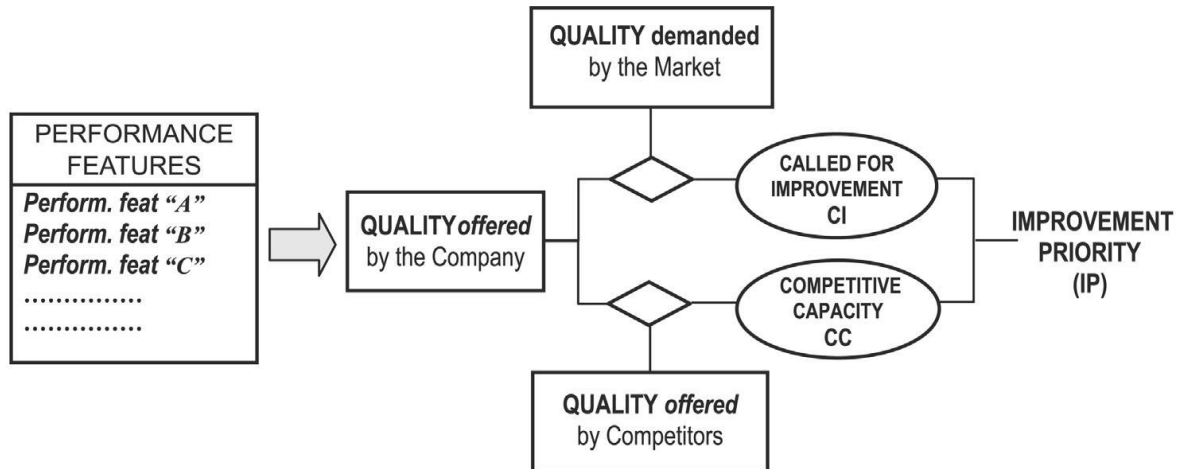


Figure 9: Selection of products performance features needing improvement in consideration of market demands and competing products

SUB-Model 2: the competitiveness of technology

Because all technologies have limitations, these should be considered by companies considering innovations. Such limits vary in different ways to product improvement, but rather the given technology’s proximity to a state of discontinuity, that is to say, the moment in which its utility begins to decline due to the advent of new and more effective means to the same end. Nevertheless, the company should take into consideration the existence of technological quality, represented by the capacity of the company’s accumulated technical means to produce the best possible results in terms of cost to performance ratio. Such consideration motivates the following procedure for determining a sort of company technological existence between its technological capacity, that of competitors, and the state of maturity of the technology in question (figure 12)

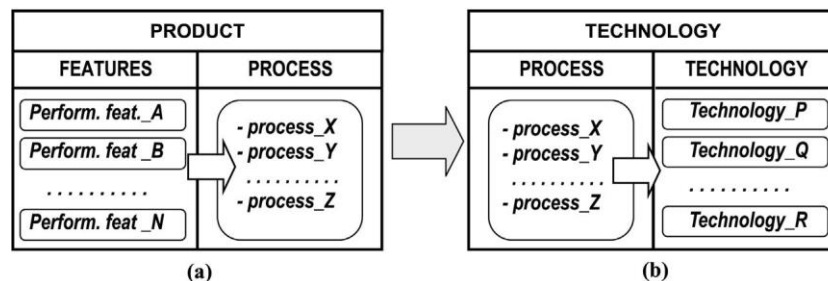


Figure 10: Linking technological to performance via processes

To this end, by analogy to the procedure outlined in the foregoing for the relations linking products and features, each selected technology must be evaluated with regards to its possible future development level of technological maturity (TM) and also the company's ability to compete technologically with other comparable firms (the company's technological capacity (TC). The value of the first parameter can be determined by estimating the current state in which an evolving technology can be placed within its foreseeable life cycle. Such evaluation includes some evident difficulties that can still be resolved through alternatives to the opinions of experts in the given field. The second parameter, instead, represents the company's ability to effectively utilise the technology in question better than its competitors. It can therefore be determined by evaluating the company's know-how, patents, human and financial resources and R&D investment, and comparing them with competing firms.

As before, the type of approach allows a two-dimensional matrix to be constructed (figure 12)

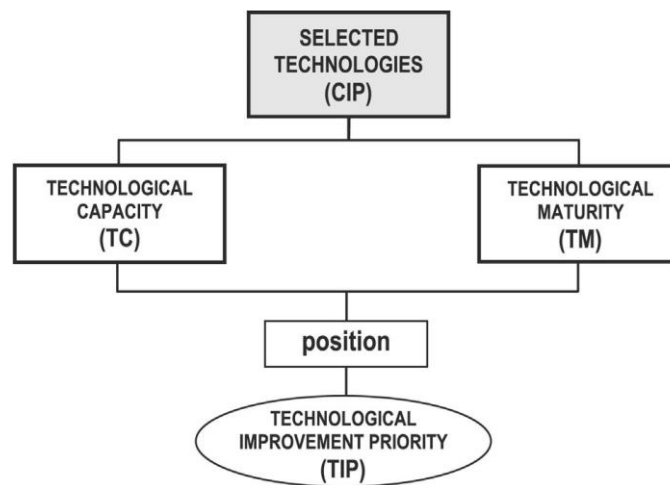


Figure 11: Measuring the priority of technologies

Sub-model 3: the strategic value of technology

At this stage, the company can proceed with the evaluation of the strategic value of the technologies considered, an index of which the company obtained by crossing the value of the competitiveness intervention priority (CIP) with those of the technological intervention priority (TIP) this is clearly possible only because these values are the same, as they both stem from qualitative results, and can therefore be linked in a matrix (figure 14, in a manner similar to that previously describes for technologies and processes. Each technology is will be assigned a strategic value (SV), which represents its ability to contribute benefits on the company in terms of improvements to both its products and its overall technological performance.

The matrix therefore provides an overall related view of the strategic position that a company can realise by adopting those technologies with high strategic values (SV).

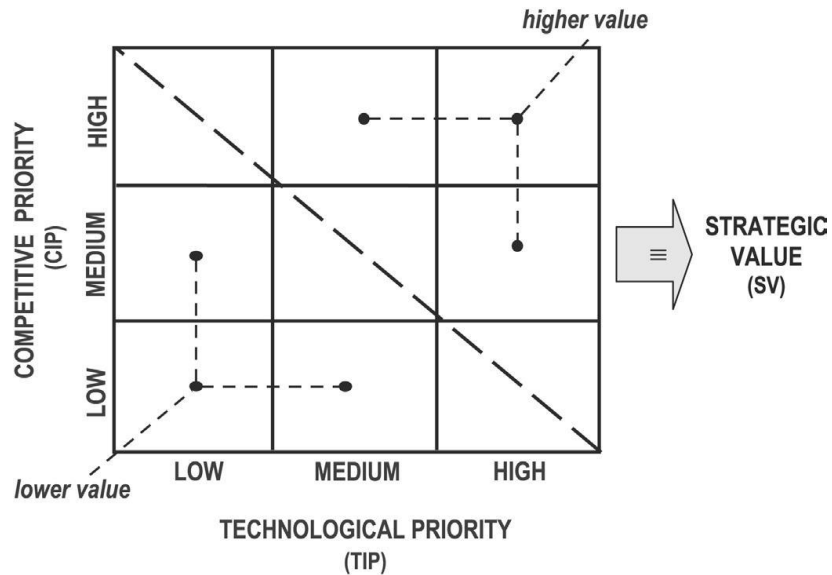


Figure 12: Matrix for the Strategic value of technology (SV)

To provide an overview of the steps covered so far, Figure 15 shows a schematic, integrated outline of the three models described.

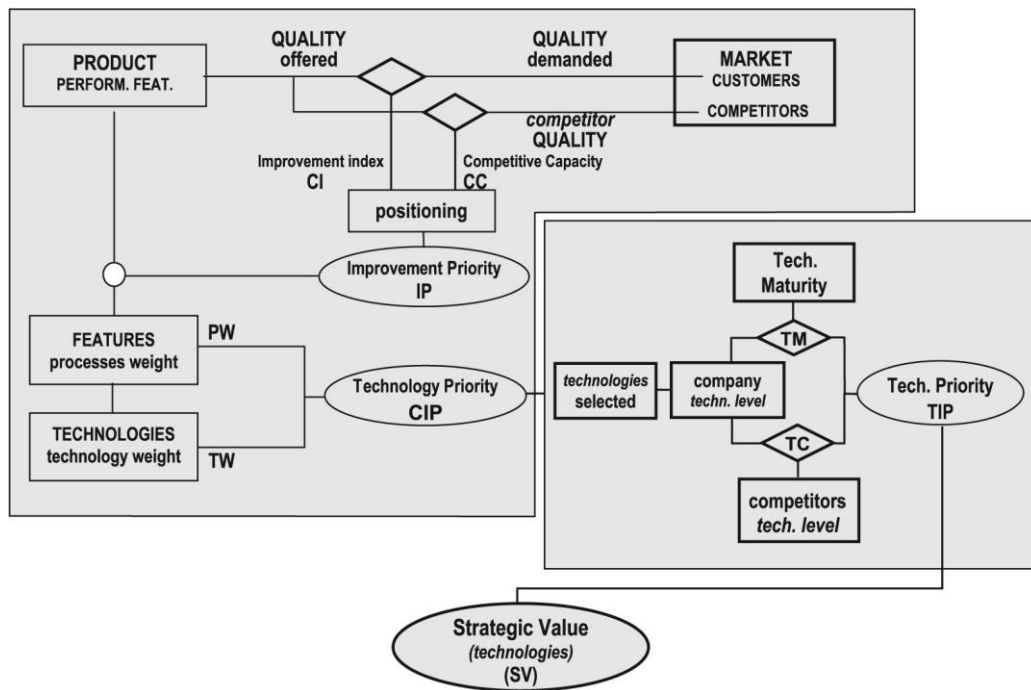


Figure 13: Integration of the three sub-models for evaluating technological priorities

Sub-model 4: the strategic value of technology

As mentioned in the beginning of the model, the results of adopted technologies are measured in the increased market share and expansion into new markets. Therefore, any parameters used in measuring the benefits and improvements on which the success of the company depends on is expressed in economic and financial terms. However, traditional financial indicators are known to be unsuitable for valuing such phenomena. For example, return on investment (ROI) and other fixed indicators are unable to reveal the dynamic nature of technological strategies, they are incapable of accounting for supplementary investments necessary to sustain competitiveness, nor are they able to express the variability in results in the medium to long term. In times of fast changes, the assessment/ valuation system must be able to account for the impact of market dynamics on company performance. The difficult posed therefore becomes formulating a measure of company economic and financial performance.

In solving this problem, new approaches have been derived such as trying to measure the company's performance in terms of value creation that is to say, a system (such as economic value added (EVA)) that enables entrepreneurs one to estimate their decisions potentials to increase a company's economic value in a medium to long term. It is very clear from the beginning that such a valuing system have been adopted in formulating the current assessment model.

Improving company's technological innovation can enhance its competitiveness and increase not just its sales volume but also increase productivity and reduce the cost of production. Due to problems that comes with the implementation of technological innovation such as cost of financing the project, the company needs a careful examination of those economic and modern financial indicators to be able to find the most appropriate methods that best suits the company in terms of evaluating the entire project.

The foregoing considerations have led to the definition of the specifications for a performance assessment model of the decision-making process for technological innovations. The most important objectives are to provide the model with the following capabilities:

- To measure variations in company value;
- To verify the feasibility of development;
- To simulate both internal and external scenarios;
- To conduct sensitivity analysis in order to forecast the incidence of risk factors, the reliability of the processed information and the varying degrees of uncertainty inherent in the assumed scenarios;
- To express results in the form of synoptic report that, as previously stated, can evidence the criticality and significance of the different parameters and variables defined.

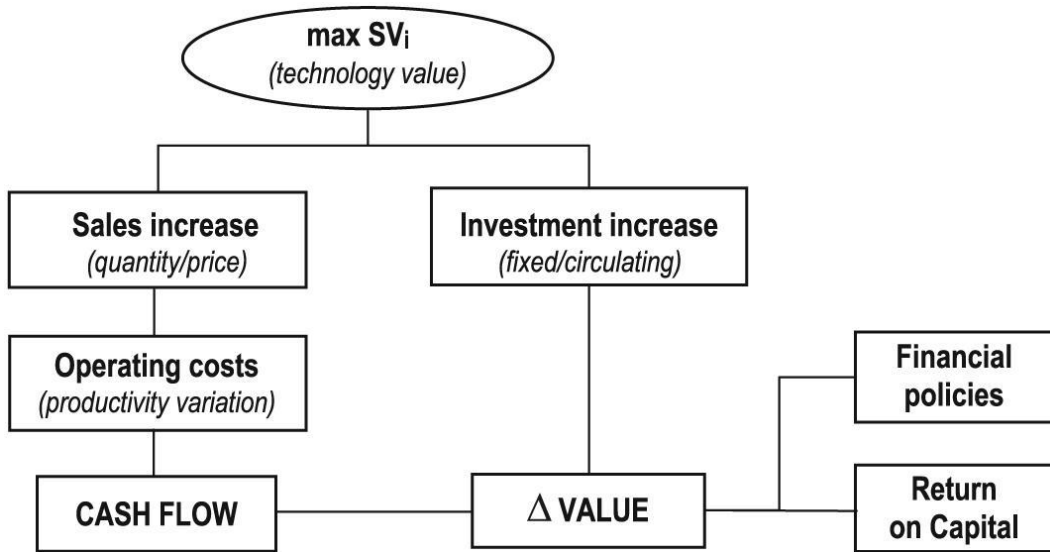


Figure 14: Sub-model for evaluation of company value

3. RESEARCH METHODOLOGY FOR EVALUATION OF TECHNOLOGICAL INNOVATIONS IMPACT ON FOOD INDUSTRY DEVELOPMENT

3.1. Research Approach

The main objectives of this research were to get a clear understating on the level of technological innovation advancement in SMEs across the Agricultural sector. This was based on the topic of the thesis and the factors involved in the research process. The questionnaire questions where selected to cover all the aspects of the evaluation such like, the approach of the companies to innovation, the type of innovation implemented by the company, problems and challenges faced by the SMEs and at the end evaluate the economic and financial impact on their implementation of innovation. Although there are many questions to be asked on this issue, I decided to focus on the most important aspects to arrive as the results. The bases in which the questionnaire was formed is represented in the conceptual model represented in the figure below.

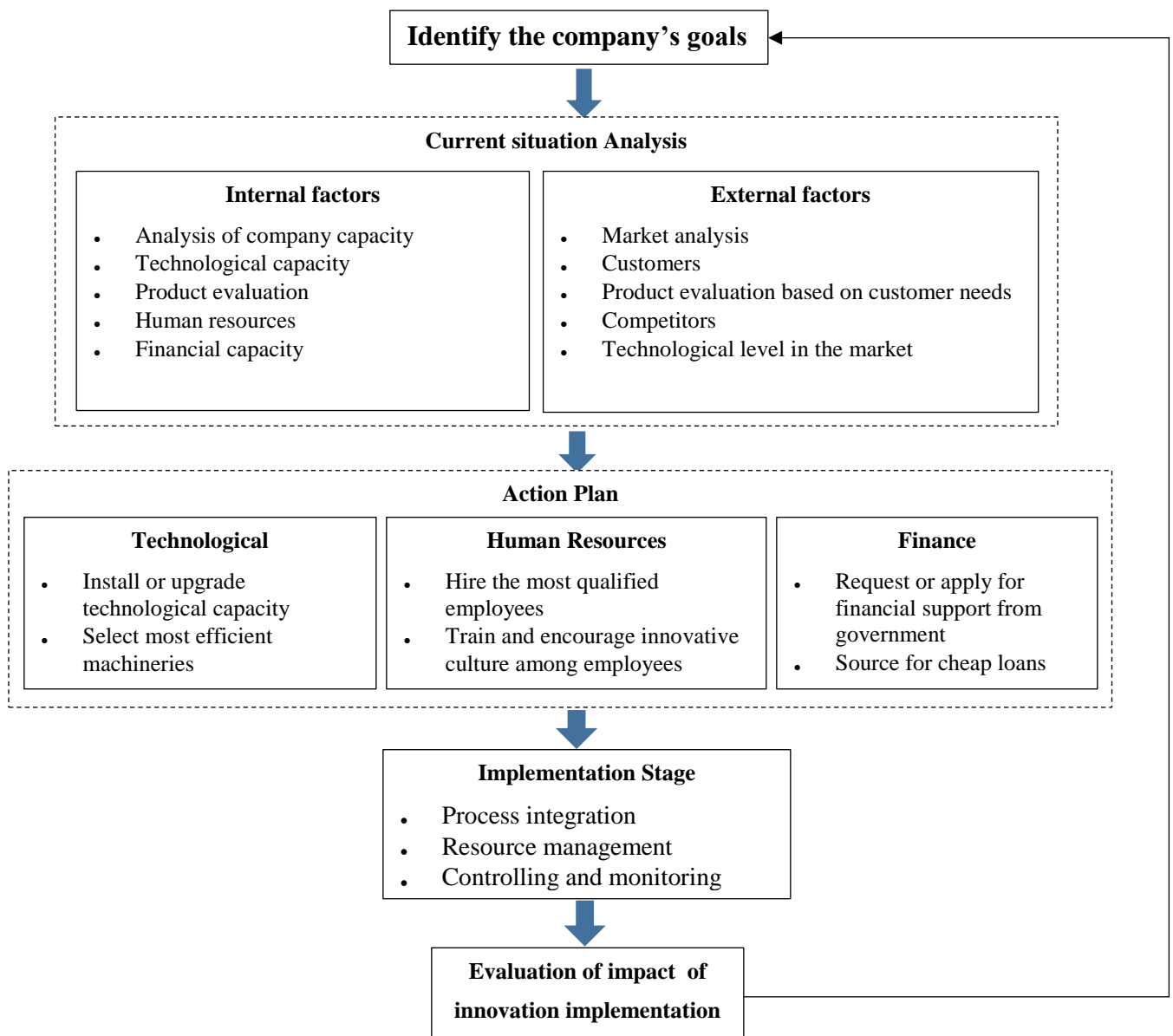


Figure 15: Conceptual model

The conceptual model represents the structure and factors involved in the research and the conducted analysis. It shows the first state which first identifies the main objectives of the company by analysing the internal and external factors related to successful implementation of the innovation. The company as seen in the conceptual model will have to analyse the capacity as a company by evaluating their technological capacity, the product which is been produced or will be produced, their human and financial resources and then on the external factors, the company will have to analyse the market and customers based on demographics, product evaluation based on customer needs and the level of their current technology compared with the available technology in the market and their competitors. Subsequently, the company will have to make decisions based on the effectiveness and efficiency of those factors and then move to the implementation stage of the selected choices. The last stage of the model will be evaluation of the benefits of the implemented innovation process.

This model is similar to the abducted model in the theoretical part of the thesis but is more simplified and streamlined for a better understanding. It aimed at describing the evaluation and implementation process of innovation SMEs for overall better performance both within the company and its external environment. Each stage of the process is considered critical to the process for maximum value delivery and deserve careful analysis and due attention for successful implementation process.

3.2. Data collection and research significance analysis

The targeted participants of this research where general employees working in SMEs within the agricultural sector in Nigeria. This was specifically meant to target SMEs that have less than 100 employees based on Nigerian definition of SMEs. The questionnaire was shared among three of my relatives living in Nigeria to visit the SMEs and get the employees to fill the survey questionnaire. These group of employees where targeted because of their knowledge and experience within the agricultural sector and overall innovation advancement within the industry and the country in general. About 45 copies of the research questionnaire were printed out and taken to the various SMEs for the employees to fill and about 29 of them were filled but I selected to analyse only 24 because 5 were not miss filled. The employees whom were asked to fill the questionnaire where selected among based on their positions, years of experience, departments and age. This was because all the participants are important in decision making and the implementation process of the innovation within their various SMEs.

The analysis was done using the most famous and accurate analytical programme IBM (SPSS). The data was imputed and analysed to determine the results of each question from the questionnaire.

The research topic was chosen because of the value and importance it has to the Agricultural industry and its economic impact on SMEs and the entire country. Having a clear understand on the level of innovation implementation and all the factors affecting the process will help determine where improvements are needed in order to achieve better results. This food industry is of strategic importance to the economic development of the country and deserve maximum attention. Innovation has been seen to improve production significantly in other developed and developing countries which is why this research was very important and needed at this point in time to help create a model that will be beneficial to Nigerian SMEs in the food industry. The research aimed at recommending the key aspects needed for ultimate performance of those SMEs in the domestic and international markets, therefore, key factors are chosen in consideration of the locations and market in which these SMEs operate.

4. RESEARCH FINDINGS OF TECHNOLOGICAL INNOVATION IMPACT ON FOOD INDUSTRY IN NIGERIA

4.1. Analysis of the results

The results were analysed from all the questionnaire questions in order to derive specific results based on the participants responds to each question and in each section. The results will be represented and analysed below as follows

The first section of the questionnaire was framed to have an understanding on the company’s approach to innovation and below are the results on each of the questions.

Does your company have a strategic plan for innovation?

		Frequency	Percent	Valid Percent
Valid	Yes, we have	21	75.0	87.5
	No, we don't have	1	3.6	4.2
	We are planning to have	2	7.1	8.3
	Total	24	85.7	100.0
Missing	System	4	14.3	
Total		28	100.0	

As shown above, the respondents mostly agreed their companies have a strategic plan for innovation with about 87.5 valid percent while the 8.3 planning to implement a strategy with only 4.2% answering No, we don’t have. This shows positive approach to the overall results on the side of the company’s approach towards innovation. It also shows their determination even though the difficulties involved in innovation implementation and strategy.

Does your company devote resources for innovation?

		Frequency	Percent	Valid Percent
Valid	Yes, we have	17	60.7	70.8
	We are planning to have	7	25.0	29.2
	Total	24	85.7	100.0
Missing	System	4	14.3	
Total		28	100.0	

Resources like human capital, finance and infrastructure is strategic to the successful implementation of innovation and this claims by the respondent shows a positive devotion of resources to ensure their innovation implementation is successful. 70.8% agreed they have devoted resources while 29.2% have plans to devote resources to support their innovation process and success. It’s another positive step towards

transformation from old and typical processes of food processing to more innovative ways of processing food.

Does your company have a support system to encourage employees to innovate?

		Frequency	Percent	Valid Percent
Valid	Yes, we have	15	53.6	62.5
	We are planning to have	9	32.1	37.5
	Total	24	85.7	100.0
Missing	System	4	14.3	
Total		28	100.0	

Does your company have a support system to encourage employees to innovate? * What kind of tools / Incentives does your company use to develop human resources towards innovation development? Crosstabulation

Count

		What kind of tools / Incentives does your company use to develop human resources towards innovation development?				Total
		Organise training programmes	Knowledge and information exchange with other companies	Support employee's participation in international (conferences, seminars, events)	Meetings to share innovative ideas among employees	
Does your company have a support system to encourage employees to innovate?	Yes, we have	10	0	3	2	15
	We are planning to have	6	2	1	0	9
Total		16	2	4	2	24

Question 3 and 4 compares the frequencies of companies that have a support system to encourage innovation among employees and what kind of tools/incentive they use to develop their human resource. About 15 out of 24 employees agreed their companied have a support system which include 10 employees saying their companies use to organise training programmes as a development tool while other 3 says their companies support employee's participation in international conferences, seminars and evens and 2 employees indicated their company's development tool is organising meeting among employees to share innovative ideas with the management. Also 9 employees indicate their companies are planning to have a support system to motivate employee's participation in innovation.

Have your company implemented innovation in the last 3 years? * If yes, what kind of innovation? Crosstabulation

Count

		If yes, what kind of innovation?				Total
		Technological	Organizational	Marketing	Other	
Have your company implemented innovation in the last 3 years?	Yes	13	6	3	1	23
	No	0	0	1	0	1
Total		13	6	4	1	24

Question 5 and 6 compared companies based on their employee’s responses that have implemented innovation and the type of innovation they have implemented. Most of the companies that have answered yes for implementing innovation within the last 3 years, 13 of them have implemented technological, 6 implemented organisational while 3 implemented marketing innovation which makes it 23 employees accepting their companies actually implemented marketing and only 1 employee answered “No” that they have not implemented innovation in their companies. It seems most SMEs have understood the importance of innovation in one way or the other, they believed innovation could actually improve the performance of their companies.

Which Levels of Innovation Are You Pursuing?

		Frequency	Percent	Valid Percent
Valid	Incremental Innovation (Innovations that keep your existing offering competitive.)	15	53.6	62.5
	Radical Innovation (Innovations with new value propositions that expand your business into new markets.)	7	25.0	29.2
	Transformational Innovation (Innovations that transform the world, changing markets and lives forever.)	2	7.1	8.3
	Total	24	85.7	100.0
Total		24	100.0	

Question 7 from the questionnaire was focused on determining the level of innovation the companies were pursuing in order to have an understanding on which method of innovation from incremental, radical and transformational innovations. The results indicated 15 companies are pursuing incremental innovation, 7

companies pursuing radical innovation and 2 transformational innovation. It is most likely that those companies implementing incremental innovation are moving from either old technology to new and innovative one or either they have device innovative ways of marketing or organization culture. In which ever ways the results indicate incremental innovation is the most common and mostly adopted among SMEs within food processing sector.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
What are the major Problems in implementing Innovation in your company?	0				
No qualified employees	24	3	5	4.13	.537
Employees are not encouraged	24	2	5	4.00	.978
Employees lack positive attitudes	24	2	5	4.17	.702
Difficulties to access finance	24	2	5	4.58	.717
High interest on loans	24	3	5	4.67	.565
No financial support system from government	24	4	5	4.67	.482
Lack of power supply	24	2	5	4.04	.859
Lack of good roads	24	1	5	3.00	1.022
Institutions of Innovation and R&D	24	2	5	4.08	.881
Valid N (list wise)	0				

The question of what are the major Problems in implementing Innovation in your company? Have been divided into sub categories namely Human resources, Financial resources and infrastructure. This was to have a clear understanding on which particular section the SMEs are having the most problems. The results came our indicating almost all the factors on the having an average problem. This means that all the problems are rated almost on the same level of mean which varies between 4 meaning “Important” to 4.67 meaning “Most important on the scare except for the problem of roads which shows a mean of 3 meaning neutral on the scale. It clearly shows how serious these problems are hindering the fact development and implementation process of innovation within the sector. The results also show financial problems been the most pressing problems faced by SMEs within food processing industry

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
What are the main benefits, you gain due to Innovation implementation in your company?	0				
Innovation help our company increase sales	24	3	5	4.25	.532
Innovation help our company increase production output	24	3	5	4.29	.624
Innovation help our company save cost of production	24	3	5	4.13	.797
Innovation help our company increase revenue	24	3	5	4.42	.584
Innovation help our company serve and fulfil the needs of our customers' better	24	3	5	4.21	.588
Innovation help our company compete better in the market	24	3	5	4.13	.741
Valid N (list wise)	0				

This set of questions were designed to evaluate the impact of the of innovation in those companies that have implemented innovation to see if they have benefited positively in the process. The results are impressing with the level benefits innovation has increase in their companies. It is also great to see that all the companies benefited positively from innovation whether it was implemented technologically or through marketing and organization. The results shown in the table above indicated above 4.1 mean for each of the question which means they strongly agree that their various companies benefited from innovation.

It these magnificent results, other companies within the industry will also be motivated to engage in innovation having seen it have positive impact on other companies within their industry. The most agreeable of the questions where to “innovation help our company increase revenue” with 4.42 mean been “Agree”.

4.2. Research findings and discussions

This research has been able to give an insight on the major problems SMEs within food industry are faced with. There are numerous problems but the most common and important ones where evaluated and the results clearly shows that getting finance is a major challenge and there is literally no financial support from government in the past decades. It is however chilling to understand that government has set up an

initiative to help SMEs within the agricultural sector. This will help reduce the cost of loans as commercial banks will reduce their interest rates and make these loans more accessible to SMEs within the country. Having a strategic plan for innovation is one step and having the resources such like finance is another major step to steer up the entire process of innovating a particular company or the industry. It is very important for SMEs to have easy access to finance to be able to achieve their innovation goals. This results backed up with the respondents claims on lack of financial support from the government and banks high interest rates making it very difficult for the SMEs to implement their innovative objectives.

The research also gives an insight on the type of innovations most SMEs within the sector are pursuing. It shows more companies that have implemented innovation have chosen to implement incremental innovation for help improve the standard of their various companies. This type of innovation is mainly focused on improving the already existing structure and policies within the company to achieve better results or performances. It also seems to be the most appropriate for an industry like food processing and it is also believed to have better results in terms of benefits for the overall performance of the companies whom have implemented it. The evolution of mechanised farming has witnessed a lot of innovation over the few years from farmers shifting from the traditional farming methods and the use of fertilizers and more Agro-chemicals to increase their harvest which also has effect on food processing industry. This has pushed the food processing industries to improve their production output in order to avoid large amount of waste from the harvested yields and also to serve the growing demand for food across the country.

Another interesting aspect of the study was the way and manner the companies implemented innovation within the last 3 years. The results indicated that out of the 24 respondents, 23 agreed that their companies have implemented innovation within the last three years. This also shows how enthusiastic the companies are significantly recognising the importance of innovation. In their response, most of them implemented technological innovation which seems to improve their production levels as to cope with the high urbanisation and population rise. Of course, technological innovation is the most prominent of all the innovations at least in an industry like food processing, it helps in many ways imaginable to not only improve production output but also improve the standard and quality of food. It helps SMEs save cost in various ways and improve their competitive strength within the domestic and international markets and in some cases, it gives them a fair share of the market on the same levels like their counterpart's multinationals. Since technology is on the rise and has a proven record high among SMEs in both the developed and developing countries, SMEs need to utilise the opportunity it brings and increase their results and growth.

In the same results, 6 of the respondents agreed that their companies did implement organisational innovation which again is very strategic for the success of the companies. Without good organisational

structure and culture, it will make things very difficult for a company to succeed and also grow. Organisational innovation help companies to coordinate all the activities and process involved in achieving organisational goals in both short and long term. Management of resources to ensure a sustainable development and growth of a company lies in the hands of the organisational structure which makes it more crucial for companies to have an innovative organisational structure and culture in order to apply policies that will serve their stake holders better and overall compete better in the markets. It is my opinion that organisational innovation should be a key factor in the performance of SMEs and to be evaluated and reconstructed periodically to ensure the companies are moving on the right track.

The last 3 respondents said their companies applied marketing innovation which helps improve their sales. It is also very important for SMEs to have a high standard marketing principles that involves targeting, differentiation, communicating and in general order management systems that stands the teste of time. Marketing is of strategic important because it plays the roles sales and income generation which in most cases it the bedrock for successful operation and continues growth of SMEs

The performance evaluation among companies that implemented innovation in one way or the other show significant improvements and huge benefits in the process. The overall results stipulated that all the companies that implemented innovation agreed of having benefited positively from it. This might vary in terms of sales, expanding their market base, saving cost of production, serving their stake holders better and in general generating more revenue for their various companies. The most important thing to derive from these results is that, innovation is beneficial for SMEs within the food industry and should be applied in one way or the other within any existing and operating SMEs within this sector. Despite the problems and challenges faced by companies, innovation will be a key factor in ensuring their success and suitable growth overtime. It is my opinion that any existing or new SMEs should have a strategic innovation plan that will ensure availability of resources (human resources, financial resources and infrastructure) within a strong organisational structure and culture coupled with technological capacity to product at cheaper rates but high quality capered with the customer demands in the market. This will be the only way innovation will be effective for SMEs within the food processing sector in Nigeria.

4.3. Factors to improvement in technological innovation implementation process in SMEs

Improvement is always important at any stage in an organization, however, attention is given to more pressing factors that are hindering the growth and performance of a particular company or industry. Considering the results of this study. There is no doubt that many factors which are needed to contribute significantly to the development of SMEs and the entire food industry where identified. As many as they

seem, due to the limitations of this study. The author chooses to highlight the most important ones to suggest improvements. These tools and factor will be listed and briefly described below.

1. Infrastructure: infrastructure in this study refers to power supply, roads and institutions of innovation and R&D. there is huge discrepancies hindering the development of SMEs in sector due to poor electricity supply that is needed to operate machineries and daily operations within these companies. It is very sad that till today Nigerian government could not meet up with the power supply needs of SMEs and the general public. Power supply is very low within the country and that all to huge cost of diesel for operation of the machineries increasing the cost of production. It is the government duty to ensure adequate power supply to improve the operations of these SMEs and reduce their cost of operation. At a time where every country is almost going green on energy, with huge natural resources the company has, it should be able to improve power supply especially to industrial areas of the country to help industries produce better, cheaper and better quality.

Another aspect of infrastructure that need serious attention is institutions for innovation and research and development. These institutions help in advancement of SMEs through researching on how to improve the overall development of these SMEs. Knowledge sharing and Standard institutions will play a significant role in ensuring faster development of these SMEs.

The issue of roads was not so emphasized in the result but surely need improvement for better delivery and the overall transportation system of the SMEs within food industry.

2. Finance: Finance was the major problem as indicated by the result of the study. These problems exist because of lack of government support their failure in regulating commercial banks. As a result, commercial banks have very high interest rates (15% to 27%). This did not just discourage SMEs but put in very tight situation to expand their market domestically and internationally. Government lending agencies like bank of industry has too strict requirements that prevent a lot of SMEs to access funds needed for their growth and development. This factor has an economic effect on the government in terms of high rate of layoffs by some SMEs that could not afford the cost and bureaucratic process of accessing those loans. These translate to rise in unemployment and low contribution to the GDP of the government. It is unfortunate that many SMEs could not succeed due to financial reasons.

Government need an immediate action to address the problem of finance among SMEs by making it more easy for them to access the finances they need and also putting more regulatory controls on commercial banks to reduce their interests and make it more easy for SMEs in food industry to get

the required finance they need. This will drastically transform the industry and create millions of jobs across the country and for sure increase government revenue through taxes.

There are programmes that have been recently implemented by the government to help SMEs access funds more easily and at affordable interest rates but unfortunately most of these programmes are not yet inaugurated. It will be great for another research to look into these factors in few coming years in order to ascertain the actual state of these problems.

3. Human resources: Another major issue the SMEs indicated they were facing is lack skilled and qualified human resources to effectively run the affairs of the companies. This problem is known to be related with finances of these SMEs. Because they are not able to hire well qualified personnel's, they prefer to hire low skilled workers which have very little knowledge of innovation let alone to implement it. It is a serious problem because the resources involved in training those qualified employees takes time and money which most SMEs are not able to afford or simply hire already experienced employees to oversee their innovation implementation.

The solution to this problem lies in both the SMEs and the government. The SMEs must be resourceful by making use of their available resources to motivate and train their employees in the most economic and beneficial means available. This might include organising training programs within their companies, create knowledge and information sharing programmes among employees and other companies within the same industry, support employee's participation in domestic and international innovation conferences, seminars and events to help boost their innovative knowledge and skills.

The government on the other hand must make sure programmes are created to train and equip individuals especially youths willing to work in SMEs in all the states that are engage in food processing. This will create skilful employees that will be useful to the SMEs and in overall become better citizens of the country. Through this means, the government will help create a lot of innovators and capable employees that will work for SMEs and be able to even start their businesses.

4.4. Case Study on Bio Yam Processing in Nigeria.

The case study is chosen based its similarity to the main topic of this thesis. The objective here is to evaluate how technological innovation will impact on development of food industry in Nigeria. The case itself falls under the category of SMEs in the food industry which Yam processing.

Yam (*Dioscorea SPP*) is an important food crop in west Africa with over 600 different species. It is one of the most popular food crop eaten around the region and other parts of the world. The west African region is

believed to have over 90% of the total yam production in the world while Nigeria alone produces over 70% of the root/tuber crop. It is estimated that an average yam consumption per person is 0.5 to 1kg every day in Nigeria. Because yam is widely consumed across all social economic class, religious and ethnic groups, it will be hard to believe yam is not eaten in one way or the other in at least 2 out of 10 homes in Nigeria.

In recent times, due to the numerous yam products (yam chips, pellets, starch) that can be processed from yam tubers and the growing need for hygienically well packaged ready to use food products by the growing middle class in Nigeria, there is a gap in the supply of instant pounded yam flour in Nigeria thereby prompting a shift in the demand-supply equilibrium in favour of instant pounded yam flour producers.

The supply gap has been identified to continue to expand as the population of the country which is estimated to be 182 Million which continues to grow at 3.5% per annum according to UN, 2016.

Also, the rural – urban drift in the country would help to deepen the market for instant pounded yam flour which is estimated at over ₦3 billion approximately (€8,571,429) annually in Nigeria.

According to the above model, this explains the market demand for the products and potential expansion to nearby countries such as Ghana and Cameroon where yam products are widely consumed.

The reason for technological innovation in this particular product may lie in the massive growing demand for more hygienic, quality and easy preparation methods especially in the urban areas. People are not looking for more easy and fast ways of preparing food and will give a great opportunity for this product to be received in the market across the country. The process of production involves transformation of the byproduct “Yam” to its powdered form (instant yam Pando flour) to the final eatable product (pounded yam) as shown below.

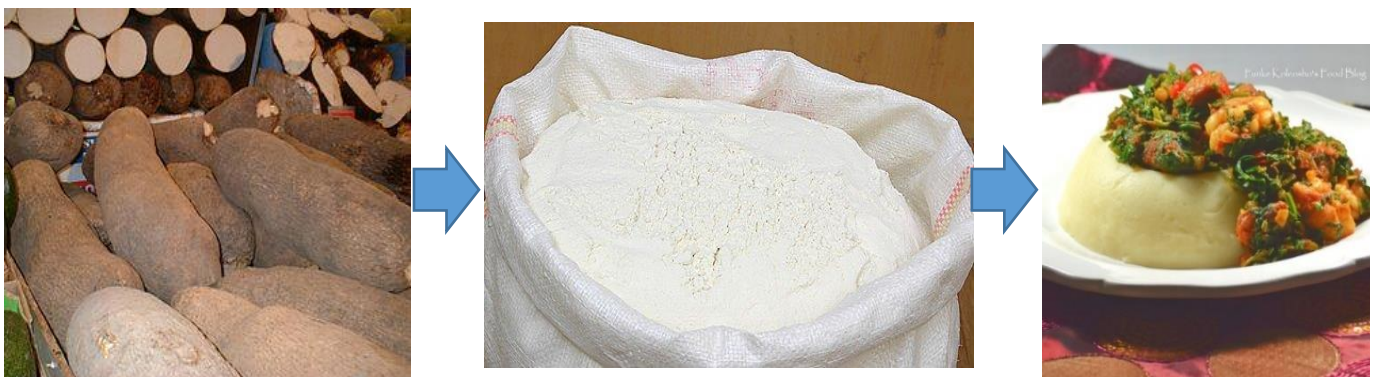


Figure 16: Yam to Pounded yam

Technological capacity analysis for Yam processing

The technology required for successful production of the product is available locally in Nigeria. The problem is that, the quality of the technology available is not of high quality and lack automation and innovative capacity to meet up the desired production output of the product. I have strong doubt if these products will be sustainable for company and the environment. The following companies based on my research are the ones producing those machineries and equipment required for the production of instant pounded yam flour in Nigeria

- Abiola Electrical & Machinery Company Limited, No 37, Odi-Olowo Street, Oshogbo, Osun State, Nigeria;
- Household Investment Co. Limited, Suite 25, Block 5, LSDCP Complex, Plot 12, Ilupeju Industrial Avenue, Lagos;
- Federal Institute of Industrial Research {FIIRO}, 2 FIIRO Road, Off Cappa Bus Stop, Oshodi-Mushin Road, Oshodi-Lagos;

Other sources like Alibaba.com has were vastly explored to compare quality and price of the machinery and I can tell that those made in China machines are more advance and to an extend will be more effective in the production of this product. Technological capacity in Nigeria is overall low as the country lack the technology to build credible and sustainable low-tech and high-tech machinery needed for production. These is one of the challenges SMEs faced in Nigeria. The importation cost of these machines massively adds to the cost of capital and unnecessary cost of running the company. It's a challenge that required serious intervention from the government and investors within and outside the country.

Human resource analysis for Yam processing

The need for qualified and skillful employees is critical for the company's success. This means the company will have to source for well trained and experienced employees that either have been laid off or willing to change their current job. The need to train and motivate employees to participate actively in innovation will be a priority which will help the company's overall strategy in achieving its overall success. The plan of the author is to source for employees that will individually contribute to the growth and sustainability of the company

Competitors analysis

It is safe to say that; the demand far outstrips the supply meaning that a reasonable percentage of the total market requirement has remained unsatisfied. More than 60% of the country is still not covered by the few

companies operating mostly in the western part of the country. Because of this, the prices are very high in some parts due high cost of transportation from some parts of the country

Financial resource analysis for Yam processing

Financial resources of the business will be sourced in both private and governmental organizations created to assist SMEs within the Agriculture and food processing sector. The newly created organizations like bank of industry (BOI) which has lower interest rates mostly single digits between 7% to 9% annually and flexible repayment plan will be the main targets. This will lessen the pressure and cost of capital and production overtime. Some micro credit banks which are created for the soul purpose of assisting food processing businesses will be an option. This is to ensure finance cost of running the business is affordable and not of high risk for the company.

Financial Plan

Financial Assumption

I have taken a very pessimistic assumption that the tax at 5%, Principal at ₦ 25,000,000, (€75,757.57) Tenor of 24 months and Interest at 17% with a Moratorium of 2 months. The installed capacity is 3 tons per day with capacity utilization at 70% in the first and second year and the current price of ₦ 350/ kg Approx. (€1.1).

It is based on the above factors the financial plan is predicated on.

Startup Capital Estimation

Required Startup Capital Estimate	
ITEMS	AMOUNT
Pre-operating Expenses	20,136,680.00
Opening Stock	5,559,575.00
Initial Operating Expenses -3months	4,240,000.00
Insurance and inventory	563,745.00
Total Startup Capital Estimated	30,500,000.00 (€92,424.2)

Source of Capital

SOURCES OF FUNDS	AMOUNT	%
Personal Fund /Equity	5,500,000	18%
Bank Loan	25,000,000	82%
Total Funds Sourced	30,500,000	100%

Operating Activities and Expenses and Cost of Production

This section provides for the activities that would be carry out during the life span of the business and the estimated cost.

Table 4: Operating activities and expenses

Operating Activities and Expenses (Bi-monthly)													
Expenses	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	Total
Salary Expenses	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	2,750,000	₦ 33,000,000
Repair & Maintenance	32,000	32,000	32,000	32,000	32,000	32,000	40,000	40,000	40,000	40,000	40,000	40,000	₦ 432,000
Advertising	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	400,000	₦ 4,800,000
AGO for Generator and Project Vehicle @ 100 L /day @ ₦ 150/	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	₦ 9,000,000
Electricity @ 3000 Kwh/ Month @ ₦ 20 / Kwh	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	₦ 1,440,000
Utilities -- water, waste disposal, telephone and Miscellaneous	150,000	150,000	150,000	150,000	150,000	150,000	85,000	85,000	85,000	85,000	85,000	85,000	₦ 1,410,000
Total Operating Expenses	4,202,000	4,202,000	4,202,000	4,202,000	4,202,000	4,202,000	4,145,000	4,145,000	4,145,000	4,145,000	4,145,000	4,145,000	₦ 50,082,000
Initial Operating Expenses Approx.	₦ 4,173,500												

Table 5: Cost of production

COST FORECAST (Bi-monthly)														
Cost	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	TOTAL	
Qty {KG}	350	350	350	350	350	350	350	350	350	350	350	350		
Yam Tubers -- Tons	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000	80,000		
Cost/Unit														
Amt (₦)	28,000,000	28,000,000	28,000,000	28,000,000	28,000,000	28,000,000	28,000,000	28,000,000	28,000,000	28,000,000	28,000,000	28,000,000	₦ 336,000,000	
Packaging Material{ Printed 1 Kg polypropylene nylon}	110,250	110,250	110,250	110,250	110,250	110,250	110,250	110,250	110,250	110,250	110,250	110,250		
Qty														
Cost/Unit	15	15	15	15	15	15	15	15	15	15	15	15		
Amt (₦)	1,653,750	1,653,750	1,653,750	1,653,750	1,653,750	1,653,750	1,653,750	1,653,750	1,653,750	1,653,750	1,653,750	1,653,750	₦ 19,845,000	
Total Cost of Sales	29,653,750	29,653,750	29,653,750	29,653,750	29,653,750	29,653,750	29,653,750	29,653,750	29,653,750	29,653,750	29,653,750	29,653,750	₦ 355,845,000	

Evaluation of Economic and financial benefits

To understand if any project or investments are successful, there is a need for financial and economic evaluation and so as this cases study. However, these evaluations are based on assumption that if the technological innovations are duly implemented as suppose, it will drastically lower the cost of production based on the new and innovative machines on the part of the company and externally, the proposed business would positively affect socio-economic development of the situated location and the country at large. Some of the economic benefits are as follows;

➤ Employment Generation

The proposed business would generate employment opportunities both directly and indirectly. About thirty-two (32) persons would directly employment in the agricultural industry. Indirectly, about 20-35 people are expected to be employed and this includes farmers and transporters.

➤ Source of Government Revenue

The proposed business would also generate revenue to government through payment of various taxes like personal income tax, company tax and other such tax and levy from the federal, state and local government.

➤ Increase in Gross Domestic Product (GDP)

The proposed business would increase the gross domestic product (GDP) of the country.

The above makes the business socio-economically desirable

Financial benefits of the proposed business are as well based on the assumption that the business would be able to make some reasonable profits after all expenses and taxes are deducted from sales.

Sales Assumptions:

The following assumptions were made while calculating the sales forecast

1. Selling price of ₦350/ kg ex-site for yam flour
2. Output of 3 tons per day and the plant would operate at 70% of installed capacity
3. That the plant would produce approximately 110 Metric tons bi-monthly of yam flour in the first and second year
4. That the plant would operate for 440 days for the first two years

Based on the above forecast, the table below present the following sales forecast for 2 years

Table 6: Sales Forecast

SALES FORECAST (Bi-monthly)													
	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	TOTAL
Yam Flour -- 1 Mt	Qty {MT}	110	110	110	110	110	110	110	110	110	110	110	110
	Price/ Mt	₦ 350,000	₦ 350,000	₦ 350,000	₦ 350,000	₦ 350,000	₦ 350,000	₦ 350,000	₦ 350,000	₦ 350,000	₦ 350,000	₦ 350,000	₦ 350,000
	Amt ₦	38,500,000	38,500,000	38,500,000	38,500,000	38,500,000	38,500,000	38,500,000	38,500,000	38,500,000	38,500,000	38,500,000	38,500,000
Total Revenue Cumm. ₦	38,500,000	77,000,000	115,500,000	154,000,000	192,500,000	231,000,000	269,500,000	308,000,000	346,500,000	385,000,000	423,500,000	462,000,000	

Table 7: Profit and loss statement

Bi-Monthly Profit and Loss Statement (24 Months)													
Components	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
TOTAL SALES	38,500,000.00	38,500,000.00	38,500,000.00	38,500,000.00	38,500,000.00	38,500,000.00	38,500,000.00	38,500,000.00	38,500,000.00	38,500,000.00	38,500,000.00	38,500,000.00	462,000,000.00
TOTAL COST	29,653,750.00	29,653,750.00	29,653,750.00	29,653,750.00	29,653,750.00	29,653,750.00	29,653,750.00	29,653,750.00	29,653,750.00	29,653,750.00	29,653,750.00	29,653,750.00	355,845,000.00
GROSS PROFIT	8,846,250.00	8,846,250.00	8,846,250.00	8,846,250.00	8,846,250.00	8,846,250.00	8,846,250.00	8,846,250.00	8,846,250.00	8,846,250.00	8,846,250.00	8,846,250.00	106,155,000.00
EXPENSES													
Operating Expenses	4,202,000.00	4,202,000.00	4,202,000.00	4,202,000.00	4,202,000.00	4,202,000.00	4,145,000.00	4,145,000.00	4,145,000.00	4,145,000.00	4,145,000.00	4,145,000.00	50,082,000.00
Interest	813,304.27	774,652.77	735,196.04	694,917.29	653,799.40	611,824.88	568,975.90	525,234.23	480,581.28	434,998.06	388,465.18	340,962.87	7,022,912.18
Depreciation	453,222.90	453,222.90	453,222.90	453,222.90	453,222.90	453,222.90	453,222.90	453,222.90	453,222.90	453,222.90	453,222.90	453,222.90	5,438,674.80
TOTAL EXPENSES	5,468,527.17	5,429,875.67	5,390,418.94	5,350,140.19	5,309,022.30	5,267,047.78	5,167,198.80	5,123,457.13	5,078,804.18	5,033,220.96	4,986,688.08	4,939,185.77	62,543,586.98
NET PROFIT BEFORE TAX	3,377,722.83	3,416,374.33	3,455,831.06	3,496,109.81	3,537,227.70	3,579,202.22	3,679,051.20	3,722,792.87	3,767,445.82	3,813,029.04	3,859,561.92	3,907,064.23	43,611,413.02
Income Tax	98,746.54	98,746.54	98,746.54	98,746.54	98,746.54	98,746.54	98,746.54	98,746.54	98,746.54	98,746.54	98,746.54	98,746.54	1,118,333.27
NET PROFIT AFTER TAX	3,278,976.29	3,317,627.79	3,357,084.52	3,397,363.27	3,438,481.16	3,480,455.68	3,580,304.66	3,624,046.33	3,668,699.28	3,714,282.50	3,760,815.38	3,808,317.69	42,493,079.75

Based on the above profit and loss statement for the first two years, the company is projected to make ₦42,493,079.75 (€128,767) in net profits. This assumption is based on current market situations and predictions that things will remain the same, however, there are more positive changes that are likely to make things better for the business as government promise to improve the situation of SMEs in the country such as making funds more accessible and at lower interest rates.

CONCLUSIONS AND RECOMMENDATIONS

This research was based on evaluating the impact of technological innovation impact on development of food industry in Nigeria. Based on the results of the study, the following conclusions are drawn.

1. The problems associated with SMEs in the food industry were found to be numerous and on both internal and external sides of the SMEs. Most of these problems were attributed to long term impact of bad governance that was unable to assist and encourage SMEs within the food processing industry and the overall agricultural sector in the country. This led lack of financing, proper infrastructure, skilful and required human resources for those SMEs to thrive. Internally, some of the SMEs were not able to innovate and compete with the multinationals due to cheaper products pouring in from China and the western countries. It will be necessary for the government to take drastic measures in order to solve some of these issues and step in helping these SMEs to grow and sustain their development for economic benefits of the country.
2. This research discovered that incremental innovation was more prominent and the most practiced innovation type has raised some questions if that is the most appropriate type of innovation for this type of business or if it simply works better for this sector. These questions could be answered in two ways one being that, in the past years, most SMEs in the food processing sector were engaged in locally produced machines which were not effective and involved a lot of diesel to run them. This caused high cost of production to the companies. Also, the output those machines were able to produce was not so much and they were unable to meet up the supply demanded by the market. Another reason was frequent break down of these machines that used to cause delay in production. As new technologies began getting into the market from China mostly, these SMEs took advantage of those machines and were able to completely change their production units making their production process more innovative and cost effective. The new machines are said to be automated and run on electricity which saves cost for the SMEs as they transition from the old ineffective machines to more innovative and cost effective machines. This also improves their products and their entire business processes making incremental innovation more prominent among SMEs in food industry in Nigeria.
3. To help deal with some of the problems and challenges facing SMEs in the food industry and the entire agricultural businesses, a model was designed to help SMEs examine and analyse their situation such like their technological capacity, analyse their internal factors as well as external factors to determine their position and how best they can use innovation to compete better in the

market and sustain a long-term growth. These factors revolve around what they need to succeed and how best they could make use of their available resources to break through the market. The model involves first listing their goal(s), secondly, evaluating their internal and external resources, implementing the innovation tools and last part is to evaluate the economic and financial benefits of the implemented innovation.

4. Considering the evaluation of those companies that implemented innovation within the last 3 years, it is very clear that Technological innovation has been seen to have so much impact on the development of food industry in Nigeria, most of the impact is positive in terms of lowering the cost of production and creating more revenue streams for the companies that participated in innovation implementation processes. It has economics and financial benefits for SMEs that successfully implemented innovation in one way or the other in their various companies. Technological innovation has changed the food industry in the most positive ways imaginable. It's not only in the production section but in order management systems which helps improve and makes customer service process faster and more efficient, it also contribute in making order delivery and relationship with suppliers better by improving the communication systems between SMEs and their stakeholders. This leads to more sales and revenue for those SMEs in the food industry in Nigeria.

Recommendations

Some of the SMEs underutilised the potentials innovation could have to their companies. This study indicated that some of the participant's shows that their companies were lagging behind in some areas. Because of this, their results were seen to be lower than expected. The following recommendations are those SMEs

1. In motivating employees to participate fully in innovation activities within their companies will have a lasting impact on their innovation capacity. But it seems some of the companies don't even have this as a plan or a factor which is considered to be important among their innovation objective. SMEs should have an initiative to engage their employees in every way possible to participate fully in innovation in order to help boost their success target. Engaging employees in innovation will benefit the companies in a long-term process and also help the company grow faster and sustain its development.
2. SMEs should collaborate with institutions of innovation and R&D in order for them to constantly improve their methods and strategies to compete better and control a larger

share of the market. This should be able to help them have an edge over their competitors at all times if they are able to have up-to-date information on markets, customers, technologies and financial support news. They will be able to use this valuable information to act faster than their competitors which will always help them to be ahead of them.

3. Apart from technological innovations, SMEs should also take into consideration the importance of organisational and marketing innovations. These innovations are essential for maximum function of the entire company. The organisational culture and structure matters a lot when it comes to effective coordination and management of activities which leads to the overall success of the company. On the other hand, marketing innovations stipulates how well the company will be able to generate sales which increase income to the company. These two types of innovations are very important and should be given due attention at all times.
4. The last recommendations would be focused more on government. This is because government has an important role to play for the success of SMEs within the country. As indicated from the results, it is obvious that lack of infrastructure, difficulties to accessing funds and lack of government support are the most important problems hindering the growth and development of these SMEs. This means the government must device a strategic plan in solving the highlighted issues in order to create an enabling environment for SMES to thrive. These could include creating programs that will easily allow SMEs to access funds at lower interest rates and well as working with commercial banks and other micro finance banks to improve the process of accessing funds for SMEs. Building the required infrastructure like steady power supply and credible institutions of learning and research specifically for research and development (R&D) to be used by SMEs will help boost their chances of survival. This will further help the government to generate more income through taxes and overall gross domestic product(GDP).

The above recommendations will help SMEs boost their chances of survival and in a long run positively impact everyone in the society. When Small and medium scale enterprises (SMEs) do well, people are able to have good jobs and improved standard of living, government is able to make more money and sustain both economic and financial development.

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ANNEXES

ANNEXES 1. Questionnaire

Questionnaire

Questionnaire on Innovation impact for SMEs development

This survey is carried out by Eugene Agoh, a student from Kaunas University of Technology, Lithuania. The main topic of this research is Innovation impact on SMEs specifically in Nigerian Agricultural Sector.

By filling out this 5-10 minute survey, you will help to obtain the necessary data to complete my master's thesis.

Privacy statement: Please note, all information concerning this survey will be kept confidential and will not be used for any commercial or public matters.

Section 1. General Information: Please mark the most appropriate box below

Age: 18 – 25 26 – 36 37 – 47 48 – 57 58 - 67

Position: Executive Senior Manager Manager Technician Other

Years of work experience: 1-5 6-15 16-26 27-37 37-47

Department: Sales Marketing Production Finance R&D/Innovation Other

How many employees are at your company? 1-25 26-50 51-70 71-100 Above 100

Section 2: Companies Approach to Innovation

Please choose the box that best defined your opinion as described below.

1. Does your company have a strategic plan for innovation?
 Yes, we have No, we don't have We are planning to have

2. Does your company devote resources for innovation?
 Yes, we have No, we don't have We are planning to have

3. Does your company have a support system to encourage employees to innovate?
 Yes, we have No, we don't have We are planning to have

4. What kind of tools / Incentives does your company use to develop human resources towards innovation development?
 Organise training programmes
 Knowledge and information exchange with other companies
 Support employee's participation in international (conferences, seminars, events)
 Meetings to share innovative ideas among employees
 Other.....

5. Have your company implemented innovation in the last 3 years?

Yes No

6. If yes, what kind of innovation?

Technological

Organizational

Marketing

Other.....

7. Which Levels of Innovation Are You Pursuing?

Incremental Innovation (Innovations that keep your existing offering competitive.)

Radical Innovation (Innovations with new value propositions that expand your business into new markets.)

Transformational Innovation (Innovations that transform the world, changing markets and lives forever.)

Section 3: Problems and challenges of implementing innovation in SMEs

Please choose the box that best defined your opinion as described below.

1= Not important, 2= Less important, 3= Neutral, 4= Important, 5= Most important

8. What are the major Problems in implementing Innovation in your company?

Human Resources

1	2	3	4	5
---	---	---	---	---

1	2	3	4	5
---	---	---	---	---

No qualified employees

1	2	3	4	5
---	---	---	---	---

Employees are not encouraged

1	2	3	4	5
---	---	---	---	---

Employees lack positive attitudes

Finance resources

1	2	3	4	5
---	---	---	---	---

1	2	3	4	5
---	---	---	---	---

Difficulties to access finance

1	2	3	4	5
---	---	---	---	---

High interests on loans

1	2	3	4	5
---	---	---	---	---

No financial support system from government

Infrastructure

1	2	3	4	5
---	---	---	---	---

1	2	3	4	5
---	---	---	---	---

Lack of power supply

1	2	3	4	5
---	---	---	---	---

Lack of good roads

1	2	3	4	5
---	---	---	---	---

Institutions of innovation and R&D

Section 4: The impact of innovation in Agricultural SMEs

Please choose the box that best defined your opinion as described below.

1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly Agree

9. What are the main benefits, you gain due to Innovation implementation in your company?

Internal Factors

1	2	3	4	5
---	---	---	---	---

Innovation help our company increase sales

1	2	3	4	5
---	---	---	---	---

Innovation help our company increase production output

1	2	3	4	5
---	---	---	---	---

Innovation help our company save cost of production

External Factors

1	2	3	4	5
1	2	3	4	5

Innovation help our company increase revenue

Innovation help our company serve and fulfil the needs of our customer's better

1	2	3	4	5
---	---	---	---	---

Innovation help our company compete better in the market

Thank you for your answers and corporation! Eugene Agoh, +37067835704