



Case Report

Assessment of human capital development on cassava production in Nigeria: A Case Study of selected farmers in Jema'a Local Government Area, Kaduna State

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Abstract

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This research study conducted a thorough assessment of Human Capital Development and training effect on cassava Production in Nigeria with a case study of selected Cassava farmers in Jema'a Local Government Area, Kaduna State. This research paper further offers critical reviews of the theoretical literature on the effect of human capital development on Cassava farmers. Extensive academic output, using a diversity of approaches and analytical frameworks, sought to systematize knowledge transfer categories and strategies with a view to improving the application of its scientific knowledge on human capital training and development education. More so, the objectives of this study include: to ascertain the extent to which manpower training and development has improved the cassava value chain. To achieve these outlined study objectives above, primary and secondary data were collected using well structured, tested and trusted close ended thought provoking survey instrument that were administered to the randomly selected research participants who are farmers drawn from the twelve wards of Jema'a Local Government. From the data analysis, the research findings highlighted that training has not been able to transform the value chain where one would see the existence of large scale cassava farmers together with cassava processing facility which would improve the economic prosperity of Nigeria. This study therefore concluded that Nigeria has not been able to use the human resource meaningfully. Based on the research outcome, the researcher recommends the needs of workers and how their performance is significant to the success or failure of the organization. The need to explore for better method for human capital training and development on cassava value chain in Nigeria.

Keywords: Manpower, Training, Development, Cassava, Value Chain, Sustainability.

INTRODUCTION

Nigeria as a nation has been experiencing shortage of food production especially Cassava production over the past one year and has raised concerns among her citizens. Looking inwardly, the impact of human capital development on the food production in Nigeria remains the bane development of organisations or nations with a focus on the pulling of material, financial resources and

any other resources in a nation for the attainment of development and prosperity is the sole responsibility of the human resources.

Manpower is said to be the basis of all resources and it is the indispensable means of converting other resources to man kind's use and benefits. So how well a nation develops and employs human resource skills is

fundamental in deciding how much it will accomplish. Nevertheless, manpower is the pivot of every human institution. Even in the developed and industrial nations of the world where the use of machines and technology is at an advanced stage, manpower is still very essential. Training therefore holds the key to unlock the potential growth and development opportunities to achieve a competitive edge.

Further research studies show most countries are blessed with abundant natural resources but lack the basic technology for transforming and maximizing the benefits of these natural endowment resulting from the under development of these countries. If the manpower is adequately trained and developed they would be able to take up these development challenges and bring great benefits to their countries. Furthermore, Manpower Training and Development (MPTD) is a dynamic process. In other words, it is a response to change in the beliefs, attitudes and behaviour of individuals so that they can better adopt new techniques and challenges.

Since the independence in 1960, Nigeria has been faced with the challenges of providing adequate and effective manpower needs for the management of its economic resources. The inability of Nigeria to provide the necessary manpower needs results in the inefficient and under-utilization of the abundant economic resources.

Nigerians are under used, under employed, frustrated and prevented from bringing their talents to bear on the well-being of their organisation and the nation at large. Nigeria with a great potential in agriculture sector, especially root and tuber and with comparative advantage in cassava production is the highest producer with an annual production output of over 40 million metric tonnes, it is expected that the manpower in Nigeria use this advantages for the development of the sector leading to the creation of wealth, poverty eradication and industrialisation of the nation.

Some of the Challenges in the cassava value chain include the primitive use of hole and cutlass for production and the inability of Nigeria to develop an effective, economic and competitive value chain most especially in processing and expansion of new market. A comprehensive and encompassing training and developmental programme is expected to turn the face of cassava value chain in Nigeria into major player in local and international starch sweeteners, ethanol, High Quality Cassava flour (HQCF) and dried chips by driving production and processing technologies and organising producers and processors into effective value chain.

Objectives of the Study

To find out the impact of manpower training and development on the cassava value chain in Nigeria with a case study of Jema'a Local Government Area of Kaduna

State and to ascertain the extent to which manpower training and development has improved the cassava value chain.

Significance of the Study

The researcher has highlighted the importance of manpower training and development and how it is important in the development of national resource and have also stated that the neglect of manpower training and development would not result in the needed deployment of a country. As Nigeria concentrates on the development of the non oil sector with the dwindling oil prices and also her bid to diversify its economy to other sectors some of the recent efforts are gear towards the development of other sector such as the cassava sector.

REVIEW OF RELEVANT LITERATURE

Concept of training and development

Training and development is a subsystem of an organization which emphasize on the improvement of the performance of individuals and groups. Training is an educational process which involves the sharpening of skills, concepts, changing of attitude and gaining more knowledge to enhance the performance of the employees. Training is about knowing where you are in the present and after some time where will you reach with your abilities. By training, people can learn new information, new methodology and refresh their existing knowledge and skills. Due to this there is much improvement and add up the effectiveness at work.

Development refers to those learning opportunities designed to help employees grow. Development is not primarily skill-oriented. Instead, it provides general knowledge and attitudes which will be helpful to employees in higher positions. Efforts towards development often depend on personal drive and ambition. Development activities, such as those supplied by management developmental programmers, are generally voluntary.

Training is meant for operatives hence it is reactive process aimed to develop additional skills. It is short term process, its objective is to meet the present need of an employee they initiative is taken by the management .Development is meant for executives, It is pro- active process aimed to develop the total personality, It is continuous process, has the objective to meet the future need of an employee, initiative is taken by an individual.

Types of Training and Development in Agriculture

There are various methods of training which can be used

to effect training. The particular training method used depends on time, cost, effort instructor's preference, number of trainees, depth of knowledge needed, background of the trainees etc. (IJASS, 2013). There are many approaches to training, but the researcher will concentrate more on the types of training commonly used in today's organization. Such as on-the-job, skills, retraining, cross functional, team, creativity, literacy, diversity, crisis and customer services training. Others, according to IJASS (2013), are: orientation/induction course, in-house-training, workshops, seminars, conferences (off-the-job-training) off-the-job pupillage training.

On the other hand, Ezeani (2013) categorized training into two types; preserving and in-service training. To them, pre service training is more academic in nature and is offered by formal institutions following definite curricula and syllabuses for a certain duration to offer a formal degree or diploma. The researcher will concentrate on the in-service training hence the study centred on this subject.

In-service training includes: Off-The-Pupillage Training Programmes Training, Induction/Orientation Training, Foundation Training, Maintenance or Refresher Training, Career or Development Training and On-the-Job-Training.

Off-The-Pupillage Training Programmes

These are for officers in administration, accounts, co-operatives, engineering departments who are trained in recognized higher institutions of higher learning. They are long-term training programmes.

Induction/Orientation Training

Is given immediately after employment to introduce the new extension staff members to their position.

Foundation Training

This is appropriate for newly recruited personnel, every staff member needs some professional knowledge about various rules and regulations of the government, financial transaction, administrative capability, communication skills, report writing, leadership ability, etc.

Maintenance/Refresher Training

This keeps specialists, administrators, accountants, supervisors and frontline workers updated and enables them add to the knowledge and skills they have already (IJASS, 2013).

Career or Development Training

Is designed to upgrade the knowledge, skills and ability of employees to help them assumed greater responsibility in higher positions. This is departmentally arranged.

On-the-Job-training

Is ad hoc or regularly scheduled training such as fortnightly training under the Training and Visit (T&V) system of extension for superior officer or the subject-matter specialists to the subordinate field staff.

Off-the-Job Training Programmes

These are refresher's courses involving officers in the management cadre such as administrative officers, accountants and professionals. The training is usually a short term programme like 3-5 days. No matter the type of training involved, the fundamental aim of training is to assist the organization achieves its purpose by adding value to its key resource such as people it employs.

Benefits of training and development.

Training is encompassing everything that is expected to boost organizational development and competencies. In order that the total performance may be improved, organizations need to have trained and experienced skilled work force (Shiku and Duru, 2015). Sound organizations move along and administer training and development programs for the employees.

These programs are purposive and meant to equip the employees with the necessary skills that are required for particular jobs. Besides, failing to reach an expected or required level of performance of the employees or declines in the productivity or changes due to technological breakthroughs also necessitate training and development programs to be administered in the organizations. Also, because of the complexities of various jobs functions, the importance of training and development programs emerges in the business organizations.

Training is a process of learning. It involves the application of acquired knowledge aiming at better performance of the employees, while development involves not only the related process of developing but also helps the employees in building up their personalities, at the same time as, improving their progress towards the actualization of their full potentials.

Management appoints leaders, the managers, who influence the employees, so that they can make goal directed efforts to produce the desired results. They inspire the employees for the accomplishment of

organizational goals. They build up competencies and ethical standards. They direct the employees towards defined objectives of the organization while providing effective training and development programs. They enthuse and motivate them, so that the tasks can be carried out effectively and efficiently.

On-and-Off the job methods, special lectures, conferences and seminars

The purpose of on-the-job method is to involve the employees in learning while they are at work, whereas through off-the-job training program, the employees need to leave the work place so as to spend the required duration in the learning process. Special lectures are meant to create the awareness of fundamental knowledge. Shiku and Duru (2015) asserted that by way of arranging conferences, various discussions are held on the points of common interest, in regard to the organization and various issues, ideas are collected and experience is shared in order to deal with the problems. With critical discussions, the participants of seminars study various aspects and the complexities of particular jobs. The authors further shared that the sole purpose of training and development programs is to build the necessary skills of the employees and to create positive feelings among them (Shiku and Duru, 2015).

It's a fact and opposed to the supposition that man can do things that he believes he can. Thus, a true leader is the most influential person to build and develop self-confidence of the employees. He is a source of inspiration to his subordinates. He strives to instill the team spirit by making his members believe that they are capable of doing challenging tasks. This is how the employees learn many things and develop their personalities while improving organizational competence under the healthy environment of an organization (Brum, 2007).

Your commitment to training will obviously be transmitted to the career marketplace, including job seekers and recruitment professionals, by all means, word of mouth and positive feedback by current and past employees. Increasingly, your company will be recognized by recruitment professionals who seek to place ambitious candidates within your organization partly on the strength of your company's reputation (employer brand) - and the strength and quality of your training.

Training and development in the Cassava Industry

Fundamentally the training and development of manpower in agriculture is the responsibility of the Universities of Agriculture, Departments of Agriculture in

Nigeria universities, Colleges of Agriculture, Research institutes, Government agencies, Federal and state ministries of Agriculture.

Cassava Value Chain in Nigeria

Cassava (*Manihot Esculenta* Crutze) is one of the most important agricultural crop in Nigeria. It is the most widely cultivated crop in the southern part of the country. Cassava has increased in the middle belt in recent years.

Nigeria is known as the largest producer of cassava in the world with an annual production of over 40 million tonnes of tuberous root. Uhiene (2012) asserts that the increase in cassava production output in Nigeria from 12 million tonnes in 1986 to 34 million tonnes in 2003 and up to 36.8 million metric tonnes in 2009 could be attributed to the availability of improved varieties of cassava, relatively well develop markets infrastructure, existence of improved processing technology, participation of middlemen in cassava marketing and so on, the presidential initiative on cassava by the President Olusegun Obasanjo administration the action plan for cassava transformation by the president Good luck Jonathan Ebele administration would further increase the annual production.

Cassava is available round the year making it preferable to other crops by farmers. It is also rich in carbohydrate especially starch and consequently has a multiplicity of end uses. Nigeria has a lot of factors working on her behave as far as cassava production is concern ,cassava as a crop can thrive well in most part of Nigeria, about four fifth of the total land mass of is suitable for cassava cultivation. The local market for cassava is well organised and highly competitive.

In Thailand, cassava is a major foreign exchange earner and a building block for industrial development; in Latin America especially Brazil cassava has proven to be a reliable raw material for the food industry and for animal feeds. However the cassava industry in Nigeria has not grown to expectation despite high production output.

Presently the government is doing so much in the cassava sector via its action plan on cassava transformation. The cassava transformation seeks to create a new generation of cassava farmers, oriented towards commercial production and farming as a business, and to link them up to reliable demand, either from processors or a guaranteed minimum price scheme of the government. The overarching strategy of the cassava transformation is to turn the cassava sector in Nigeria into a major player in local and international Starch, Sweeteners, Ethanol, HQCF, and dried Chips industries by adopting improved production and processing technologies, and organizing producers and processors into efficient value-added chain.

Cassava production in Kaduna State

Kaduna State is a state in central northern Nigeria. Its capital is Kaduna. The state is the successor to the old Northern Region of Nigeria, which had its capital at Kaduna. In 1967 this was split up into six states, one of which was the North-Central State, whose name was changed to Kaduna State in 1976. The state was further divided in 1987 and carved out certain area which is now part of Katsina State.

The total land mass of Kaduna is 46,053 km² with a population of 6,006,562 people, the languages spoken by the indigene is Hausa and Gbagi. Kaduna has 23 local government areas thus: Birni-Gwari, Chikun, Giwalgabi, Jkara, Jaba, Jemaa, Kachia, Kaduna North, Kaduna South, Kagarko, Kajuru, Kaura, Kubau, Kudan, Lere, Makarfi, Sabon-Gari, Sanga, Soba, Zango Kataf and Zaria.

Over Seventy percent of the state's population engaged in crop and livestock production. The crops produced mostly in Kaduna state are: yam, cotton, groundnut, tobacco, maize, beans, guinea corn, millet, ginger, rice and cassava. Over 180,000 tons of groundnut are produced in the state annually. The major cash crop is cotton which the state has a comparative advantage in as it is the leading producer in the country. Animal reared include cattle, sheep, goats and pigs.

A classification of cassava production state into belts placed Kaduna into the cassava producing belt. However, it is not among the top most cassava producing states in the country such as: Ebonyi, Imo, Ondo, Anambra, Kogi, Taraba, Cross River, Enugu, Ogun, Benue, Delta, Edo. There are no large scale cassava farms located in Kaduna State. Most of the state's cassavas farms range from 0.2 to 5 hectares and mostly yield are between 10.2 tons to 11.7 tons.

Industrial Products from Cassava

Cassava has multiplicity of industrial end users which gives it a potential to be used for poverty eradication as establishment of industries to produce cassava products will serve as an avenue of providing more jobs.

For the purpose of this study the researcher will categorize the various products gotten from cassava into three, namely: The Primary Products, The Secondary Products and The By-Products.

Primary Products from Cassava

Four primary industrial products from cassava stand out as important for Nigeria. These are cassava flour, crude ethanol, native starch, and animal feed/cassava chips and pellets. These products are commonly traded and show the highest potential for growth in demand, and are

associated with medium and large scale processing.

Secondary Products from Cassava

Cassava can be processed into various secondary products, including modified cassava starch, glucose syrup, extra neutral alcohol, noodle, bakery and confectionery industries, meat and textile processing.

Cassava By-Products

Cassava by-products are widely used in most tropical areas for feeding pigs, cattle, sheep and poultry.

Dried peel

Cassava roots are fed to sheep and goats. Raw or boiled roots are mashed with protein concentrates such as maize, sorghum, groundnut, oil palm kernel meal and mineral salts and used for livestock feeding.

Cassava leaves and stems

Cassava leaves and stems of the cassava plant are considered a waste product. However, analytical tests have shown that cassava leaves have a protein content equivalent to that of alfalfa (17-20%) (Echebiri and Edaba, 2008) and can be used at 100 percent substitution to replace alfalfa as a protein rich source for animal feed.

Cassava meal

Cassava meal is the powdered residue of the chips and roots after processing is done to extract edible starch. It is generally inferior in quality to chips, pellets, and broken roots, has lower starch content and usually contains more sand. Its demand by the European Economic Community (EEC) has declined following a shift to the other cassava products. However, small-scale farmers who produce their own feedstuffs ensure its continued use by blending it with other ingredients. The above list of cassava products indicates the large variety of intermediate and end products within the cassava industry.

Trends of Cassava Development around the World

Production

The African cassava production is subsistence in nature - focused on producing enough to feed the family. It is

labour intensive, using very little fertilizer or pesticide inputs. However, since the 1990s in Latin America there have been significant shifts toward input-sensitive and large-scale production in regions like Brazil. The Asian production that targets the animal feed and starch industries are also more commercial and characterized by large plantations, high levels of mechanization, and the use of inputs and irrigation.

Private sector-led subcontract cassava production has also evolved as processing industries strive to maintain sustainable continuous supply of raw material. This has further fuelled cassava production and processing and the development of high yielding disease resistant cassava varieties, creating improved productivity and competitiveness at the farm level. For example, in 1999, to regain momentum in cassava research and development, cassava-producing countries in Latin America formed a consortium called CLAYUCA (Spanish acronym). The cassava value chain has also experienced a surge in Latin America and Asia, thanks to strong participation and leadership by the private sector (Tarawali et al., 2013).

Processing

In spite of its economic weakness, Sub-Saharan Africa is now developing small-scale, low cost cassava processing technologies that enable farmers produce high quality cassava-based staple foods. These technologies allow farmers add value to a perceived “famine reserve crop” by producing a higher quality product, allowing them expand sales in their existing markets and the creation of new market opportunities. Conversely, in Asia and Latin America, the industry employ state of the art processing technologies for their industrial production of starch, ethanol, cassava flour and animal feed (cassava pellets). These regions have also developed a viable subcontract processing market where large farms employ smaller firms normally at the farm gate level, to provide them with intermediary products like cassava chips.

Utilization (Markets)

Global consumption of cassava has changed since 1961. Its use as food is its dominant market in Africa and Asia where its consumption has doubled and increased by 70% in these countries respectively. In Latin America where consumption is its second most important market, the consumption rate has increased by 50%.

Bench Marking Nigeria Cassava Industry

In order to compare the competitiveness of the Nigerian

cassava industry on the industrial market, both the productivity of the sector and the prices of the end products are compared with some countries.

Brazil

South America countries, Brazil and Colombia have advanced cassava development systems, which play a vital role in their successful industrialization. With 70% of the South American market share, these two, especially Brazil, has become a leading world producer, processor and marketer of cassava and its products. Brazil and Colombia are very similar to Nigeria in several ways, including: Location in the low land tropical latitudes, with similar climate, vegetation and ecology (Echebiri and Edaba, 2008).

Despite Nigeria's similarities to both Brazil and Colombia, the latter have developed their industrial cassava sectors, proving cassava can be transformed from a staple food to a multi-use industrial raw material. According to Odunlami (2006), the factors for the Brazil and Colombia success stories in cassava production, processing and marketing include:

Yield

Between 1986 and 1998, the Brazilian cassava yields an average of 13 MT per hectare. The planting of improved, higher yielding, disease resistant, pest resistant and high starch content varieties of cassava resulted in increased yields. Low out-put small holds farmers' average of about 15 MT per hectare, with better lands yielding about 20 MT per hectare. Using mechanized technology yields average 45 MT per hectare. With only 2.2 million hectares under cassava, Brazil produces about 24,000,000 MT per year.

Colombia, despite its agro-ecological challenges, diversity, various systems of cultivation and utilization and other biological problems, averages 12 MT per hectare. With cassava farming in Nigeria only on smallholder farms, her average yield is less than 11 MT per hectare (Odunlami, 2006).

High Starch Content

The average starch content in the cassava varieties cultivated in the State of Sao Paulo (Fiber, Branca de Santa Catarina, IAC 12, and Mico) were never below 30%, and were on average 33% annually (Sarmento, 1997). In comparison, the starch content in cassava from Thailand is around 26% and in Nigeria only about 20%. However, some of the newly released IITA varieties in 2005 have more than 25% Starch content.

Vertical Integration

Producers are encouraged and assisted in integrating with cassava processors. In Brazil, medium to large-scale cassava plantations (averaging about 500 hectares per family) are integrated with processing facilities, especially in very intensive farming areas. For example, a starch company requires raw material from a large number of suppliers. With large land cultivation the company reduces its number of suppliers and business contracts, and with fewer suppliers, has improved raw material.

Availability of Large Areas

Over 70% of producers in Brazil are small-scale holders. Unlike Nigeria however where all the producers are small-scale holders, 30% of Brazilian farmers operate medium and large-scale farms, producing the bulk of the aggregated output. This dual cassava system in Brazil has a small-scale production, processing, and marketing system called “low input-low output” system. The second phase is the medium to large-scale integrated production, processing, and marketing called “high input-high output mechanized system”. This is what makes Brazilian cassava competitive. Colombia also employs a similar dual farming system. The advantages of large scale farming which include economies of scale in production and processing, efficient use of production inputs, larger outputs and easier access to product markets, play a vital role in the Brazilian and Colombia success stories. Unlike Nigeria that consumes 95% of its cassava production as food, processing 5-10% for industrial, 70% of Brazil's production is industrial; with 50% of this quantity used as livestock feed.

Low Level of Mechanized Cassava Cultivation

A comparison of production costs between cassava and corn shows that corn employs better inputs and automation in its production. Mechanization when carried out in the cassava industry significantly lowers labor costs, the cassava root price and allow economies of scale for cassava farmers.

Market Concentration

Only two companies in Brazil produce about 700,000 MT of corn-starch with their size and share enabling them invest in product research, reach major customers, and reduce production costs. In comparison, the cassava industry is made up of more than 60 firms, many of which have diversified into higher level value added products especially in the modified starch sector.

Price Fluctuations

Most agricultural raw materials face seasonal price fluctuations. However, cassava prices are subject to great seasonal variations. They typically reach a minimum price level during the main harvest period (between May and August) and increase again by the end of the year. In Brazil, cassava starch competes directly with corn-starch and a price comparison of their raw materials provides a good illustration of their fluctuations. Despite great variations in corn price, the instability of cassava prices is much greater.

Drying Technology

One of the greatest limitations for cassava producers in Colombia is the way drying technology is applied. With sun drying the most common method applied, the process becomes cyclic and depends on the times of the year with the most sunshine. This is also the cassava harvest period. They are unable to dry outside these climate windows due to lack of sunshine, and small amount of roots. This, in turn, hampers continuous cassava supply and fails to meet the demands of the various secondary industries. An additional problem is poor root quality control. Dirty and unprocessed roots are used and dried, creating poor quality chips which do not meet industrial standards and/or consumer expectations.

Thailand

Thailand is often cited as a tropical country that has successfully transformed cassava into an industrial crop. This transformation was driven by a unique export opportunity to the European Union (EU) with the transformation occurring in two phases:

In the first phase, the Thai cassava sector accelerated during the late sixties, increasing during the seventies and the eighties. With high feed import duties, the EU turned to Thailand for its cassava and soybean meal, as a ratio of 80:20 is equivalent in energy and protein to grain feeds such as maize and barley. Thus, Thai cassava meal was exported to the EU countries. In the late 60s, Thailand shifted its focus to cassava pellets processing. The processing into pellets reduces its volume by about 20-25%, thereby reducing transportation costs. There are approximately 200 pelleting factories in Thailand, with an average total capacity of 10 million tonnes per year.

Following the EU's withdrawal of its preferential treatment for Thai cassava/tapioca pellets in the 90s, and the end of its export to the EU, Thailand entered into the second phase of its transformation. Having already established a competitive industry, it was able to diversify

into starch and starch-based products, with starch processing done at large-scale factories. Starch and starch-based products are now exported to Australia, Taiwan, Japan, China, and Malaysia.

Organization of Thailand's Cassava Sector

During the last decade, the Thai starch industry has exploded, with half of its starch production for export. (For local consumption, modified starch and syrup industries are the biggest local starch consumers). The cassava trades in Thailand remains typically export driven. It further seeks to increase its yield of fresh root per hectare, and improve its efficiency (Paley, 2004). With its unusual export beginnings, it cannot serve as a development model for Nigeria. Nonetheless, it highlights two development lessons:

Organization of the Private Sector

The Thai private sector is well organized and has developed a highly efficient transport and processing system. The trade associations, the two most active being Thai Tapioca Trade Association (TTTA) and the Thai Tapioca Flour Industries Trade Association (TTFITA) interrelate and develop policies and R&D into native and modified starch. While the TTTA is focused on developing local and international trade, by providing its members with information on export procedures, prices and market linkages, the TTFITA has registered 41 modern starch factories with a production capacity of 2 million MT, producing top quality cassava starch each year.

Processing Technology

The comparative advantage of the Thai cassava industry lies in its efficient processing, not the low cost of its raw material. Development of the processing industry was stimulated by a need to improve the uniformity in shape and size of cassava chips required by compound feed producers/users. In addition, during transportation, loading and unloading of chips, the dust generated caused serious air pollution, placing pressure on European importers to improve the nature of cassava products handled by the ports. Soft and hard pellets were created from chips. Thailand began exporting pellets in 1981, and by 1989, it was virtually the only pellet product exporter to Europe. This Thai processing technology can be adapted to Nigeria. A review of the manufacturing of cassava starch showed that to achieve efficient manufacturing and quality product, important factors included:

a. the quality and quantity of processing water,

- b. the energy consumption, and
- c. the separation and drying processes.

Major challenges in the cassava industries in Nigeria

- a. High production cost of cassava-based products from price fluctuations and limited sources of supply.
- b. Little or no product quality control or standard to ensure consistency.
- c. Poor and inadequate infrastructural facilities; good roads and regular water supplies are needed. These are vital to value addition; hence, farmers still have low income.
- d. Most farmers and industrialists find it impossible to get loans from the Banks. The few that have the opportunity are limited because of the high interest rate. Easy access to alternative products through importation, e.g., starch. The industries using starch reported that they found it easier to import corn-starch than search for cassava starch that is not readily available and so they will not use it.
- e. Lack of a good market information system to create a network among the stakeholders.
- f. Poor capacity building of the processors: especially the women who are in the fore front of cassava processing.
- g. The women are not empowered for the enterprise. Low promotion of SMEs for value-added cassava products.

SWOT Analyses of Cassava Development in Nigeria

The goal of this process is the development and maintenance of a well-functioning market for West African cassava and cassava products that is able to compete successfully with products from other regions in Africa. The expected end result would be new efficiencies gained, economic incentives identified, opportunities for product development and use realized, and finally, the industrial growth of the cassava industry.

Strengths

Here are strengths:

- ✓ Available cultivable land area.
- ✓ Available market, locally and internationally.
- ✓ Adaptability of cassava to different soil conditions
- ✓ Available water bodies.
- ✓ Conducive weather conditions for increased production.
- ✓ Human resources - over 70% of the Nigerian population is involved in one form of agriculture or another, largely in the rural areas. Available improved cultivars.

- ✓ Viable and functional stakeholders' associations, especially of processors, growers, fabricators, and exporters. Available local resources for appropriate technology.
- ✓ Available labor for processing, especially among women.

Weaknesses

Relatively low productivity: subsistence farming is still widely practiced, mainly because of the low level of mechanized farming with little or no encouragement/motivation for farmers. Poor to low infrastructural facilities, especially of energy.

The power supply is erratic, compelling industrialists to go to an alternative energy source, presently limited to the use of a generator. Diesel and petrol add to the cost of production. Use of other sources of energy such as solar power is low at present. Other infrastructure includes good roads and potable water. These are not easily available, especially for processors who, in trying to cope with the situation, incur very high production costs that often discourage them from continuing in the trade. This particular weakness cuts across all stakeholders in cassava, especially farmers and processors at all levels, small, medium, and large. Lack of entrepreneurial skills and strategies: most of the key players in cassava enterprises lack a plan to guide them appropriately in business, especially the MPCs and SMEs. The skill to quantify activities and expenses is completely lacking, making it difficult to clearly define profit or loss. Institutional credit facilities for agriculture are inadequate at affordable interest rates to increase production in the areas:

- ✓ The supply of agricultural production inputs is inadequate.
- ✓ Lack of sustainability.
- ✓ Lack of coordination of rural and agricultural development efforts through the multiplicity of agencies involved.
- ✓ Inefficient processing equipment, especially drying facilities.
- ✓ Low-level use of appropriate/modern technology-drying, peeling, processing equipment. Inadequate number of experienced and committed processors.
- ✓ Gender discrimination: low purchasing power of female processors in the acquisition of the appropriate equipment (pressing machine, graters, grinders).

Opportunities

Improving on human capital development by focusing on the youth who are presently restive are:

- ✓ Filling the demand gap for food and supplying food items to the sub-region.

- ✓ Exploring investment through public-private partnerships.
- ✓ Availability of research institutes such as NCRI, IITA, FIRRO, and RMRDC. Availability of high-yielding cassava varieties.
- ✓ Opportunities to export cassava and its products.
- ✓ Available markets.
- ✓ Industrial use as a cheap raw material and a substitute for more expensive materials.
- ✓ Diversification of cassava utilization based on varietal differences to suit different purposes. Easy linking of stakeholders in the value chain. Efficient market information system.
- ✓ Increased production.
- ✓ Availability of more cassava products.

Threats

Here are possible Threats:

- ✓ Lack of clearly defined division of labor in agricultural development among the three tiers of Government that poses the danger of continuous role laxity and role confusion. Competition from the other cassava-producing countries in the world.
- ✓ Need to meet cassava demand domestically and industrially.
- ✓ Possibility of elite capture and political interference; this puts a wedge in the flow of policy benefits to rural people, as originally intended. High cost of labor for the strenuous activities in cassava production, especially harvesting.
- ✓ Unfavorable market climate for sustainable cassava industry.
- ✓ The preponderance of older people in agriculture is a hindrance to encouraging farming enterprises.
- ✓ Inadequate funding of agriculture inhibits the activities of Government organs, stakeholders, and agricultural performance generally. Relative prices of other food crops and products.
- ✓ Problems over the available energy source.
- ✓ Financial involvement and gender disparity.
- ✓ Climate change.

Mechanised Cassava Production

Small-scale cassava production in Nigeria mostly depends on manual labor and millions of Nigerian farmers are now less able to employ workers. One solution will be to replace human labor which is also becoming scarce with the use of machines. Full benefits of using improved inputs, such as stems, fertilizers, and herbicides in cassava production cannot be achieved without the use of improved tools or machines.

Processing Cassava to Starch Production Processes.
Processing Cassava to Chips Production Processes.

Processing cassava to Garri Production Processes.

The production processes as listed above comprise of simple operations involving simple equipment. All their simple operations are same and similar to one another. The essential operation are as follow.

Sorting and weighing

The harvested cassava roots are sorted, woody ends cut off with a knife. Bad quality cassava tubers are carefully removed from the mixture of bad quality, good quality cassava tubers and extraneous matter from the production process. The good quality tubers are carefully weighed into an aluminium trough spring balance on hanger or platform scale is used for weighing.

Determination of starch in fresh root

Starch content is determined on the basis of 3-4kg sample. Cassava tuber would be randomly selected from the lots, washed free from dirt and dried with a towel weighed using a weighing scale and dropped in a graduating cylinder made of plastic, half filled with water.

Subjectively, the starch contents determined by snapping a medium-size root. If the tuber snaps with medium force the crop is generally regarded as mature and the flesh will appear white and dry. Immature tuber is usually slightly yellow and although firm, has a translucent watery core.

Washing and peeling

The cassava roots are washed in portable water to remove adhering sand. They are then manually peeled with knives or peeling tools and washed again for further removal of sand and other dirt. At larger scale production mechanical washers and peelers are been used to accomplish the peeling and washing operations.

Grating of cassava tuber

The pieces of cassava tubers are feed into a hammer milling type of cassava grating machine which grates the tubers into cassava mash. The cassava mash is discharged into plastics or stainless steel vats of 100 litre capacity.

Extraction

The slurry is passed through the starch extractor (a vibratory sieving machine) where the cassava starch slurry is extracted from the cassava mash.

Sedimentation

The slurry form is allowed to sediment in settling table for about eight hours. At the end of sedimentation period, two layers of liquid are formed; the top free supernatant liquid on top of thick starch slurry.

Dewatering

At the end of the sedimentation period the supernatants layer of liquid is removed by siphoning off the liquid with rubber hose. The bags of slurry are individually tied with nylon rope. The bags of slurry are then placed in hydraulic or screw press where the slurry is dewatered down to a moisture content of about 40%.the resultant products is cassava starch wet cake.

Cake crushing and granulation

The wet cake produced is passed into a crushing machine where the cake is broken into small units after which the small units are passed into a granulator which breaks the small unit's into granules. The granules expose a large area of the wet cake to subsequent drying process.

Drying

The wet cake granules are fed into a stainless steel tray drier at a temperature of about 100*c backed with intermittent stirring until the moisture content of the cake is reduced to about 10%. Alternately, the flash dryer at a hot air temperature of about 200 can be used.

Milling

The dry cassava starch after cooling is milled into powder using a hammer milling machine with mesh aperture of 500 micron. Alternatively a disc milling machine can be used to achieve the same particle size as that of hammer milling machine.

Packaging

The starch is left to cool down to room temperature after which it is fed into moisture proof polythene bags and large scale packaging in form of 25kg,50kg bags sizes.

Successes Recorded in the Cassava Industry in Nigeria

Nigerian Starch Mills Limited (NSM) was incorporated in

1970's and is the oldest and largest starch producer in Nigeria, is an integrated agri-business growing cassava, processing 60,000 tons per annum into starch in the Anambra States of Nigeria. NSM sells to a number of top-ranked manufacturers of food, pharmaceutical, and other products.

Niji Farms is located at Km 1, Komu Road, Ilero, Kajola LGA, Oyo State. They have a cultivated Cassava farmland covering an expanse of over 4000 hectares. 50 tonnes of cassava tubers is harvested daily on their farms and also plant cassava all year round to keep up with expansion. They had partnership with Harvest Plus in the multiplication of 125 acres of Vitamin A Cassava. So far, Niji Farms have supplied over 5,000 bundle of TME 419 Cassava stem to National Root Crops Research Institute, Umudike (NRCRI), supplier of HQCF to Honeywell and Flour mills of Nigeria among many others, exportation of Garri to UK market, establishment of several local markets for products from processing center. Graham Hatty, a 65-year-old Zimbabwean is the Managing Director of Hatty farms and trading as Ireti farms located in Sango Kwara State Nigerian he spent the past 41 years farming at Norton, 35 kilometres west of Harare. He is one of a team of fifteen white Zimbabwean farmers courted vigorously by Nigerian former president Olusegun Obasanjo, to settle in Nigeria to open up commercial farming.

Cassava Pest and Disease

Insects, mites, spiders, and other creatures occur in cassava farms. Some of these creatures are harmful while others are beneficial. The harmful creatures are called pests because they feed on and damage cassava leaves and stems and roots, causing losses to the farmer. Some of these pests are easily seen. However, there are others such as tiny mites which may not be easily noticed especially if you are not trained to look for them.

Leaf and Stem Feeders

The common leaf and stem pests of cassava are cassava mealy bug, cassava green mite, variegated grasshopper, and whiteflies

Cassava Green Mite

Cassava green mite, also known as *Mononychellus Tanajoa*, lives on the under surface of young cassava leaves. Mites are wingless, very tiny, and appear as specks to the naked eye. In the farm, you can see them more clearly if you look at them under a hand lens. The nymphs (immature mites) are green in color and turn

yellowish as they get older.

Variegated Grasshopper

Adults of the variegated grasshopper, *Zonocerus Variegates*, are green and have bold yellow, black, white and orange markings on their bodies. The nymphs are black with yellow markings on the body, legs, antennae and wing pads. The young nymphs gather in large numbers on weeds and low-growing crops.

Spiraling Whitefly

Adults of the Spiraling Whitefly, *Aleurodicus Dispersus*, are bright white in color. Adults and nymphs of the insect occur in large numbers on the under surfaces of cassava leaves covered with large amounts of white waxy materials.

Bemisia Whitefly

Adults of the whitefly, *Bemisia Tabaci*, have bright white wings, as in the spiraling whitefly. The insects are, however, smaller than the spiraling whitefly and are not covered with white material. The adults and nymphs occur on the under surfaces of young leaves. The nymphs appear as pale yellow oval specks to the naked eye.

Cassava white scale

The cassava white scale, *Aonidomytilus Albus*, is found mainly on cassava stem surfaces. The females are wingless, firmly attached to the stems, and covered with white material. The males have wings.

Vertebrate Pests

The common vertebrate pests of cassava are birds, rodents, monkeys, pigs, and domestic animals. The bird pests are usually bush fowl or francolins (*Francolinus sp.*) and wild guinea fowl. These birds feed on storage roots that have been exposed. They also scratch the soil surface to expose the storage roots. The remaining portions of the attacked roots later rot. Birds are particularly a problem where cassava is planted in soils that are loose and easy to scratch away.

Cassava Disease

Many diseases are caused by very tiny living things

called pathogens. Pathogens are so tiny that you cannot see them even with the aid of hand lenses. Examples of pathogens are viruses, bacteria, and fungi. When a pathogen attacks a cassava plant, it multiplies and spreads inside or on the plant. As it spreads, it destroys the plant. The plant will show signs (symptoms) of attack. Damage symptoms of cassava diseases appear on the leaves, stems and storage roots of the plant.

The common diseases of cassava are cassava mosaic disease, cassava bacterial blight, cassava anthracnose disease, cassava bud necrosis, and root rots. Some of these diseases attack the leaves and stems of cassava plants while others attack the storage roots. Leaf and stem diseases common leaf and stem diseases of cassava are:

- ✓ Cassava mosaic disease,
- ✓ Cassava bacterial blight,
- ✓ Cassava anthracnose disease,
- ✓ Cassava bud necrosis, and
- ✓ Brown streak disease

Cassava Mosaic Disease

Cassava mosaic disease is caused by a virus which occurs inside cassava leaves and stems. The leaves of cassava plants with the disease are discolored with patches of normal green color mixed with light green, yellow, and white areas. This discoloration is known as chlorosis. The chlorotic patches can be confused with cassava green mite feeding damage.

Cassava bacterial blight

Cassava bacterial blight is caused by bacterium which occurs inside cassava leaves and stems. Initially, damage by cassava bacterial blight appears as water-soaked dead spots (lesions). The lesions occur between leaf veins and are most evident on the lower surfaces of the leaves. The lesions are small, not completely round in shape, and have a few angles at their edges.

Cassava Anthracnose Disease

Cassava anthracnose disease is caused by a fungus which occurs on the surface of cassava stems and leaves. Cassava anthracnose disease appears as cankers “sores” on the stems and bases of leaf petioles. Cankers weaken the petioles so that the leaf droops downwards and wilts. The wilted leaves die and fall causing defoliation and shoot tip die-back or complete death of the shoot.

Leaf Spot Diseases

Cassava leaf spot diseases are caused by fungi. There are three different types, namely white leaf spot, brown leaf spot, and leaf blight. Cassava white leaf spot disease appears as circular white or brownish-yellow spots on the upper leaf surfaces. The spots sometimes have purplish borders around them. Cassava brown leaf spot disease appears as small brown spots with dark borders on the upper leaf surfaces (Sani et al., 2009).

Stem and Root Diseases

Cassava brown streak disease: Cassava brown streak disease is caused by a virus. Presently the disease is reported only from cassava-growing regions in East and Southern Africa. Damage symptoms of cassava brown streak disease appear on the leaves, stems, and storage roots of cassava plants. On the leaves, the disease appears as patches of yellow areas mixed with normal green color. The yellow patches are more prominent on mature leaves than on young leaves.

Cassava Bud Necrosis

Cassava bud necrosis is caused by a fungus which occurs on the surface of cassava stems and leaves. The disease appears as patches of brown or grey fungal matter covering the stem. The fungal matter sometimes covers buds “eyes” on cassava stem cuttings. The affected buds die, which reduces the sprouting ability of stem cuttings.

CASSAVA ROOT ROT DISEASE

Various kinds of fungi living on or in the soil. The fungi occur mainly in soils that do not drain properly and in forest fallow land that has been recently cleared. The leaves on cassava plants affected by root rot disease turn brown, wilt, and the plant appears scorched. The leaves may or may not remain attached to the plant, but the plant loses a lot of water and dies.

Marketing of Cassava and its Products

Some other processing factories as markets for fresh roots are:

- ✓ Vesa Farms Limited,
- ✓ Deladder Investment, Benin City
- ✓ Jodex Ventures, Oyo

- ✓ Wahan Food Limited, Afan, Kwara State
- ✓ Agadu Farms Limited Gboko, Benue State
- ✓ Kanawa Nigeria limited Kano.
- ✓ Rose endeavours, Ahoda, Rivers
- ✓ Windows mites Abak, Akwalbom State.
- ✓ Aguada Investment Umahia, Abia State.

Bread bakeries

Nigeria imports about 4 million ton/year of wheat a total of 2.2 million ton/year is used for bread making. At a 20% replacement rate, this translates to 440,000 tons of High Quality cassava Floor (HQCF) for the bread making industry per year. Every bread Factory around you is a market for high quality cassava floor either to be supplied directly to them or via the floor mills.

Biscuits factories

Some Biscuits factories make use of 100% cassava floor for the production of their biscuits, others use a blend of varying percentages of cassava floor and wheat floor for the production of their biscuits base on their formulation, at 20% replace of wheat floor with cassava floor the total annual requirement is 100,000 tons of cassava floor.

Manufacturers of Noodles

Noodles manufacturers such as Northern Nigerian Noodles Limited located in Kaduna make use of 20% cassava floor in producing the noodles. At 20% replacement of wheat floor with cassava floor 60,000 tons of cassava would be required is needed every year for the production of noodle. Supply can be down directly to the companies that needs it or true the wheat flour-mills.

Flour Mills

Flour Mills of Nigeria Plc (FMN) was incorporated on 29th September, 1960 as a private limited liability company with a modest paid-up share capital of N1 million and converted to a public company in November, 1978. FMN produce Golden bit chin-chin, golden penny confectionary flour, Golden Penny Goldenvita, Golden Penny Masavita, Golden penny instant noodles, Golden Penny Pasta, Golden Penny Prime Flour and the blend 20% of here flour with cassava flour .

Nestle Foods

Nestlé is the world's largest food and beverage company. Having 2000 brands ranging from global icons to local

favourites, presenting in 191 countries around the world. Some of their products are Maggi, Millo, Nido, Cerelac, Nescafe, Golden more, ideal, carnation, Kitkat, Gloria Cassava Starch is used in these products as binding agents.

Beverage Industries

Beverage industries like the Nigerian Bottling Company, 7up bottling company, Nigeria breweries are test running liquid glucose as sweetener in there beverages and glucose can be produced from cassava .

Sorbitol in toothpaste

Sorbitol is an example of a humectant, an ingredient that prevent loss of water in the toothpaste. Cassava sugar alcohols can be used as orbital in tooth paste.

Beer

SAB Miller plc, one of the world's largest brewers, started the first production ever of commercial-scale beer using cassava. The beer, Impala, is brewed in Mozambique by SAB Miller's local subsidiary, Cervejas de Mocambique (CDM), with the ambition to create a portfolio of high quality, affordable beers brewed using locally-sourced raw materials for lower income consumers in Africa.

Snacks

Cassava flour can be used 100% in the production of snacks or used with wheat flour at various percentage substitution: meat pie, dough nut, queens cake, chin-chin, burns, weeding cake can be produced from cassava flour.

Plywood Industries

Cassava flour is used in the production process of plywood as adhesive. The conventional glue used for plywood industries is more expensive than using cassava flour. Ply wood industries would be able to save much if the substitute the convectional glue the use with cassava flour.

Adhesive industry

Adhesive is been used by various companies. These companies range from bottling companies, comities companies, companies producing items that one needs

to package in containers that need stickers. The adhesive are used to stick labels on the packaging materials

OVERVIEW OF JEMA'A LOCAL GOVERNMENT AREA, KADUNA STATE

As a case study in this research work, Jema'a Local Government Area, Kaduna State population is recorded 278,735 as at the 2006 census. Currently, the migration of baby boomers and new farmers into the area over the years, brings the current population of Jema'a local government estimated to be 398,809 in this year 2020. The geographical size of 1,661km², located between latitude 9 o 11' and 9 o 30' N and longitude 8 o 00' and 8 o 30' E. and is bounded in the East by Kagoro in Kaura Local Government, in the North by Zonkwa and Ungwa Rimi District of Zangon Kataf Local Government, to the West by Jaba Local Government and in South Nassarawa State and the South-East by Sanga Local Government Area respectively. Jema'a Local Government Area, Kaduna State has 12 wards, namely: Jagindi, Godogodo, Atuku, Gidan-Waya, Maigizo, Kaninkon, Kagoma, Asso, Kafanchan 'A', Kafanchan 'B', Bedde and Takau.

METHODOLOGY

With the estimated population of the Jema'a Local Government Area, Kaduna State stated above, three (3) randomly selected research participants (referred to as samples) were drawn from each of the twelve (12) wards of in Jema'a Local Government totalling the sample size of thirty-six (36) as the research participants. The well-structured open-ended and the thought provoking research survey instruments were administered to the selected research participants.

Data Analysis

Thirty-six (36) survey instruments were administered in the 12 wards of the Jema'a Local Government Area. While 32 of the survey were filled and returned, 11 farmers responded to have been trained whereas 21 farmers responded not to have been trained in any form of cassava of cassava value chain. Number of farmers that produce cassava on plot of land less than 10 hectares were 89.7% and 8.22% for trained and untrained farmers respectively and 10.26% and 15.78% produced cassava on less than 10 hectare plot respectively. About 76.9% and 38.60% of trained and untrained farmers used improved varieties respectively while 23.1% and 61.4% of trained and untrained farmers do not use improved varieties.

Summary

As the main aim of this research was to note the impact of human resource training and development on cassava value chain in Nigeria, the research outcome here has shown that there has been some kind of training of farmers in cassava value chain in Jema'a Local Government but the training has not cover a substantial number of farmers in the local government area. The training have not been effectively utilised by the farmers in the local government as you cannot see any significant improvement in the indices.

CONCLUSION.

Training and development activities have been carried in the cassava value chain but however the training has only been able to improve the use of improve cassava varieties and herbicides in cassava production. This training has not been able transform the value chain were one would see the existence of large scale cassava farmers together with cassava processing facility which would improve the economic prosperity of Nigeria. It is therefore noted that Nigeria has not been able to use the human resource meaningfully.

RECOMMENDATION.

Based on the research outcome, the researcher recommends:

- The need for workers and how their performance is significant to the success or failure of the organizations.
- The need for intensive human resource training and development on cassava value chain in Nigeria is very necessary.
- More so, it is recommended that better methods be explored in conducting constant training and development of human resource that would bring about the needed development in the Cassava value chain in Nigeria.

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