Benue State University Makurdi

Centre for Food Technology and Research (CEFTER)

Needs Assessment Report

For The

Establishment of CEFTER Food Technology Innovation

Complex

MARCH, 2022

1.0 INTRODUCTION

The BSU-CEFTER is the only World Bank sponsored tertiary program in Nigeria and West Africa that is saddled with the responsibility of preventing/minimizing post-harvest losses. Because of this mandate, CEFTER is continuously revising its programs to meet the needs of the Nigerian community and West Africa as a whole. One of the important areas that it examines at present and considers worthy, is the construction of a Food Technology Innovation Complex. The complex will further enhance the reduction of post harvest losses of crops. It is expected to be a resource centre for training of students in food processing on industrial scale, quality assurance and quality control, research and development.

Benue State is traditionally an agriculturally based economy where the major contributors to Gross Domestic Product (GDP) revolve around the production of food crops/farm produce.

Most of the industries use these farm produce as their raw materials. Over the years, the growing domestic demand and requirements for international trade have propelled the Government of Benue state to diversify agriculture by encouraging farmers to increase the production of tubers, fruit and vegetable crops. The Ministry of Agriculture and Natural Resources (MANR) which implements and coordinates policies pertaining to agriculture has been the driving force behind this strategy. In achieving its policy objectives in this regard, emphasis is on the mandate crops (rice, maize, sorghum, yam, cassava, sesame, vegetables, soybean, tree crops and oil palm) across their value chains. Government is also synergizing with Joseph Sarwuan Tarkaa Univeristy, Makurdi (JOSTUM), Akperan Orshi Polytechnic, Yandev (AOPOLY) and other agricultural research institutes on innovation technology and other research products. The Government of Benue state in her diversification of agricultural programs is receiving support from International Development Partners (IDPs) such as FADAMA project of the World Bank, Interventions by the German Cooperation, Bill and Melinda Gates Foundation and the International Fund for Agricultural Development (IFAD) Value Chain Development Programme. Among the aims of these projects is to increase the capacity of rural producers to efficiently and

effectively produce and market non-traditional products and develop small-scale enterprises. In addition, support agencies such as the Benue Chamber of Commerce, Industry, Mines and Agriculture (BECCIMA) provide market facilitation services to the private sector for export of non-traditional produce. However, the increased production has not been absorbed by local and export markets and there is an apparent seasonal oversupply of some produce followed by scarcity.

The food processing industry in Benue is relatively unsophisticated with few food manufacturing companies and relatively small cottage industries. Hence, the focus is largely on primary production and CEFTER recognizes a strong need to have skills in secondary and tertiary processing. It has been reported that among the reasons for wastage of agricultural produce in Benue State and Nigeria, is the deficiency of skills in postharvest techniques and agro processing.

In Benue state, training in agriculture and food production is conducted mainly at 2 institutions apart from CEFTER, the Joseph Sarwuan Tarka University Makurdi JOSTUM, and Akperan Orshi Polytechnic, Yandev, Gboko AOPOLY. Though food science and technology programs have been mounted at the Joseph Sarwuan Tarka University, Makurdi emphasis are more on the theory and practicals are done on small laboratory scale. The necessary equipment to carry out the needed food packaging, processing and preservation techniques on industrial scale are largely inadequate and in some cases not available. Lack of professional equipment has hindered them from engaging in this aspect as an institution, for fear of not meeting the requirements by government regulatory bodies regarding food manufacturing standards. Finance could be another reason since the government of the Nigeria does not spend much on education. In the College of Agronomy, the courses can be regarded as production oriented. The Akperan Orshi Polytechnic, Yandev (AOPOLY) provides postsecondary training in agriculture. It offers a 2-year Certificate Program with a practical bias and a diploma program, which is a sub professional program also conducted for 2 years. It also offers some few causes at HND level but is always faced with the problem of National Board for Technical Education (NBTE) accreditation. The curriculum of the AOPOLY has few courses each in food science and food processing. Emphasis is on the elementary practical kills in the food processing courses.

The idea of establishing a Food Technology Innovation Complex by the Benue State University Centre for Food Technology and Research (BSU-CEFTER) is a welcome development. This

project will provide not in a small measure the needed placement for CEFTER students' Internship program, skilled manpower for the food manufacturing industry as well as provide job opportunities to the teeming youth of the immediate community and Benue State as a whole. This will as well serve as source of funding for the centre itself. The project is in line with the "Triple Helix Model" strategic plan of the Government of Benue State policy on Agriculture (2020). The project will provide according to the model, the needed Research, Capacity Building, Technology Innovation and knowledge network while farmers shall provide the basis for agriculture produce. However, it would be necessary to conduct a needs assessment to provide the empirical data to identify the gaps in the labour market, performance of our employed graduates, community relations, farmers and food/agro processing industry. Kaufmann and English (1979) describe a needs assessment as a formal process which determines the gaps between current outputs or outcomes and required or desired outcomes or out puts.

A number of studies have demonstrated the successful use of needs assessment to identify gaps in carrying out such projects. The target groups were university alumni (Norton and Eastmond 1981); employers of graduates (Torheim *et al.*, 2009); and employees (Napoleon *et al.*, 2006).

This study therefore addresses the subject of the establishment of a Food Technology and Innovation Complex by the Benue State University Centre for Food Technology and Research (BSU-CEFTER). It determined the current students' Internship centres available, skilled manpower available/required in food industries by stakeholders that will guide the procedural development of the project. Also, interact with CEFTER students and immediate community on the usefulness of this project. The strategic research objective was to determine if establishing a Food Technology and Innovation Complex by the Benue State University Centre for Food Technology and Research (BSU-CEFTER) can lead to increase in value-added production in Benue State while the specific research objective is to assess whether the limited skills available in agro processing industry have hampered value-added production in Benue State.

2.0 SURVEY DESIGN AND ADMINISTRATION

The study was conducted in March, 2022 mainly in Gboko and Makurdi, Zone B Senatorial district of Benue State where most of the industries in the state are concentrated. Gboko is one of the largest and populous local government areas of Benue State. It has a land mass of 1,615 sq.km with a population of 361,325 people (NPC, 2006). It is bounded by Tarka Local Government on the North, Ushongo Local Government to the south, Buruku Local Government

on the east, Gwer on the west and Konshisha Local Government on the south west. It lies between $7° 05°$ to $7°31'$ N and $9° 53°$ E in the North central region of Nigeria with typical savannah vegetation and climate (Ubwa *et al.,* 2013). Makurdi, the Benue State capital, has an estimated population of 500,798 and lies between Latitudes $7°45'S$ and $7°52'N$ of the equator and between the Longitudes $8°35'W$ and $8°41'E$ of the Greenwich meridian (Isikwue *et al*., 2016). Benue is traditionally an agricultural based economy focusing on primary production. The current economy dictates that there should be more emphasis on value-added production. The survey design covered 3 main study populations and at least one management/senior staff in each study population as focal person/groups: small scale and medium enterprises operating in the state, students of CEFTER and the host community.

2.1 Small and Medium enterprises

2.1.1 Study population. There is no complete list of small scale food processing entities in the state. The target group was mainly agro processors. Contact information for the target group was sought through companies/agro processors in partnership with CEFTER and physical search by the team since most of them don't want to be known may be for fear of paying tax or closure by Government monitoring agencies. The team identified 4 companies as medium enterprises and 22 small scale enterprises. A total of 26 active small and medium enterprises were identified. The companies were informed through phone calls before the visit and a letter of introduction was issued by CEFTER management and presented to management by Needs Assessment team during the visit.

2.1.2 Measurement instrument: A survey questionnaire was administered as structured interviews to the owners of small and medium scale operators which consisted of: Questionnaire IA, IB, IC and ID requesting information on the number of graduates of BSU-CEFTER, Joseph Sarwuan Tarka University, Makurdi (JOSTUM), Akperan Orshi Polytechnic, Yandev (AOPOLY) and any other tertiary institutions in Nigeria or west Africa respectively employed at each organization for over 4 years and the levels at which they operate in the organization; questionnaire II sought to determine their competencies in food processing as required by the organization, techniques applied in their operations and marketing of their product(s) and areas in which they require further training. The competencies are those related to food science and food processing as recommended by the Nigerian Institute of Food Science and Technology (NIFST). Companies were requested to indicate whether those identified competencies were (a)

required and available (b) required but unavailable or (c) not applicable. Questionnaires III, IV, V and VI was designed to determine the number of agro processors and their product(s), the number of active agro processors trained in core competences and information from students relating to their internship and CEFTER program and the host community respectively. Content validity of our survey questionnaire was determined by having discussions with focal groups -a member of the management/ senior staff of each company to know the relevance and clarity of questions. Recommendations were made and appropriate changes considered so as having a valid instrument.

The survey questionnaire was hand-delivered to the company's most senior and qualified technical/administrative functionary responsible for the day-to-day operations of the processing plant to fill. In situations where the questionnaire could not be filled and returned to us, a member of the team was delegated to follow-up. Visits to the place and follow-up telephone calls were made to provide any clarifications or details and to make arrangements for collecting the completed questionnaire.

2.2 BSU-CEFTER

2.2.1 Study population: Students of CEFTER at all levels of study including alumni.

2.2.2 Measurement instrument: Convenience sampling method was employed here. Survey questionnaire V was uploaded on the students' portal/platform. Students were asked to provide information on their experience during internship, the present laboratory facilities, state if they are in support of the establishment of Food Technology Innovation Complex or not and on a general note, suggest possible areas they would want CEFTER to expand more in her quest for establishing a Food Technology Innovation Complex.

2.3 Host community

2.3.1 Study population: The members of the community comprising the youth, old/aged, community and the traditional leaders

2.3.2 Measurement instrument: Survey questionnaire VI was designed and presented to them randomly as oral interview/discussion. The questionnaire was about awareness creation, seeking to know the existence of a similar factory in their community, their willingness to support such a project, level of mobilization of their members, safety and security of the factory. There were also informed of the benefits of such project to a community. The team visited the community two times.

2.4 Data analysis: Information gathered on the number of graduates from BSU-CEFTER, JOSTUM, AOPOLY and others employed for over 4 years was calculated as a percentage and presented as a bar chart. The responses from the core competences, number of agro processors and their products and number of active agro processors trained in core competencies were summarized for each of the companies as well as those from the students and host community. The products were group according to companies and other data were spreadsheet coded and frequency of responses was calculated as percentage.

3.0 RESULTS

3.1 Skill/Manpower

The four companies (the names of the companies have been changed to ensure confidentiality) produce a range of products (Table 1a). *Theta* processes vegetable oil, *Gamma* is into vegetable oil processing, seed and grain sorting while *Alpha* processes rice. *Omega* is into tuber processing, water treatment, rice processing, animal feed processing, seed and grain sorting, food analysis and incubation technology.

Table 1a: Range of products by the 4 companies (Medium enterprise)

S/N	Product	Company
1	Tuber processing (yam, cassava and potatoes)	*Omega,*
2	Water treatment plant	*Omega*
3	Dairies (Yoghurt)	
4	Bakery (bread and biscuits)	
5	Tomato and pepper processing	
6	Vegetable oil processing	*Theta, Gamma*
7	Rice processing	*Alpha, Omega*
8	Fruit juice processing	
9	Animal feed processing	*Omega*
10	Seed and grain sorting	*Gamma, Omega*
11	Food analysis laboratory	*Omega*
12	Technology incubation centre	*Omega*

Amongst the 68 graduates employed by the four companies over the past four years, none came from BSU-CEFTER (0%), 40 (58.82%) JOSTUM, other tertiary institutions in Nigeria 18 (26.47%) and 10 (14.71%) come from AOPOLY (Figure 1). Out of the 68 graduates, 24 (35.30%) were holders of B.Sc Chemistry, followed by 15 (22.06%) with B. Engineering, then

11 (16.18%) graduated in Social Science, 10 (14.71%) graduated with Agricultural Science, 6 (8.81%) holders of B.Sc Food Science and Technology, 1 (1.47%) holders of B.Sc Biology and Physics. From the four companies, *Omega* employed the highest number of graduates, 46 (67.65%) with 19 in Chemistry, 15 Engineers, 7 social sciences, 3 Food Scientist and 2 in Agricultural Sciences.
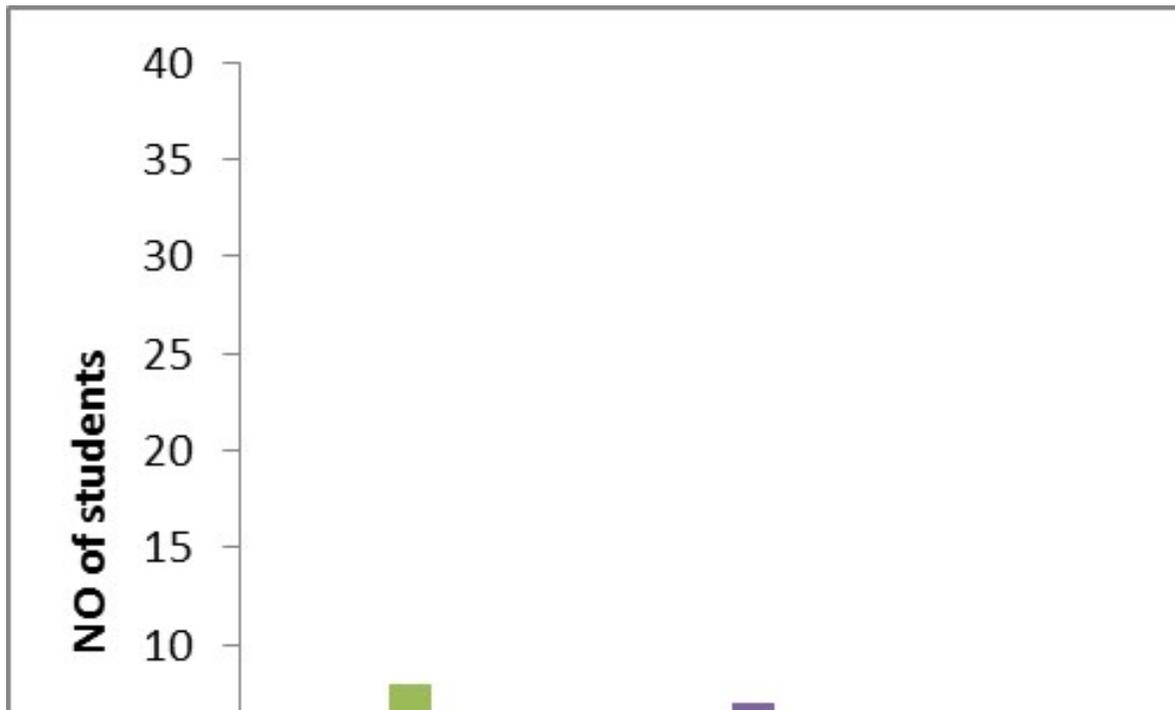
Figure 1: Number of graduates employed from BSU-CEFTER, JOSTUM, AOPOLY and other tertiary institutions in Nigeria or West Africa by the 4 companies over 4 years.

Theta employed a total of 13 (19.12%) graduates, 8 graduates in Agricultural sciences, 4 graduates in Chemistry and 1in physics. *Gamma* employed 7 (10.29%) graduates with 4 in Social Sciences, 1 each in Chemistry, Biology and Food Science and Technology. *Alpha* employed 2 (2.94%) graduates in Food Science and Technology. Most of the companies complained that CEFTER students don't apply for job in their establishment after completion of their internship and graduation from school. Graduates of the 4 companies occupied technical, supervisory and management positions except *Theta* and *Alpha* whose graduates were yet to attain management positions.

The results of skills available in the areas of core competence as identified by the Nigeria Institute of Food Science and Technology varied among companies. *Omega, gamma* and *Theta* indicated that skills are available in food safety and handling. *Alpha, Gamma* and *Omega*

indicated skills in food packaging and labelling and shelf life and expiry date. As for food safety and microbiology only two companies, *Omega* and *Gamma* indicated availability of skills in this area. *Alpha* requested for skills in food safety and handling and food safety and microbiology. Both companies indicated that though skills were available there is need in enhancement in the quality and complement of employees.

Training was conducted within the respective companies by either internal management personnel, hired consultants or by sending the employees overseas or both. All the 4 companies supported the establishment of a food technology innovation complex by CEFTER.

The operators of the 22 small scale enterprises interviewed for this part of the study prepared a range of products (Table 1b). 11 out of 22 (50.00%) are into bakery business (Bread, biscuits etc), followed by those water treating with 4 out of 22, representing 18.18%.

Table 1b: Number of small scale active agro processors

S/N	Product	No of company
1	Tuber processing (yam, cassava and potatoes)	3 (13.64%)
2	Water treatment plant	4 (18.18%)
3	Dairies (Yoghurt)	3 (13.64%)
4	Bakery (bread and biscuits)	11 (50.00%)
5	Tomato and pepper processing	*
6	Vegetable oil processing	×
7	Rice processing	×
8	Fruit juice processing	*
9	Animal feed processing	1 (4.54%)
10	Seed and grain sorting	×
11	Food analysis laboratory	×
12	Technology incubation centre	×

*Not found in the state, ×Listed in table 1a

There was a variation in the results of the number of registered small scale enterprises trained in food safety and handling, packaging and labelling, shelf life and expiration date (Table 2). With

regard to food safety and handling, 5 (33.33%) out of the 15 registered small scale and medium enterprises received training while 10 (66.67%) were not trained in this area. The same case for packaging and labelling, 5 (33.33%) out of 15 received training while 66.67% did not receive any training. In shelf life and expiry date 4 (26.67%) out of 15 received training whereas 11 (73.33%) of them did not receive any training in this area. Similarly, 4 (26.67) out of 15 received training in food safety and microbiology while 11 (73.33%) had no training in this area.

Table 2: **Number of registered (n=15) small scale and medium enterprises trained**

S/N	Area of training	Trained (%)	Not trained (%)
1	Food safety and handling	5 (26.67)	10 (73.33)
2	Packaging and labelling	5 (26.67)	10 (73.33)
3	Shelf life and expiry date	4 (33.33)	11 (66.67)
4	Food safety and microbiology	4 (33.33)	11 (66.67)

Few agro processors received training in the above four areas from two local agencies-Standard Organization of Nigeria (SON) and National Agency for Food and Drug Administration and Control (NAFDAC) while most of them did not receive any training.

Skills for preparing products came from a variety of sources. Less than 30% indicated that they attended structured training programs, informal training 43% and self-taught 27%. Some processors received training from more than one source.

All the agro processors indicated that marketing of products is done locally. The products are sold mainly to retailers. These include supermarkets, small shops, municipal markets and roadside vendors. An attempt was made to separate these four categories. However, the team recognized that the agro processors did not keep the accurate records and therefore, the data would not have been reliable. All the agro processors supported the establishment of a food technology innovation complex by CEFTER.

The operators indicated that they lack training in the following areas:

- Food production to expand product line
- Food safety and microbiology
- Food safety and handling
- Water treatment and safety practices
- Handling of factory equipment
- Food preservation and storage
- Laboratory analyses and management

- Packaging and marketing
- Animal feeds formulation

(10) Quality assurance and quality control

3.2 Data from interaction with students

The data from CEFTER alumni and students presently on the program showed that 46 (85.20%) out of 54 vouched for the establishment of food technology and innovation complex. Most students indicated that this will ease the accommodation problems and risk exposed to during internship. Also, this will help in posting students on internship in areas relevant to their field of study.

The students suggested that the following areas should be included in the complex:

- Fruit juice factory
- Tomato and pepper factory
- Spacious laboratories
- High-tech and modern equipment for food analyses
- Availability of laboratory reagents
- Collaboration with the local farmers in the area of food preservation

3.3 Data from interaction with the host community

The report from interaction with the host community indicated that 89 (93.68%) out of 95 interviewed supported the establishment of food technology innovation complex in their area and expressed satisfaction with the level CEFTER has involved the community. They also expressed their happiness for proposing such a project in their community and promised their unalloyed support and cooperation when the project takes off fully. Benefits of the project to the community were highlighted as job creation, skill acquisition, market for agricultural produce and access to products and by-products of the company.

The following requests were made by members of the community:

- Employment to members of the community
- Portable water supply to the community
- Power supply to the community
- A feasibility study is conducted to address the issues of waste disposal, noise and odour emanating from the company.

4.0 DISCUSSION

The lack of technical skills is among the contributing factors that have affected value-added production in food processing companies-medium and small. All food processors indicated that more skills were required for them to add to the range of products that are manufactured.

The medium companies indicated that although some skills were available in core areas of competency, as identified by NIFST, deficiency in critical areas such as food processing and industrial experience limited employees' ability to develop new products. In an effort to correct deficiencies, training is conducted to enhance the skills of the employees. Although training is the mandate of these organizations, if CEFTER is able to provide a cadre of professionals with knowledge and skills in food processing with experience in handling factory equipment and they are employed by the manufacturers it may reduce the resources expended in training.

The companies may want to consider expanding their pool of potential employees. As noted from the results, the majority of the employees in the medium companies are not from CEFTER but JOSTUM, AOPOLY and other universities. These graduates had degrees in Chemistry, Natural Sciences and few in food science. Graduates from CEFTER who are more exposed to aspect of food processing and technical skills required in the industry would have been more ideal. This illustrates a need for more sensitization of CEFTER programs.

Among the small agro processors, it was also observed that the products manufactured form a limited range and applies only the basic skills in processing such as grinding, dehydration and drying. The processors indicated that they would like training in food processing so as to increase their product line. Craig (2007) also highlights the lack of technical skills in processing among agro processors. Exposure to training can potentially stimulate their creativity and innovation and possibly encourage them to expand their businesses.

The results indicated that there is training available in the 4 areas examined. However, for all the 4 areas only few of the registered agro processors had received training. The deficiency in training among the processors has implications for public health particularly as it relates to food safety and handling where only 26.67% had training in this area. With the establishment of food technology innovation complex, there will be more personnel trained in this area who can impart their knowledge to the agro processors. With food technology innovation complex, training will no longer necessarily be limited to structured, formal, class room settings but outreach programs will be conducted to train agro processors at or very close to their places of business by qualified personnel. If established, training will be conducted on a regular basis in all 4 areas examined to

keep the agro processors updated with the standard practices and requirements of the industry unlike before.

The Benue State Government policy on agriculture (2020) is to increase and diversify crop production. With increased production of fruits and vegetables more technical skills would be required in the preparation of secondary and tertiary products and also in postharvest technology. Both would reduce waste considerably. As indicated in the results, there is no single active fruit juice, tomato and pepper processing industry in the state though the state produces abundant raw materials in this area. The Government having recognized the need for skills in this area should synergize with CEFTER and make sequential steps towards developing the expertise. In addition, as pointed out by Pinstrup-Andersen (2000), the increased output from processing will create a demand for the primary, fresh produce and in the long-term stimulate increase cultivation. The Benue community stands to benefit economically by having a wider variety of products for local and international markets.

Industries are important partners since those entities will be the direct beneficiaries of CEFTER graduates, research and technology services that will be offered by the centre. Suggestions from industries will be considered in the design of the activities for food technology innovation complex to meet their best needs. This will not be limited only to programs in CEFTER but also, the certificate courses offered in AOPOLY under CEFTER program. Any institution that produces graduates with the knowledge and skills that workplace or immediate community demands automatically increase her enrolment capacity and the relevance of CEFTER increases (Kuhn, 2011). CEFTER can make use of this project as an internship facility as well as graduate students that are practical oriented with hands-on factory machines. They will understand how their theoretical knowledge is applied in manufacturing. Experience gained by the students would help to make them more prepared for employment. The students will have the opportunity to attend a program focus on providing the skills for the food industry and allied areas.

The overall goal of the project is to cater for national and state needs. As demonstrated by the results, there is a local market for the commodities. Consumers gain from the benefits of the availability of processed foods, such as longer shelf life and the convenience of having prepared food. A small percentage of processors sell their products to other states on request this shows

that such products has the potential to grow since national demand for processed food is expected to increase.

5.0 CONCLUSION

The results of the study point to the need for the establishment of food technology innovation complex to cater for the needs of food industry, CEFTER students, CEFTER as an institution the Benue community, Nigeria and West African region. Students will receive requisite skills to transform and add economic value to the ''food basket'' and possibly create niche and high-value markets for Benue produce.

The cost of establishing Food Technology Innovation Complex may appear ambiguous to World Bank but Benue will gain tremendously from this project.

Finally, it is necessary to point out limitations of the study. The population of small and medium scale enterprises in the state is very small to generate enough data for employed graduate. Also, the team could not have access to the list of all the companies operating in the state. Although effort was made to involve all the companies in the study, only few of them responded.

References

Craig, K. (2007). Final report CHF/partners in rural development report, Social entrepreneurship program (SEP). To secure the livelihood of small farmers through improved production and marketing of non-traditional crops. Study of marketing opportunities for small non-traditional crops farmers

Government of Benue State Policy on Agriculture (2020)

Isikwue, M. O., Ochedikwu Anthea, E. F. and Onoja, S. B. (2016). Small farm Gravity Drip Irrigation System for Crop Production. Greener Journal of Science Engineering and Technological Research, 6:48-54

Kaufinann, R. A. and English, F. W. (1979). Needs assessment concept and application, New Jersey Educational Technology Publications Inc. p32

Kuhn, M. (2011). Food science flourishes on campus, Food Technology, 65(3): 48-53

Napoleon, L., Freedman, D., Seetharam, K. and Sharma, P. (2006). An educational needs assessment of Pennysylvannia workforce: opportunities to redefine secondary career and technical education to meet food industry needs. Journal of Food Science Education, 5: 19-23

NPC (1990). National Population Commission of Nigeria (web) retrieved 29/3/2022

Norton, B. E. and Eastmond, J. N. (1981). Guiding a range curriculum with an educational needs assessment, Journal of Range Management, 34(6): 475-476

Pinstrup-Andersen, P. (2000). Food policy research for developing countries: emerging issues and unfinished business. Food Policy, 25(2): 125-142

Torheim, L. E., Granli, G. I., Barikmo, I. and Oshaug, A. (2009). A survey among potential employees for developing a curriculum in public health nutrition, Public Health Nutrition, 12(8): 1039-1045

S. T. Ubwa, G. H. Atoo, J. O. Offem, J. Abah and K. Asemave (2013). An assessment of surface water pollution status around Gboko abattoir, African Journal of Pure and Applied Chemistry, 7(3): 131-138