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ABEOKUTA NIGERIA

85th INAUGURAL LECTURE

VALUE-ADDITION TO AGRICULTURAL AND FOREST RESOURCES: MEANS FOR HERBAL THERAPY AND ENTREPRENEURIAL SKILLS DEVELOPMENT

by

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VALUE-ADDITION TO AGRICULTURAL AND FOREST RESOURCES: MEANS FOR HERBAL THERAPY AND ENTREPRENEURIAL SKILLS DEVELOPMENT

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Gentlemen of the Press,

Distinguished Ladies and Gentlemen,

Great FUNAABITES!

1.0 PREAMBLE

I am most grateful to God Almighty for His mercies, grace, kindness, and favour to deliver the 85th Inaugural lecture today Wednesday, February 7, 2024. I appreciate God for the opportunity that I have to present my little contributions to teaching, research, and extension services which constitutes the three tripodal mandates of the establishment of the Federal University of Agriculture, Abeokuta (FUNAAB), Nigeria. I was privileged to be employed into the services of FUNAAB as an Extension Fellow at the Agricultural Media Resources and Extension Centre (AMREC) and to be anchored to the Department of Agricultural Economics and Farm Management in August 2001 as an Academic staff after a meritorious 20 years service in the Banking industry. I am glad to say that I am the first Professor in AMREC to present my inaugural lecture. I am also the first female Professor of Agricultural and Resource Economics and the fourth lecturer in the Department of Agricultural Economics, and Farm Management, and the tenth Inaugural Lecturer in the College of Agricultural Management and Rural Development (COLAMRUD) FUNAAB.

1.1 Introduction

In my understanding, an Inaugural lecture provides a forum for a newly appointed Professor to give others the privilege to understand his/her research, and contributions to fill the gaps in knowledge. This is the importance of his/her contributions to the society and the advancement made to the quality of life of beneficiaries of the knowledge. In all honesty, it represents a great achievement in the career of academia. I, based on the fact stated, therefore, feel honoured and blessed by God to stand before you to give an account of my humble efforts and contributions towards expanding the frontier of knowledge in the field of Agricultural and Resource Economics, an aspect of Agricultural Economics.

Agricultural Economics emerged from the field of Economics over six decades ago, to take care of issues of efficient Resource

Allocation in Agriculture as well as issues related to Agricultural Development. It is also the application of economic principles to the operations of the agricultural industry(Non-oil Sector). Dedicated scholars of Agricultural and Resource Economics solve the most challenging problems like managing the world's food supply and enhancing societal well-being in the non-oil sector. My work in this field is towards fostering a greater understanding of adding value to agricultural and forestry resources and wastes that currently plagues our economy. The resources can be used as herbs and can make possible entrepreneurship skills development amongst the entrepreneurs, farmers, processors, students, members of staff and the general public.

Also, my research focus is on the analysis of the economics of resource management and allocations in the areas of product development for nutritional security, healthy living and healthy skin for personal hygiene and sustainable livelihood of the processors as well as the profitability of Micro, Small, and Medium Enterprises (MSMEs) in agricultural/forest-based herbal products enterprises development in the non-oil sector. In addition, the demand-driven research is to maintain the nutritional/medicinal value of herbal products for herbal remedies and consumers' healthy lifestyles, increase the marketing margin of rural farm families and generate additional income among farm families especially the vulnerable (women and the youth).

My research is centred on the entrepreneurship skilldevelopment, herbal therapy, and effective management of agricultural and forest-based produce as an instrument for the analysis of economic relationships and filling the 'gaps' between farmers, processors and consumers for value-added products, entrepreneurship and achieving Sustainable Development Goals (SDG), Goal 3. And thinking out of the box, in order to make agriculture a beautiful profitable business, advertising on billboards with beautiful and successful young entrepreneurs and farmers to attract young

people to the business is desirable. With the available resources in agriculture, if fully tapped, it could easily be described as the oxygen of the economy in Africa, and not just the backbone,

I will center my inaugural lecture on the Title 'Value Addition Processing in Agricultural and Forest Resources: Means of Herbal Therapy and Entrepreneurship Development'.My previous experience in the banking sector as a District/Regional bank Manager, and present work experience as a lecturer and researcher in the Department of Agricultural Economics and Farm Management (AE&FM), College of Agricultural Management and Rural Development (COLAMRUD) coupled with my postgraduate experience in Forestry Economics and Management have actually prepared me for this lecture. With my entrepreneurial mindset, I was creative and innovative by developing and exhibiting at local, national and international level the Value-Added Herbal Products based on the additional indigenous knowledge I learned during my study.

1.2 Value-Addition, Herbal Therapy and Entrepreneurship Skill Development

1.2.1 *What is Value Added Product?*

Value-added processing is a means to utilize agricultural and forest produce, and not used for fresh market sales and the surplus of the producers during the growing season, which usually leads to glut. However, depending on the raw ingredients and the final product, there are usually processing regulations that need to be added.

1.2.2 The Concept of Value Addition

Value addition is the additional features or economic value that a company or firm adds to its products and services before offering them to customers. Adding value to a product or service helps companies attract more customers, which can boost gain and profits. It can attract consumers to buy more of the products such as Agricultural Forest products for herbal remedies and

entrepreneurship skills development to generate more income to the farmers and processors. To put it simply, figure out what consumers want, when they want it, where they want it and then make it and provide it to them. In the case of medicinal plants, added value can be created by direct minor processing to increase the quality of the raw herb harvested or cultivated, or indirectly by meeting quality standards through chemical testing or by processing the natural herbs in other shapes to prolong the shelf life.

1.2.3 Definition of Herbal Therapy

Herbal therapy is the use of plants and plant extracts for medicinal purposes (especially plants that are not part of the normal diet). Herbal products are made from botanical, or plants, that are used to treat disease or to maintain health. People use herbal medicines to try to maintain or improve their health. Many people believe that products labeled 'natural' are always safe and good for them. The main goal of herbal therapy is to return the body to a state of natural balance so that it can heal itself. Different herbs act on different systems of the body. Herbal therapy helps to reduce side effects , provides self-healing, personal hygiene, helps to improve overall health, and can generate or/and save money.

1.2.4 Concept of Entrepreneurship Skill Development in Agriculture and Forestry

Entrepreneurship in Agriculture is the creativity and innovative processes taken up in agriculture or the allied sector to create new products for customers and consumers. It includes process of adopting, new methods, processes, techniques in agriculture for better output and economic earnings. Entrepreneurship skills include various skill sets such as leadership, business management, time management, creative thinking and problem solving. These skills can be applied to many job roles and industries especially agricultural sector. These entrepreneur skills are vital for promoting creativity, innovation, business growth and

competitiveness. There is growing interest in the promotion of entrepreneurship in agriculture as a strategy to improve agricultural productivity. Entrepreneurship training is considered as a viable option to inspire farmers and enable them to develop skills to identify business opportunities and start profitable Agribusinesses. The Value Addition processing in Agricultural and Forest Resources can be used as herbal therapy to prevent and cure diseases by successful entrepreneurs in the field of herbal medicine.

1.2.5. Agricultural and Forest Resources Wastes

Agricultural and Forest Resources wastes are non-product outputs of production and processing of agricultural products that may contain material that can benefit man but whose economic values are less than the cost of collection, transportation, and processing for beneficial use. Agricultural wastes' composition depends on the system and type of agricultural activities these wastes can be in the form of liquids, slurries, or solids (Obi, *et al.*, 2016). Almost all agricultural activities generate wastes, which are generated in large quantities in many countries. The wastes may constitute a serious threat to human health through environmental pollution and handling them may result in huge economic loss. However, in many developing countries like Nigeria where large quantities of these wastes are generated, they are not properly managed because little is known about their potential risks and benefits (Adejumo and Adebiyi, 2020). Adejumo and Adebiyi (2020) further gave a broad classification of agricultural solid wastes as follows: Animal production of solid wastes, food and meat processing solid wastes, crop production solid wastes, on-farm medical solid wastes, horticultural production of solid wastes, industrial agricultural solid wastes, chemical wastes.

According to Sadh, *et al.* (2018), most of the agro-industrial wastes are untreated and underutilized, they are disposed either by burning, dumping or unplanned landfilling. These untreated wastes

create different problems with climate change by increasing several greenhouse gases. Agricultural wastes can be used as alternate sources for the production of different products like biogas, biofuel, mushroom, and tempeh as the raw material in various research and industries. The use of agro-industrial wastes as raw materials can help to reduce the production cost and also reduce the pollution load from the environment. Agro-industrial wastes are used for manufacturing biofuels, enzymes, vitamins, antioxidants, animal feed, antibiotics, and other chemicals through solid state fermentation (SSF).

Africa has a lot of untapped biomass energy resources in the form of agricultural residues (such as straw and manure). Agricultural wastes can be converted into char, a carbon-rich material that can substitute coal for cooking (thereby helping to mitigate deforestation) and can be used for water treatment, as a fertilizer, to improve soil structure and stability, and help sequester carbon (European Union, 2018).

As Janet (2023) noted, cocoa as one of the most cultivated cash crops in the world, is a major source of revenue for cocoa farmers, especially for the West African farmers who account for over 70% of global supply. However, the vast amount of cocoa by-product wastes generated along the production and supply chain is a huge loss of potential income for the supply chain, exacerbating food insecurity and poverty in poorer regions. She noted further that the loss of economic value to generated wastes is environmental pollution. Most cocoa by-product wastes are abandoned on the plantations or stored in fields and the wastes decomposition attracts flies and other insects that are harmful to the cocoa tree. The decomposition residues are a potential source of pathogenic microorganisms like the fungi that cause the black pod disease. This disease alone causes annual global yield loss of 20-30% resulting in huge financial losses that are most felt by local farmers. It is instructive to note that cocoa wastes products can be further

utilized for more economic gains. For example, cocoa pod husks constitute huge amounts of wastes. According to Janet (2023), for each ton of cocoa beans produced, 10 tons of pod husks are discarded as wastes. The husk makes up about 70-80% of the weight of the cocoa fruit. The pod husks can be transformed into high-value products, such as raw materials to produce agrochemicals, biomaterials, biofuels, organic acids, and animal feed as they are a rich source of protein, fibres, potassium, and other minerals. Cocoa pod ash has been commonly used in West African countries to produce African black soap which today is sold worldwide. Cocoa pod husks when sun-dried and burned produce an ash comprising 40% of potassium hydroxide or potash. This serves as a catalyst for saponification when added to oils to produce soap.

Forest operations generate large volumes of wastes. Its massive by-products are an excellent source of high-value raw materials for other industries. Banana peels are used as supplementary feed for livestock in their cultivation areas. It can be said that not all of wood taken out of the forest are used at an industrial level others are being disposed as wastes and not all of the wood wastes are utilized. Sawmills generate a huge amount of wood wastes through processing logs of wood into lumbers of various forms and sizes in the mills. These wood wastes include sawdust, slabs, bark, and split wood.

Sambe, *et al.* (2021) reported that wood wastes are also generated from other wood processing industries, like the furniture industries, plywood mills, and particleboard mills and generated from municipal and industrial activities. Due to poor management methods, these vast amounts of wood residues are often discarded as useless materials, usually untreated, into the environment where they cause adverse effects. Disposal methods such as heaping at industrial sites, dumping on roadsides, drainages or water bodies and open-air burning are common

practices. The residues are often dumped into rivers by wood industries that are situated close to riverbanks. Quoting different authors, Sambe, *et al.* (2021) noted that these indiscriminate disposal practices result in unfavorable environmental and human impacts, the unsightly look of the environment, air pollution, respiratory tract infection, eye problems, contamination of rivers and ground waters, distortion of water ecosystems and climate change. The proper utilization of wood wastes through reuse and recycling will reduce pressure on the ever-decreasing forests, reduce environmental pollution and create wealth and employment and thereby fostering the economic development of the country.

2.0 MY RESEARCH AND COMMUNITY SERVICE CONTRIBUTIONS

My working closely with farmers and processors over the years in the banking sector and as an Extension Fellow in the Agricultural Media Resources and Extension Centre (AMREC), Skill Leader/Deputy Director in the Centre for Entrepreneurship Studies (CENTS) and Lecturer in the Department of Agricultural Economics and Farm Management (AEFM), and Department of Forestry and Wildlife FUNAAB have availed me the privilege to understand the problem of processing, glut during marketing as well as the consumptions of herbal products for herbal therapy. The entrepreneur's major problems are value-addition, post-harvest technology, value-addition development, and management challenges. These challenges aroused my interest in the "gaps" that existed in value-addition development to natural resources (agricultural/forest-based produce) and the wastes generated during commercial processing of produce such as cocoa, cassava, palm oil and plantain.

I discovered that most of the farmers have good and sound indigenous knowledge about primary production in their various farming enterprises. However, given that most agricultural/forest-based production in Nigeria is rain-fed, most products are ready for

sale almost at the same time. These characteristics of agricultural produce by the farm deny the farmers of selling at competitive prices due to the production glut and the perishability nature of Agricultural produce. Also, Nigeria has changed their consumption pattern after the oil boom by depending so much on imported products leading to high foreign exchange.

2.1. Value Addition to Agricultural and Forest Resources

2.1.1 Economic Analysis of Yam Flour Processing in Saki, Oyo State, Nigeria

The importation process has denied the farmers/processors from enjoying fair market share having also produced this primary produce but, lack of credit assistance and the necessary technology for value-chain development and management has led to low income. This was evidenced by a study conducted by Oluwalana et al (2020) on the "economic analysis of yam flour processing in Saki, Oyo State, Nigeria" The study examined the economics of yam flour processing in Saki, Oyo State, Nigeria in 2020, where primary data were obtained from 120 respondents using questionnaire. The findings of this study revealed that the gross margin and net farm income were ₦146,770.03 and ₦141,536.79 per processing cycle respectively, while the return on investment was 3.25 for every ₦1 invested as evidenced in Table 1. This implied that yam flour processing is profitable. The multiple regression results in Table 2 revealed that labour, transportation, storage and packaging costs and distance to the market were negatively significant at 5%, 1%, 1%, and 1% probability levels respectively. Also, years of processing experience and membership in an association were positively significant at 1% and 5% probability levels respectively.

Table 1: Cost and return structure of yam processing.

Variable	Mean(₦)	% Cost	% Total Cost
1. Revenue	183,765.80		
Fixed Cost			
i. Depreciation on grinding machine	4,183.78	79.95	9.91
ii. Depreciation on container	697.75	13.33	1.65
iii. Depreciation on knife	183.69	3.51	0.43
iv. Depreciation on sack	168.02	3.21	0.40
2. Total Fixed Cost	5,233.24	100.00	12.39
Variable Cost			
i. Cost of yam tuber	25,115.32	67.89	59.47
ii. Labour cost	5,245.95	14.18	12.42
iii. Cost of fuel, water and wood	2,002.70	5.41	4.74
iv. Transportation cost	2,373.87	6.42	5.62
v. Cost of storage and packaging	1,224.60	3.31	2.90
vi. Cost of peeling	1,033.33	2.79	2.45
3. Total Variable Cost	36,995.77	100.00	87.61
4. Total Cost	42,229.01		
5. Gross Margin	146,770.03		
6. Net Farm Income	141,536.79		
7.Rate of return on investment	3.35		

Source: Oluwalana et al., 2020

Table 2: Factors affecting the profitability of yam flour processing.

Variable	Coefficient	Standard Error	t-value
Constant	-98872.286	55404.626	-1.785
Cost of yam tubers	-0.583	0.838	-0.695
Labour cost	-4.460**	2.064	-2.161
Transportation cost	-34.598***	4.701	-7.359
Cost of storage and packaging	-29.725***	10.185	-2.98
Sex	33230.260	27358.400	1.215
Age	610.918	1632.330	0.374
Household size	2605.583	4088.473	0.637
Years of experience	39676.366***	1503.233	2.645
Years spent in school	571.015	1644.968	0.347
Distance to market	-11503.431***	2784,186	-4.132
Membership of Association	55705.497**	22089.262	2.522
Diagnostic Statistics			
Probability >F	0.00		
R-Squared	0.51		
Adjusted R-Squared	0.45		

****(p<0.01), **(p<0.05)*
Source: Oluwalana et al., 2020

The study, therefore, concluded that the cost of storage and packaging of yam flour is significant for the profitability of yam flour processing. Hence, the study recommended that intervention should focus on improving storage facilities and other packaging materials to reduce post-harvest loss. In addition, processing experience was found to have a significant effect on the profitability of the processors.

2.1.2 Analysis of Yields of Kola-nut Production, Processing, and Marketing in Sagamu LGA, Ogun State, Nigeria

Paradoxically another study on "an analysis of yields of kola-nut production, processing and marketing in Sagamu Local Government Area (LGA), Ogun state, Nigeria" was carried out by Oluwalana *et al.* (2017) to describe the socio-economic characteristics of the farmers, net farm income, marketing channels and factors influencing the output of kola nut for its impact on food security. Table 3 shows the profound findings of an average farm net income of ₦208,680.40 per annum with total revenue of ₦291,149 and a gross margin of ₦237,789.50 per annum. The average total cost incurred was calculated as ₦82, 468.40 being the cost of labour, transportation, and items such as cutlass.

Table 3: Budgetary Analysis of the Kola Nut Farming

	n	Minimum	Maximum	mean
Total Variable Cost (TVC)	100	17800	129420	53359.50
Total Fixed Cost (TFC)	100	11600	61150	29109.10
Revenue	100	45000	812500	291149.00
Total Cost	100	35400	190570	82468.60
Net Income	100	-11800	701350	208680.40
Gross Margin	100	6000	737700	237789.50
GROSS RATIO	100	0	1	0.36

Source: Oluwalana et al, 2017

Regression Analysis was used to identify the socio-economic factors influencing the output of kola nut farmers' production in the study area. Table 4 shows that Farmers' age (X_1) was negatively significant, indicating that as they age, they may become physically unable to do intense farm operations which leads to productivity reduction. Farming experience (X_2) was positively correlated with the output of kola nut indicating that increase in the farmer's experience will increase productivity. Farm size was found also to be positively significant which implies that increase in farm size will lead to increase in output. Kola nut production is a profitable business as deduced from the scope of this study. It is a good source of income generation for farmers, marketers and even the

government through internal sales and exports; it also provides employment opportunities and supplies raw materials for industries. However, there were certain observations made that served as constraints in increasing kola nut output. These include reliance on only traditional knowledge of planting, difficulties procuring loans and transportation problems.

Table 4: Multiple Regression Analysis Results of Kola nut Production on Some Socio - Economic Factors in the Study Area

	X_0	X_1 *Age (years)*	X_2 Experience (years)	X_3 Education	X_4 Plantation Size (ha)	X_5 Family Size	X_6 Marital Status	R^2	F
linear	3.44	-0.75***	0.38**	-1.17	4.00**	2.06	-0.47	0.777	5.71
double log	9.80	-1.67***	-2.54	1.03	7.15**	0.61	-0.645	0.554	11.01

** Significant at 5%, *** Significant at 1%
Source: Oluwalana et al, 2017

2.1.3 Enhancing Food Security: cultivation of oyster mushroom (Pleurotus sajor-caju) using agro-forestry wastes

A study conducted on 'Enhancing Food Security' with a specific focus on mushrooms using agro-forestry wastes. In this study, maize cob (M), boiled maize cob (MU), oil palm fibre (P*), sawdust (S), mixture of oil palm fibre and sawdust (P*+S), mixture of oil palm fibre and maize cob (P*+M), mixture of maize cob and sawdust (M+S), mixture of oil palm fibre, sawdust, and maize cob (P*+S+M) were screened for cultivation of oyster mushroom (*Pleurotus sajor-caju*) in a Completely Randomized Design consisting of nine treatments, replicated six times (Plate 1). The maize cob served as the control and the results (Table 5) showed that the maize cob naturally supported the mycelia growth and production of fruit bodies. Growth on mixture of maize cob and oil palm fibre was like that of maize cob but the yield was different. Oil palm wastes had the least yield and the result showed that unboiled oil palm wastes did not support the growth of mushrooms. The production of fruit bodies on the mixture of oil palm fibre and sawdust was scanty as well as the mixture of sawdust and maize cob.

Plate 1: Substrates tested for cultivation of *Pleurotus sajor-caju*. (A) Mixture of oil palm fibre and sawdust - P*+S; (B) Mixture of oil palm fibre and maize cob - P*+M; (C) Sawdust - S; (D) Mixture of oil palm fibre, sawdust and maize cob - P*+S+M; (E) Boiled maize cob - MU; (F) Maize cob - M; (G) Boiled oil palm fibre - P; (H) Oil palm fibre - P*.
Source: ***Oluwalana et al 2017***

Table 5: Effects of different agro-forest wastes on mushroom yield in grams (mean values) at different flushes

Substrats	1st Flush		2nd Flush		3rd Flush		4th Flush			
	Fresh (g)	Dry (g)	Fresh (g)	Dry (g)	Fresh (g)	Dry (g)	Fresh (g)	Dry (g)	Total	Mean
M	41.51	20.01	23.46	10.41	22.36	8.96	15.57	7.46	149.74	18.72
MU	36.21	16.71	31.59	15.07	21.71	8.72	15.12	7.23	152.36	19.05
P*	0.00	0.00	0.00	0.00	10.35	4.52	9.20	1.08	25.15	3.14
S	29.22	12.49	20.01	11.28	12.01	5.54	6.97	0.91	98.43	12.30
P*+S	16.10	9.07	13.23	6.21	9.46	3.62	6.01	0.62	64.32	8.04
P*+M	23.68	11.01	19.77	9.31	10.21	4.81	5.72	0.64	85.15	10.64
M+S	19.46	8.72	14.99	6.96	8.45	3.48	4.99	0.50	67.55	8.44
P*+S+M	15.07	7.04	12.47	5.39	7.24	0.95	3.94	0.37	52.47	6.56
LSD	6.15	2.77	6.15	2.77	6.15	2.77	6.15	2.77	35.68	4.46

Source: Laboratory Work.

Source: *Oluwalana et al., 2017*

2.1.4 Sales of Medicinal Forest Tree Barks in Abeokuta, Ogun State Nigeria.

A lot of wastes (cocoa pods, cassava peels, palm kernel shaft and plantain peels) is generated during commercial processing of the produce which results in environmental hazards and health issues such as body pain, headache, malaria, and typhoid. Moreover, these wastes can be turned into Value-Added Herbal Products such as herbal soap and Shea butter cream which have antifungal properties for healthy skin management that is "personal hygiene" and these products can be sources of income generation for processors. This was evidenced in the study on Sales of Medicinal Forest Tree Barks in Abeokuta, Ogun State Nigeria. The study revealed (Table 6) that a significant number of respondent sellers, 58.6% of the total, earn less than ₦5,000 per month, falling into the low-scale category. Some of these sellers are in the large-scale seller's category, earning above ₦10,000 per month. However, 27.33% of respondents earn between ₦5,000 and ₦10,000 monthly from bark sales, above the minimum wage paid to State government employees then(2002). About 14% earned above ₦10000

Table 6: Income distribution of respondents according to scales of bark sales

Income in Naira	Low Scale	Medium Scale	Large Scale
<5,000	88 (58.6%)	-	-
5,000 -10,000	-	41 (27.33%)	-
Above 10,000	-	-	21 (14%)

Source: Field survey, 2002

This study has shown that the Marketing of Medicinal Forest Tree bark is an income-generating venture, especially for young women in Abeokuta. It can provide full-time employment if well developed as almost half of the respondents are earning above the State Government minimum wage from bark sales based on the medicinal benefits. The management implications of this situation are that sellers may lose their livelihood if their sources of wares are destroyed. The study therefore recommends that tree planting campaigns should be stepped up in Abeokuta and the government should provide highly subsidized tree seedlings to farmers to encourage them.

2.1.5 Effects of Physico-chemical attributes of forest-based herbal Soap on human skin in Southwestern Nigeria

As an Agricultural and Resources Economist, the farmers' indigenous ways of value-chain development by the processors in terms of produce wastes management have been examined and assessed. I discovered innovative ways through research on how processors were able to convert some wastes from agriculture and forestry (cassava peels, cocoa pods, palm kernels, plantain peels) into herbal soap that can be used for healthy skin maintenance and generated more income for processors, which reduce poverty for processors. Through some research done, such as the Effect of Physico-chemical attributes of forest-based herbal soap on human skin in Southwestern Nigeria, it was discovered that the business is viable and profitable while at the same time, providing healthy skin care for the people. It is no longer news that there is a growing awareness of the medicinal benefits of renewable forest resources that can be used as natural cosmetics for the benefit of human skin health instead of bleaching by women or sometimes men to keep their skin light. Today, more rural dwellers in forest reservations have resorted to utilizing more Non-Timber Forest Products (NTFPs) and agro-processing wastes products (APWPs) into African Black Soap (ABS) otherwise called Herbal Soap (HS). Some of the NTFPs that fall under natural cosmetics are herbal

soap (black soap) produced from Cocoa Pod Husks (CPH); Shea-butter; Coconut Oil; Aloe Vera Gel, and Natural Fragrance Oil. This is an excellent natural body-care soap in the original fashion and suitable for all skin types. The major raw materials that are used to produce herbal soap are NTFPs and AFWPs such as CPH; Palm kernel Oil (PKO); cassava peels (CP) and, Plantain Peels (PP). Samples of 5g each were dissolved in 50 ml of solution (10% concentration) to get results.

The results of the physic-chemical analysis (PCA) on Herbal Soap (Table 7) and photographic impressions of six Samples (Plates 2 to 7) collected during a field survey from different locations in Southwestern, Nigeria revealed that the pH range of the herbal soaps (10% solution) is between 9.89 to 10.18 ,which is a good indication that the herbal soaps fall in the mid alkaline pH range-(that is, ideal soap pH range that has a little or no irritation on mildest skin texture. Some synth soaps, that bleach, give a pH range above 10.50 and other acidic soaps below 6.98 pH range of the soap (10%) lies between 981-3110 × 10 mg/L. The Total Dissolved Solid (TDS) mg/L of the herbal soaps falls between 981-3110 mg/L, which is a good indication of the inertness of the soap to the atmosphere when exposed to moisture. Industrial PKO (981-1775) melted but traditional processed PKO (1800-3110) stayed dry. The Conductivity (US/cm) of the herbal soaps' ranges from 18,200-47,150 (US/cm) × 10. These measured parameters indicate the extent of dissolved ions present in the herbal soap materials that when released nourish the skin on use. The higher the dissolved ions, the better the skin absorption of the desirable ions. This results in healthy skin in human beings and maintains a light complexion without bleaching or toning exposing the skin to damage. Black complexion people are also maintained as black as ever, with no risk of bleaching. It is noteworthy that soap is very important for personal hygiene by sane persons and not mad man.

Table 7: Physico-chemical Attribute of Herbal Soaps Produced by Entrepreneurs from Southwest Nigeria

ID	LGA/ State	Vegetation type	Description	pH	TDS (mg/c) ^{x10}	Conductivity (US/cm) ^{x10}
A	Odeda / Ogun	Forest	Cocoa pod Ash + Palm Kernel oil (Traditional/Industrial) (No filler)	10.0	1339/ PKO industrial (melted)	475X5=23,750
B	Ibarapa / Oyo	Derived Savannah	Cocoa pod Ash + Palm Kernel oil (Traditional/Industrial) + (filler-garri)	9.95	1135/ PKO industrial	422X5=21,100
C	Afijo/Oyo	Derived Savannah	Wood Ash + Palm Kernel oil (Traditional/Industrial) + (filler-elubo)	10.10	1723/ PKO industrial	643X5=32,150
D	Iseyin / Oyo	Derived Savannah	Cocoa pod Ash + Palm Kernel oil (Traditional/Industrial) (No filler)	9.99	981/ PKO industrial	382X5=19,100
E^1	Aawe/ Oyo	Derived Savannah	Cocoa pod Ash + Palm Kernel oil (Traditional/Industrial) (No filler)	9.90	1589/ PKO industrial	546X5= 27,300
E^2	Aawe/ Oyo	Derived Savannah	Cocoa pod Ash + Palm Kernel oil (Traditional/Industrial) (No filler)	10.04	1833/ PKO traditional	639X5= 31,950
F^1	Akinyele Oyo	Forest	Cocoa pod Ash + Palm Kernel oil (Traditional/Industrial) (No filler)	10.08	1775/ PKOindustrial	617X5=30,850
F^2	Akinyele Oyo	Forest	Cocoa pod Ash + Palm Kernel oil (Traditional/Industrial) (No filler)	10.13	1919/ PK traditional	636X5=31,800
G	Osogbo / Osun	Forest	Wood Ash + Palm Kernel oil (Traditional/Industrial) (No filler)	9.89	3110/ PKO traditional	943X5=47,150
H	Agege/ Lagos	Control /Imported from Ghana	Cocoa pod Ash + Palm Kernel oil (Traditional/Industrial) (No filler)	10.18	1092/ PKO industrial	364X5=18,200

Physic-chemical field survey Analysis, 2015 Note: 5g sample dissolved in 50ml of solution. (10% Concentration). (Source: Oluwalana et al., 2018)

Plate 2: Wastes-to-Wealth initiative (Utilization of Agricultural-wastes such as Cocoa pod husks in herbal soap making) found in all research locations

Plate 3: Herbal Soap (Sample A) Cocoapod ash/lye + fried palm kernel (no filter added) found in Osiele, Ogun State, Nigeria, Forest Area

Plate 4: Herbal soap (Sample B) Cocoa pod ash/lye + fried palm kernel oil (filter added) found in Igboora, Oyo State, Derived Savannah Area

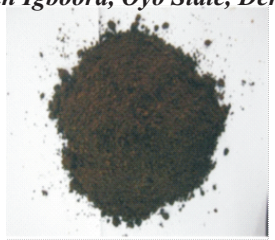

Plate 5: Herbal soap (Sample C) Wood ash/lye + fried palm kernel oil (filter added) found in Ipako, Oyo State, Savannah Area.

Plate 6: (a) Herbal soap (Sample D) Cocoa pod ash/lye + fried palm kernel oil (filter added) found in Iseyin, Oyo State, Derived Savannah Area.

Plate 7 Herbal soap (Sample E) Cocoapod ash/lye + white palm kernel oil (no filter added) found in Aawe, Oyo State, Derived Savannah Area.

Table 8 shows some of the uses of the herbal soap in the study area. Most of the respondents (87.64%) indicated the use of soap as medicine. The medical uses include using soap for stomach pain, wherein the soap is liquefied in water and drunk. It is also used in curing skin diseases such as eczema, psoriasis, ringworm, sores, and wounds. For eczema, psoriasis, and ringworm, the affected parts are washed, sometimes scrubbed with a rough object or lead such as the lead of *Ficus exasperata* ("eepin" in Yoruba) - sandpaper leaf, and the soap is applied. For sores and wounds, affected parts are washed using soaps. Herbal soap is also used as an ingredient in the formulation of anti-fibroid drugs. The soap is burnt with other materials, pulverized and daily ingested. The use of herbal soap as a cosmetic percentage was 84.46% and daily needs were 81.67%.

Table 8: Distribution of Respondents with the Uses of Herbal Soap

Uses	Lagos	Ogun	Osun	Oyo	Total (of 502)	%
Medical	33	56	16	335	440	(87.64)
Cosmetic	33	56	-	335	424	(84.46)
Cultural Purposes	10	15	16	10	141	(28.08)
Daily Needs	30	40	2	300	410	(81.67)

Source: Oluwalana, 2018; Values in parentheses are in percentages

2.2. Value Addition to Agricultural and Forest Resources Wastes and Micro, Small, and Medium Enterprises

Value addition to agricultural and forest resources wastes also known as Value Added Herbal Products is the creative and innovative process of transforming wastes into attractive and acceptable form to customers by the micro, small, and medium enterprise (MSME). The valued added product developed can attract consumers to buy more of the products such as Agricultural Forest products for herbal remedies. Value addition can also be referred to as secondary production which is a big gap in agricultural development in Nigeria. The products are supposed to be used as First Aid product to prevent or manage sicknesses and diseases. The value addition processes further increases shelf life of agricultural and forest resources, generates multiple sources of income, and help farm families and FUNAAB students to handle glut during raining season. Furthermore, it will help reduce the cost of importation and increase the revenue from exportation. Value addition has to do with the use of our two hands to create wealth from non-oil resources to create generational wealth to reduce or eliminate poverty as stated in Sustainable Development Goal 1 (End poverty in all its form everywhere). In 2023, data from budget office in Nigeria showed that the country earned 2.38 trillion naira from non-oil revenue which is higher than the 776 billion generated from oil (National Bureau of Statistics, 2023).

2.2.1 Determinants of Herbal Soap in Small Enterprises and Market-led Development in South-west, Nigeria

Some studies conducted in collaboration with other scholars within the purview of my area of focus on Agricultural and Resources economics concerning agricultural wastes range from the use of agricultural wastes such as cassava peels, for herbal soap for Small Scale Enterprises to Agrochemical wastes. For instance, Oluwalana *et al.* (2016) study on determinants of herbal soap in small enterprises and market-led development in the south-west, Nigeria, was on alternative natural products with health potential

such as herbal soap. The findings become very important in curbing the disastrous effects of mercury-based soap on healthy living and so enhance women's productive activities of the rural peasantry. This study covers herbal soap small business development and marketing aspects. Five hundred and two (502) herbal soap processors and marketers from Southwest, Nigeria, drawn from 65 communities in 16 Local Government Areas participated to determine small business variables (Table 9) of which 84% had no formal education (Figure 8). Data was collected using a close-ended questionnaire. Herbal soap entrepreneurs' data was fitted into three regression functional forms. Linear, semi-log, and double-log functions were used. Table 10 revealed the results for the estimation of factors that determine the production of herbal soap in the study area. Educational level was found to be significant at 5% (Table 10), this implies that Low literacy level clearly shows the poor human capital development of the herbal soap entrepreneurs, and this could negatively affect the profitability level of the enterprise. Hence, if the processors and marketers had formal education, they would perform better by efficiently utilizing the scarce resources available to maximize their profit level and thereby reduce their poverty level.

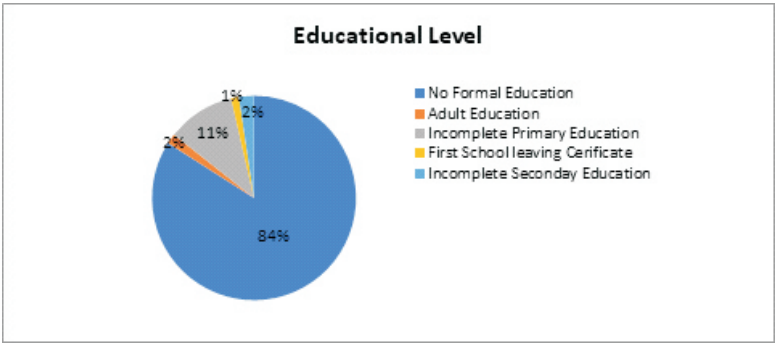

Figure 8: Distribution of Respondents by Educational level in the Study Area

Source: Computed from field survey data, 2015

Table 9: Distribution of Herbal Soap Processors by Problems Encountered

Problems	Frequency*	Percentage
Inaccessibility to bank credit facilities (Lack of funds)	502	100
Non availability of raw materials (e.g. cocoa pod ash) at all times (High cost of raw material)	502	100
Lack of extension services	502	100
Low awareness of economic potentials of herbal soap	502	100
Micro or small scale operation	502	100
Poor value- added technology education	502	100
Non availability of modern equipment	476	95
Low price of herbal soap in the market hence low profit	450	91
Poor health issue	427	85
Poor road network	302	60
Price of other substitutes	250	50
Poor level of education	250	50

Source: Computed from field survey data, 2015

Table 10: Regression results for the estimation of factors that determine the production of Herbal Soap in the Study Area

	b0	X_1 Age	X_2 Years of Experience	X_3 Educational Level	X_4 Household Size	X_5 Cost of Ashes	X_6 Labour	X_7 Extension Contact	X_8 Type of credit
Linear	-4964.5** (1.67)	-113.80** (2.26)	458.39ns (1.36)	738.66ns (4.39)	-418.84 (1.69)	6417.53 (11.2)	182.24 (1.30)	2765.08** (2.73)	6958.32 ns (6.96)
Semi-log	16548.28 (1.54)	-9799.05 (3.67)	4355.9 (3.57)	2819.7 (3.69)	-2384.43 (1.43)	22593.9 (5.51)	1551.75 (1.64)	2515.30** (2.24)	9502.07 (7.75)
Double-log	9.96 ns (10.32)	-0.87 ns (3.62)	0.40 ns (3.63)	0.05** (3.24)	-0.22 (1.45)	2.15ns (5.83)	0.14 (1.67)	0.55ns (5.47)	0.69ns (6.30)

Source Computed from field survey, 2015. Figures in parenthesis are t-values.

****** Significant at 1%; ** Significant at 5%;* ns - not significant (p ≥ 0.05)***

2.2.2 Impact of Occupational Hazards on the Technical Efficiency of Oil Palm Processors in Edo State, Nigeria

Palm oil is the world's largest source of edible oil, accounting for 25% of edible oil and fat output, according to the Malaysia Palm Oil Council in 2007. Due to rising demand and Indonesia's palm oil export competitiveness, palm oil exports surged considerably between 1991 and 2001 and from 2005 to 2007 (Amzul, 2010). The fundamental difficulty remains to ignore the negative impact on

their technological efficiency. This study contributes to the body of data by identifying and assessing the main occupational dangers experienced by oil palm processors.

A three-zone Edo State Agricultural Development Programme (EDADP) zone was adopted. Two hundred and ten oil palm processors in the study were selected using multistage sampling. The analysis included percentages, frequencies, OHIs, and Stochastic Frontier Production Analysis. Table 11 reveals that all respondents reported encountering oil palm processing industry hazards. In this study, local palm oil processors mostly suffered from smoke irritation (100%), presser injury (94.3%), spikelet injury (83.8%), fire and oil splash burns (55.7%), cutlass injury (42.9%), bee stings (22.4%), and snake bites (19.1%), among other challenges. The respondents' frequent exposure to these risks due to their long tenure in the industry shows a direct association between risky occurrences and processing experience. Workplace injuries are less frequent for workers who stay at their positions for less than five years, but processors typically have 15 years of industry experience and are more likely to be exposed to occupational hazards (James, 2015).

Table 11: Illness Experiences and Occupational Hazards

Variables	Frequency	Percentage
Hazard Experience		
Yes	210	100.0
Occupational Hazards (n= 210)*		
Spikelet Injury	176	83.8
Burns (Fire, oil splash)	117	55.7
Cutlass injury	90	42.9
Smoke irritation	210	100.0
Bee sting	47	22.4
Presser Injury	198	94.3
Snakebite	40	19.1

**Multiple responses*

Table 12 shows the Cobb Douglas Stochastic Frontier Production Function (SFPF) and inefficiency model Maximum Likelihood Estimates (MLE). Sigma squared was statistically significant (2 = 1.33, p 0.01), validating the composite error term distribution assumption and goodness of fit. The fraction of overall deviation from the frontier due to processor inefficiency is represented by gamma (γ). It shows that processor technical inefficiency caused 71.0% of the output to drop below the frontier. The study found that palm fruits (β= 0.66, p < 0.01), water (β=0.18, p <0.05), and labour (β= 0.42, p < 0.01) had the highest impact on oil palm processing output in the studied locations. It shows a 0.66-litre increase in palm oil yield per oil palm fruit. Processors must monitor the number and quality of fresh fruit bunches processed each time. Production requires expert and unskilled labour, so processors must use it efficiently. This supports Muhammad-Lawal et al. (2009) and Amaza and Maurice (2005)'s findings. The study found that occupational dangers reduced oil palm processors' technical efficiency.

Table 12: Determinants of Oil Palm Processing Output and Efficiency

Variables	Coefficient	t-value	P- value
Constant	0.798	1.47	0.850
Fruits	0.662***	6.86	0.002
Water	0.180**	2.04	0.022
Fuel	0.056	0.65	0.754
Transport	-0.061	-0.88	0.262
Labour	0.415***	3.65	0.003
Inefficiency Model			
Sex	0.344	0.29	0.676
Age	-0.041	-0.56	0.201
Educational level	1.489	1.04	0.300
Processing experience	-0.110**	-2.97	0.049
Household size	0.120	0.48	0.879
Loss time rate	0.087**	2.68	0.026
Incidence rate	0.030*	1.99	0.078
Severity rate	0.098***	3.57	0.001
Variance Parameters			
Sigma squared	1.328***	11.22	0.000
Gamma	0.711***	5.67	0.000
Log-likelihood	-156.353		

******Significant at 1%; **Significant at 5%***

2.2.3 Household Rice Demand Response to Price and Income Changes during a Food Price Inflationary Period in Oyo State, Nigeria

Figure 9 shows Nigeria's rice production rising from 3.7 million metric tons in 2017 to 4.0 million in 2018. Despite this, just 57% of Nigeria's 6.7 million metric tonnes of rice are produced locally, leaving a 3-million-ton shortage. With a remarkable study, the Nigerian government prohibited rice imports in 2019 to boost local production and ensure a stable rice industry. However, rice output climbed from 4.9 million metric tonnes in 2000 to 5.0 million in 2021, leaving a 2-million-ton gap that is either imported or smuggled in.

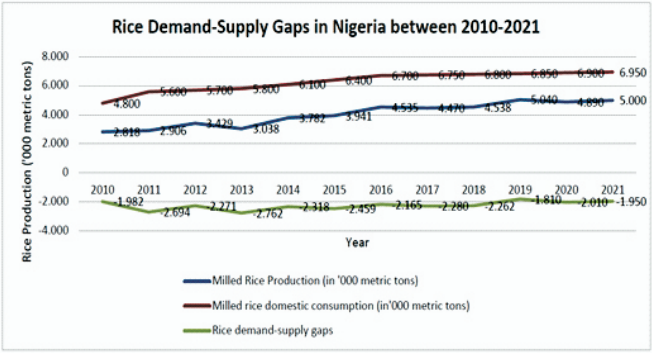

Figure 9 Trends of rice demand-supply gaps in Nigeria between 2010-2021

Source: Authors from USDA (2022) rice data outlook

Similarly, most rice studies focused on improving the supply side of the Nigerian rice industry through improved production efficacy (Shehu *et al*., 2007), increased returns and improved technologies (Saka and Lawal, 2009), with little research on household demand response, rice price changes, and food inflation. Food prices are a major cause of inflation, which lowers household purchasing power. The study examined household rice demand response to price and income changes during a food price inflationary period in

Oyo State, Nigeria. The study aimed to evaluate households' rice demand patterns in the study area, estimate household elasticity; and identify coping methods for rice price variations. Sampled Oyo State households were used to evaluate rice price reaction during food price inflation in Nigeria. The study focused on four rice varieties consumed in the study area. The findings add to food demand and inflation research. Table 13 and Figure 10 indicated that substitution of rice with other foods, preparation of rice with other foods to reduce rice in meals, and rice demand reduction are the major ways to cope with rice price and household income changes. Even while price intervention may not affect rice demand, technology improvements will lower rice production costs, lower local rice prices, boost demand, and encourage farmers to increase production.

Table 13: Coping Strategies used by households on demand for rice during food inflationary period

Strategies	SA Frequency	A Frequency	D Frequency	SD Frequency	Mean	Rank
Substitution of rice by other grain crops	124	240	80	23	2.68	1
Preparation of other food types such as beans, spaghetti alongside with rice to reduce quantity of rice being consumed	124	189	82	39	2.49	2
Outright reduction in the quantity of rice being consumed	92	207	92	36	2.45	3
Consumption of other different types of less costly rice	80	159	154	24	2.40	4
Reduction in non-rice and non-food expenditure to maintain quantity of rice consumed	140	117	118	41	2.39	5
Restriction of rice consumption by adults in order to feed small children	58	147	140	33	2.34	6
Reduction in the amount spent on other types of food consumed	88	126	1467	37	2.28	7
Reduction in the frequency of rice being cooked and consumed	96	150	96	52	2.26	8
Reduction in ration of rice being served to household members	80	114	90	71	2.04	9
Suspension of rice consumption in the house	108	42	144	61	2.04	10
Purchasing consumed rice on credit	56	81	140	63	1.95	11
Taking out a loan to purchase rice	81	43	23	14	1.75	12

Note: SA, A, D and SD means Strongly Agree, Agree, Disagree and Strongly Disagree respectively.

Source: Households field survey by authors (2021)

Figure 10: Links between food demand response to income, prices, and inflation.

2.2.4 Enterprise Assessment Across Cassava Wastes (Peels) Value Chain in Ogun State

To benefit from the rising demand for cassava products, Nigeria must improve the value-addition process by improving product quality and processing equipment. This is important since cassava is vital to Nigeria's economy and is in high demand domestically and globally. The main reason is that cassava products are made by households without mechanization. Thus, the capacity to meet industry and consumer quality and quantity demands is limited. Significant post-harvest losses and limited cassava exportation are problems. Thus, Elegbede , Oluwalana and (2020) conducted a study on Enterprise Assessment across Cassava Wastes (Peels) Value Chain in Ogun State. This study revealed the many variables that make Nigeria's manufacturing costs twice than that of Thailand and China. These are energy and raw material subsidies from those governments. Without equivalent support for Nigerian farmers, they cannot compete globally in pricing (Tewe, 2007). Enterprise evaluation of the cassava peels value chain in Ogun State, Nigeria, is examined. Table 14 shows that processing cassava peels costs N3090.83k per month and marketing them costs N6145.96k. Processing and marketing cassava peels had monthly gross margins of N9,347.74k and N13,666.22k, respectively. The

estimated profitability ratio shows a 3.97 return per naira for processing cassava peels and 3.20 for marketing them. Processing and marketing cassava peels had operating ratios of 0.25 and 0.31, respectively. Respondents said the two enterprises were financially viable. The inefficiency model (Table 15) shows that characteristics including age, credit access, family size, and cooperative membership favourably impact the efficiency of dried cassava peel production (P<0.01). Credit access, household size, and association participation negatively affect cassava processing efficiency in the research area, with a 1% significance level. The negative sign of these characteristics suggests that credit access, household size, and association membership directly affect processor efficiency. As credit, family size, and association membership increase, the processor becomes more efficient.

Table 14: Costs and Returns Structure of the Actors of Cassava Peels Enterprise across the Value Chain in kg/month /Respondent

Cost and Returns	Processors Amount in ₦ per Kg	% of total Cost	Marketers Amount in ₦ per Kg	% of total cost
Revenue (₦)				
Total Revenue (₦)	12,279.00		19,694.00	
Variable cost items				
Labour cost	150.00	4.85	-	-
Cost of Cassava Peels	-	-	3523.60	57.33
Cost of Transportation	1233.01	39.89	1890.86	30.76
Cost of Drying	1037.10	33.55	-	-
Packaging Cost	261.15	8.45	223.61	3.64
Storage Cost	-	-	157.35	2.56
Bagging Cost	250.00	8.09	-	-
Market Tax charge	-	-	232.36	3.78
Total Variable cost (₦)	2931.26	94.84	6027.78	
Fixed Cost Items				
Sundry Material (Fixed cost)	159.57	-	118.18	
Total Fixed Cost (₦)	159.57	5.16	118.18	1.92
Total Cost (TC) (₦)	3090.83	100.00	6145.96	100.00
Gross Margin	9,347.74		13,666.22	
Profitability Ratios				
Return on investment	3.97		3.20	
Operating ratio	0.25		0.31	

Source; Computed from field survey, 2019

Table 15: Inefficiency Model

Constant	-8.59*** (0.978)	-8.79
Age (D_1)	-0.168*** (0..0115)	-14.57
Education level (D_2)	0.124*** (0.056)	2.19
Years of experience (D_3)	0.0751*** (0.0199)	3.76
Credit access (D_4)	-1.24*** (0.3955)	-3.126
Household size (D_5)	-0.590*** (0.0948)	-6.223
Membership of Association (D_6)	-6.64*** (0.564)	-11.77
Diagnoistic Statistics		
Sigma-squared (δ^2)	0.188*** (0.2968)	6.36
Gamma (γ)	0.996*** (0.00213)	466.69

**** significance at 1%, **significance at 5%. Values in parentheses are standard errors*
Source: Computed from field survey, 2019

Cassava peel processors had a mean technical efficiency of 0.94. The mean production of 94% showed that cassava peel processors may boost output by 6% using current technology along the cassava wastes value chain. Additionally, the mean allocated efficiency of 83 percent for cassava peel processors along the chain showed room for 17 percent production improvement. Finally, the mean economic efficiency of 78 percent for cassava wastes (peel) processors suggests that there is room for 22 percent improvement and that the existing technology along the chain might increase gross output and profit (Table 16). The study found that cassava peel marketers have a higher gross margin than processors.

Table 16: Distribution of Technical, Allocative and Economic Efficiencies of Processing Cassava Peels along the Value Chain

Class	Frequency	Percentage
Technical Efficiency		
≤ 0.40	8	7.4
0.41-0.50	6	5.6
0.51-0.60	12	11.1
0.61-0.70	14	13.0
0.71-0.80	25	23.1
0.81-0.90	26	24.1
≥ 0.91	17	15.7
Total	**108**	**100**
Mean	**0.94**	
Minimum	**0.057**	
Maximum	**0.968**	
Allocative Efficiency		
≤ 0.10	41	38.0
0.11-0.20	27	25.0
0.21-0.30	15	13.9
0.31-0.40	10	9.3
0.41-0.50	6	5.6
≥ 0.51	9	8.3
Total	**108**	**100**
Mean	**0.83**	
Minimum	**0.018**	
Maximum	**0.996**	
Economic Efficiency		
≤ 0.10	46	42.6
0.11-020	36	33.3
0.21-0.30	15	13.9
0.31-0.40	4	3.7
≥ 0.41	7	6.5
Total	**108**	**100**
Mean	**0.78**	
Minimum	**0.0012**	
Maximum	**0.6779**	

Source; Computed from field survey, 2019

2.2.5 Compensating Wages for Agrochemical Exposure Risks of Cocoa Farm Workers

Fadiji *et al.* (2020) studied the compensating wages for agrochemical exposure risks of cocoa farm workers specifically estimated the compensating wages of life quality for agro-chemical exposure risks of cocoa farm workers in Idanre Local Government Area, Ondo State, Nigeria. This is because occupational risk is a major factor in reducing the productivity of farm workers as it impairs their physical capacity and increases their vulnerability to ill health, diseases, and injuries. Agro-chemical exposure risk has been attributed to work demand and unhealthy work environment

that these workers are subjected to which they are often not compensated. In the study, occupational risk was described as a condition surrounding a work environment or state of a work environment that increases the likelihood of death, illness, or disability to a worker while occupational hazard is the native property of a substance or process that could cause injury or damage (WHO, 1987). Four Factors causing agrochemical exposure were identified during the study, viz; residue violation, Illiteracy and ignorance, lack of awareness of personal protective equipment and smoking habit. For the residue violation, the findings in Table 17 imply that most of the respondents (57.8%) violated the residue prescriptions, while 42.2% did not violate the chemical residue. For toxic nature of some pesticide, deposited residues on the plant are dangerous to the farmer and his environment. Since cocoa serve as a major cash crop used in foreign exchange, non-compliance with the stated rule and regulations, overuse and too frequent applications of the chemical have become potential sources of danger, injury or harm to the applicator and the environments. Illiteracy and ignorance show that majority of the farm workers were unable to read the instructions written on pesticides containers, because most of the farmers are illiterate. Eleven percent of the respondents can always read instructions written on the containers, while 88.9% report that they sometimes read the instruction. Lack of awareness of personal protective equipment revealed that majority of the cocoa farm workers (65%) in the study area are not aware of PPE, while 35% are using protective equipment. Respondent that are not complying with wearing of protective gear can be easily expose to pesticide toxicity; the exposure can occur through the mouth(oral), inhalation(respiratory), skin(dermal), and eyes(visual). The implication of this is that cocoa farmers are prone to experiencing health symptoms such as skin irritation, respiratory disorder, and redness of the eyes among others due to their exposure to pesticides. Respondents were asked about their use of personal protective equipment (PPE) such as gloves and masks and more

than half did not use it, while few always use PPE to protect themselves from direct pesticide exposure. The study showed that 24.4% of the respondents smoke during pesticide application, while 75.6% answered that they never smoke during pesticide application. The practice of smoking while spraying agrochemicals was also reported among cocoa farmers. This is quite risky because it increases the likelihood of direct oral ingestion of agrochemicals. There is increase in the risk of exposure of farm workers to agrochemicals when the basic recommendations of properly washing of hands after spraying or before eating are not observed. Table 18 shows that age and health index have no effect, education, risk and temperature have positive effect while wearing PPE and smoking have negative effect on wage compensation for job dangers. This validates Devi (2007)'s finding that agricultural workers with less schooling earn more. Due to limited job possibilities, persons with less education are more productive in agriculture. Personal protection equipment ensures a safe workplace and lowers wages. Workers who smoke earn less than those who don't. It appears that smokers are risk-takers and expect reduced or no compensation for job dangers. The study concluded that appropriate use of personal protective equipment minimizes agrochemical exposure risks.

Table 17: Factors causing agrochemical exposure

Variables	Frequency	Percentage
Residue Violation		
Yes	104	57.8
No	76	42.2
Total	180	100
Reading Instruction		
Yes	20	11.1
No	160	88.9
Total	180	100
Awareness of protective equipment		
Yes	63	35
No	117	65
Total	180	Total
Smoking Habit		
Yes	44	24.4
No	136	75.6
Total	180	100

Source: Field Survey, 2019

Table 18: Factors affecting Wage Compensation

WAGE	Coeff	Std. Err.	t-value	p>t
Constant	902.6092***	332.5037	2.71	0.007
AGE	0.933146	1.019236	0.92	0.361
EDUCATION	1.045793**	0.402493	2.59	0.011
RISK	74.79754***	26.80494	2.8	0.006
TEMPERATURE	5.017797**	2.016404	2.5	0.013
HEALTH INDEX	9.208049	8.371428	1.10	0.273
WEARING PPE	-31.66634**	13.52674	-2.34	0.022
SMOKE	-41.78657**	20.90020	-2.00	0.045
R-squared	0.501			
F-value	4.30			
P>F	0.3412			
Mean VIF	1.04			
Ramsey Reset Test	0.413			

Source: Field Survey, 2019. ***p<0.01, **p<0.05.*

2.2.6 Geo-Economic Assessment of Tropical Rainforest Tree Ecosystem Service Functions and the Anthropogenic Willingness-To-Pay for its Conservation

The Geo-Economic Assessment of Tropical Rainforest Tree Ecosystem Service Functions and the Anthropogenic Willingness-To-Pay for its Conservation study of Okojie, *et al.* (2020) aimed to assess the tree cover distribution, ecosystem service awareness and value to respondents within the study area. The ease of access and extensive utilization of remotely sensed images enable the evaluation of a site and the quantification of tree canopy cover density without the need for an on-site visit (Jiang *et al.*, 2016). Tree canopy cover density obtained through remote sensing has emerged as the primary standard for urban forestry agreements in numerous countries (Tigges, *et al.* 2017). Global tree canopy cover has been measured at several scales. Nevertheless, many of these portrayals are unchanging, and those that encompass several periods are not designed enough for continuous enduring surveillance (Feng *et al*., 2017). To aid in informing decision-makers about these services, ecosystem services are being ascribed to economic values. Figure 11 is a conceptual diagram explaining ecosystem services and their interactions with the various aspects

of human well-being.

The assessment of ecosystem service awareness was conducted using a straightforward percentage distribution and a standardised Likert scale. The characteristics of the respondent's willingness to pay (WTP) were evaluated by a straightforward percentage analysis and a more advanced contingent valuation analytical method. The findings indicated that the proportion of tree cover within the designated research region varied between 10% and 66% tree cover. The mean tree cover within the research area was approximately 15%. Around 13.1% of the State exhibited varying degrees of tree coverage. The evaluation of the respondents' awareness of the tree ecosystem services within the study region revealed that they were knowledgeable of the presence of these services and had a strong familiarity with the different types. The WTP analysis reveals that 85% of the participants expressed a willingness to pay for the preservation and regrowth of trees in their local surroundings (Figure 11).

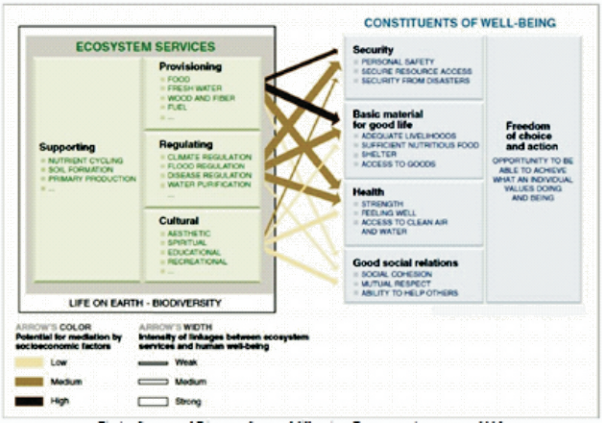

Figure 11: Conceptual Diagram, Source; Millennium Ecosystem Assessment, 2005 in Okojie et al., 2020.

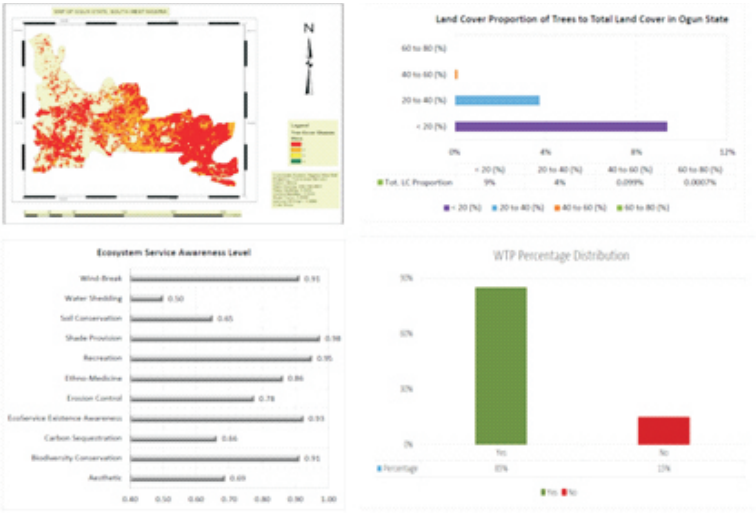

Figure 12: Bid Value Range of Respondents within the Study Area, Source; Data Analyses (2019)

This research concluded that tree ecosystem functions and categories are well-known. WTP results also suggest that most people respect trees' ecological services and are prepared to pay for them to persist. The forest area evaluation showed that just 13% of the study area had trees, 8% of which were sparse, indicating low tree cover and density. To evaluate ecosystem services by perceived relevance, an in-depth examination of ecosystem service awareness and preference is necessary. The WTP model should also integrate ecological service awareness and preference.

2.3 Value-added Herbal Products and Equipment Development and Exhibition Project

My research in this area birthed many health related products that have been patented. These products include shea butter palm, soap

,,

2.3.1 Sheabutter Balm

Sheabutter is a fatty extract from the seed of the sheabutter tree which grows predominantly in the grassland savannah of West Africa. Unrefined sheabutter has the largest healing fractions and

contains special ingredients that are ideal for healthy skin. It contains natural anti-inflammatory agents and a minor sunscreen agent. Shea butter is a natural anti-aging and hair treatment. It is very good for stretch marks, dry skin, cracked heels, sunscreen, frostbite, wind damage, lip balm and general skin moisturizer. The production of sheabutter was based on the application of indigenous knowledge gathered from rural communities in Ogun and Oyo State to add value to sheabutter and balm to produce value added sheabutter balm.

Oluwalana E.O.A. and Oluwalana S.A. (2008):"Sheabutter Balm" RP: NG/P/2007/444. Date of patent: 10/8/07. Date of Sealing: 19/08/08. -Signed: 01/09/2008. Patentee-Elizabeth Olufunmilayo A. Oluwalana and Prof. Samuel Adeniran Oluwalana. Mode of Sponsorship -Self/President of Federal Republic of Nigeria-Umar Musa Yar'adua. Patents and Designs Act (CAP 344 LFN 1990)-Year of commencement - 2008.Expiration date –2028 (20 years).

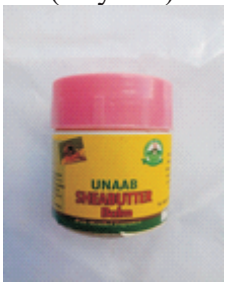

Plate 13: Picture of UNAAB Sheabutter Balm

Shea butter balm is a versatile product that can be used on all parts of the body. It can be applied to the face, lips, hands, feet, and body. It can also be used to condition hair and nails. Shea butter balm is a natural and effective way to keep your skin healthy and beautiful.

2.3.2 Herbal soap (Honey-based)

Today, there is an increasing health concern all over the world as to the health and environmental effects of artificial soaps. These soaps have been implicated in the phenomenon known as blue babies,

hyper-eutrophication of water bodies and various forms of cancer. As a result there is resurgence in the use of natural soaps made with lyre that is not corrosive on the skin and are easily bio-degradable. The honey-based herbal soap is completely natural, non-corrosive to the skin and is environmentally-friendly. It has been formulated to protect and nourish the skin. Herbal soap (Honey-based) is produced from agricultural wastes such as cocoa pod and are then mixed with other essential ingredients. The production of herbal soap (Honey-based) was based on the application of indigenous knowledge gathered from rural communities in the six southwestern states in Nigeria to add value to herbal soap to produce value added herbal soap

E.O.A. and Oluwalana S.A. (2008): "Herbal Soap (Honey-based)" RP: NG/P/2007/445. Date of patent 10/8/07. Date of Sealing 19/08/08 -Signed: 01/09/2008.

Patentee: Elizabeth Olufunmilayo A. Oluwalana and Prof. Samuel Adeniran Oluwalana Mode of Sponsorship -Self/President of Federal Republic of Nigeria-Umar Musa Yar'adua. Patents and Designs Act (CAP 344 LFN 1990)-Year of commencement -2008.Expiration date –2028 (20 year).

Plate 13a: Picture of FUNAAB Herbal Soap

Plate 13b: Picture of FUNAAB Herbal Soap

The Honey-based herbal soap is an herbal soap that is made with honey, which is a natural humectant that helps to moisturize the skin. Herbal soap is often used for its cleansing and moisturizing properties, and it can also be used to treat a variety of skin conditions, such as eczema, psoriasis, and acne.

2.3.3 UNAAB Twin Beehive

UNAAB Twin Beehive (UTB) is a wooden box consisting of two equal apartments with no landing pads. The box creates a natural and conducive environment for the bees. The bee colony lives in one of the compartment while honey is deposited in the other compartment and the entrance holes are sealed up with propolis to protect the bees and honey produced when the compartment is full of honey combs. It is easier to construct, has a low cost of construction and the casualty during harvesting is lower than Langstoth. The average annual production of UTB is between 28 and 30 litres per box. It was constructed using indigenous knowledge.

Oluwalana S.A. and Oluwalana E.O.A. (2008): "UNAAB Twin Beehive" RP: NG/P/2008/446. Date of patent 10/8/08. Date of Sealing: 19/08/08 -Signed: 01/09/2008. Patentee: Prof. Samuel Adeniran Oluwalana and Elizabeth Olufunmilayo A. Oluwalana. Mode of Sponsorship -Self/President of Federal Republic of Nigeria-Umar Musa Yar'adua. Patents and Designs Act (CAP 344 LFN 1990)-Year of commencement -2008. Expiration date –2028 (20years)

Plate 14: Smart UNAAB Modern Twin Beehive

2.4 Application of Indigenous Knowledge in Value Addition to Medicinal Plant and Spices

Indigenous knowledge with its rich diversity provides a large template for studies into ancient records of different human culture groups. Because of the strategic economic importance of indigenous knowledge, some collections of indigenous uses of plant and spices are presented in this lecture.

2.3.1 Spices: Cayenne pepper... (Ata wewe in Yoruba)

Cayene pepper is a variety of pepper. A survey of indigenous use of this spice shows that it can prevent cancer tumours and blood clots, reduce migraines, anxiety, toothache pain, allergy, inflammation and hunger. It can also remove toxins, lower blood pressure, boost metabolism, heal ulcers; improve digestion and psoriasis; support eye health; contain anti-fungal and antibacterial properties; repair damaged skin; promote longevity' stimulates orgasms; boost the immune system and increase the taste of healthy foods. It is good in treating prostate cancer. Through value addition, it has been prepared into handy use (powder) as depicted in Plate 15

Plate 15: Picture of *Cayenne pepper powder*

2.3.1 Ginger

Ginger reduces inflammation, reduces menstrual pains, lowers blood pressure, stimulates digestion, regulates blood sugar, reduces nausea, positively affects cholesterol levels and have antibacterial properties. Ginger, through value addition, can be processed into powder for smart use at every meal.

Plate 16: Picture of *Ginger Powder*

2.3.1 Garlic

Garlic belongs to the Allium genus, which also contains chives, onions, shallots, and leeks. Garlic and a few other species of this genus are similar in certain ways. It has the following benefits: cardiovascular health, antibiotics, and anticancer. Garlic can be processed into powder as shown in the product (Plate 17).

Plate 17 : Picture of Garlic Powder and bulb

2.3.1 Tumeric

Turmeric is the spice that gives curry its yellowish colour and it has some therapeutic qualities. Curcuminoids are the name given to these substances. The primary active component of turmeric, curcumin, is the most significant. Turmeric has anti-inflammatory, analgesic, hepatoprotective, cancer-prevention, and digestive effects.

Plate 18: Picture of Tumeric Powder

2.3.1 Cinnamon

Cinnamon helps in weight management, prevents Type 2 diabetes, treats virus infection and infertility, remedies toothache, reduces risk of cancer and serves as powerhouse of antioxidants.

Plate 19: Picture of *Cinnamon (Powder and the bark)*

2.3.1 Coconut Oil

Coconut oil improves memory and brain function, treat urinary, supports oral health, improves thyroid function and cholesterol levels, cures piles, reduces seizures, fights virus causing HIV boosts digestion, immune system boot, weight loss and controls diabetes (Plate 20).

Plate 20: Picture of Coconut Oil

2.3.1 Herbal Mouthwash Powder From Chewing Sticks

Herbal mouthwash is made from eight (8) different local herbs (chewing sticks) that contain natural ingredients, which give fresh breath for hours. The active mouthwash reaches all over the mouth to help remove germs and plaque and helps to heal mouth sores. It is strictly natural. The ingredients are written in the Product's label (Plate 21)

Plate 21 Picture of *Mouthwash Powder consisting of different chewing sticks*

*2.3.1 Abere (*in Yoruba*) Powder* (*Hunteria umbellate s*eed)
Abere seed is an African fruit called 'Osu'. It has many antibacterial properties as well as other health benefits which include strengthening of liver activities, lowering the risk of high blood pressure and cholesterol levels, increasing stamina and libido, boosting immune system and getting rid of intestinal worms (Plate 22).

Plate 22: *Picture* of *Abere Powder*

2.3.1 Shea Butter Balm and Cream
Sheabutter is an important vegetable fat. It is the fat of Vitallerie paradoxa Gaertn.f. the high allantoic content in the butter makes it a useful base for local pharmaceutical preparations. Its benefits includes relieve from cold and catarrh, arthritis, rheumatism and general body pains.

Plate 23: Picture of UNAAB Sheabutter (Balm and Body Cream)

2.3.1 Herbal Hair Cream

This is prepared with coconut oil, sheabutter and herbs with pure honey, olive oil, aleo vera and menthol. Its benefits include dark and healthy dandruff-free hair.

Plate 24: Picture of FUNAAB Herbal Hair Cream

2.3.1 Moringa Oil

Moringa oil moisturises and soften the skin, prevent winkles line, helps in preventing hair loss and dandruffs, helps in treatment of skin conditions and has anti-aging properties.

Plate 25: Picture of Moringa Oil from Moringa Leaves

2.3.1 Moringa

Moringa has been used to treat over 300 diseases and maladies including diabetes, high/low blood pressure, low energy, weight loss, lupus, intestinal/colon cleansing, inflamation, skin conditions, lie diseases, ulcer, cancer, impotency and menstrual disordeers.

Plate 26: Picture of Moringa Powder

2.3.1 Pure Honey

Plate 27: Picture of Multifloral Pure Honey

Plate 28: Picture of an APIARIST, Professor Elizabeth Oluwalana

2.3.1 Honey Medica Herbal Soap Bath Gel

Honey Medica Herbal Soap Bath Gel is a honey based product of Value-Added Herbal Processing Projects. It is purely produced for natural ingredients to protect and preserve the skin from diseases and germs. The soap keeps you fresh all day long.

Plate 29: Picture of Herbal Bath Gel

2.3 Book Published on Value Added Herbal Product Based on Indigenous Knowledge as an Author and Co-author

2.5.1 Training Manuals

2.5.1.1 Training Manual on Tomato Production

Oluwalana, E.O.A, Omotayo, A., Sokoya, E.G., & Jaiyeola, M. A. AMREC Training manual for the workshop on Tomato production, processing, preservation, and storage

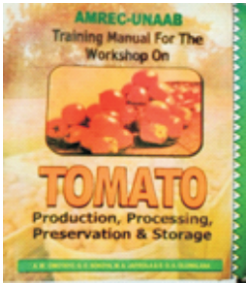

Plate 30: Picture of Training on Tomato Processing

2.5.1.2 Training Manual on Bee keeping Practice and Medicinal Application of Honey
Oluwalana, E.O.A., Omotayo, A.M, Jaiyeola, M.A., & Irekhore, O.I. Bee keeping practice and medicinal application of honey.

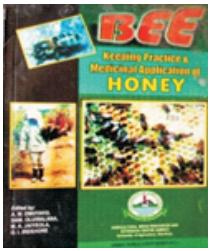

Plate 31: Picture of Training on Bee Keeping and Medicinal Value

2.5.2 Books

2.5.2.1 A Faithful Helpmeet for the Businessman
Every man created needs a HELPMEET to succeed in life. No man can go far without a helper because the creation of Eve in the Garden of Eden was initiated by the assignment God gave to Adam. Single or married, every woman has a divine mandate to fulfil in a man's life. That is why a woman cannot be excused from the success or failure of the man in her life. This concise but highly insightful book focuses on how a woman can fit perfectly into the life, ministry, business or career of her husband as a suitable helpmeet designed by God for him. This book further highlights HOMHEAL Diet Plan which include liquid diet, light diet, bland diet, transition diet and complete diet for a family and the 10 bad

and dead foods to avoid to stay in good health. In conclusion, eat your breakfast like a king, lunch like a prince and dinner like a beggar. Hippocrates, father of medicine said 'let your food be your medicine and medicine be your food'. That is, instead of sugar take honey, instead of Red meat take fish and chicken without skin, instead of cow milk take Soybean and so on.

Plate 32: Picture of Book on HOMHEAL Diet Plan

2.5.2.2 Remedies for Common Ailments; A Herbal and Non-Herbal Approach.

This book is the product of research works and training by Professor Sam and Funmi Oluwalana. It reflects the authors' wealth of experience in Natural Therapeutics and Entrepreneurship Development. The book teaches the remedies for common ailments, common sources of diseases and health programme for healthy and sick people.

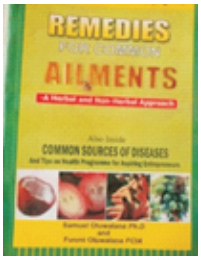

Plate 33: Picture of Book on Remedies for Common Ailments

2.5.2.2 Medicinal Uses of Onions

Nature has given many beneficial and useful plants to mankind. One such wonderful plant is onion. Even though it is one of the most popular vegetables in the world, only very few people know it is medicine. Here, the authors show the medicinal uses of onions in

90 different health situations, and a total of 142 different methods of application. Readers will see that the innocent-looking onion is a powerhouse of chemicals

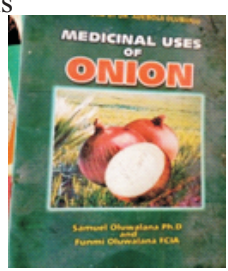

Plate 34: Picture of Book on Onion

2.5.3 Posters Developed based on Indigenous Knowledge about the medicinal Uses and benefits of value added herbal products

Plate 35: Picture of Posters on Indigenous Knowledge about Medicinal Uses of Some Medicina Plants

3.0 MY EXTENSION AND COMMUNITY SERVICE CONTRIBUTIONS

I really want to emphasize my contributions in extension work linking town and gown together which is the core work of AMREC. In 2018, based on my creativity and innovation on applying indigenous knowledge, I was selected as part of Indigenous Knowledge Systems (IKS) Committee by the then Vice Chancellor Prof Felix Salako. Also, I use to apply indigenous knowledge gained from farm families in some of FUNAAB mandate areas in

South West, Nigeria to generate more wealth which includes healthy living and income. Furthermore, I add value to agricultural and forest resources in their environment to produce value added product. I started work at Old National Bank of Nigeria Ltd as an Agricultural Credit Officer and I rose to the rank of Area/Regional manager. The Vice-Chancellor Sir, distinguished ladies, and gentlemen, I want to humbly discuss some of my contributions to Agricultural and Forest Resources Economics as essential for agricultural development and national development, based on the studies I earlier enumerated in my journal and extension publications. My discipline as a professor of Agricultural and Resource Economics has taken me from investigating the behavioural pattern of farming households to investigating resource use by the processors through value-addition processing and consumption.

As an Agricultural Economist, I have been exposed to finding solutions to issues of wastes generated during agricultural processing and of cassava, cocoa, palm oil and plantain and sickness associated with it. This aroused my interest in the Non-Timber Forest Products (NTFPs) which are annual produce like Agricultural produce, not perennial Timber produce. I started adding value to the forest produce to make them customer-friendly, especially for exhibitions and marketing. Fortunately, I came into UNAAB at the time the National University's Commission (NUC) was interested in promoting exhibitions of research outputs by university lecturers and non-teaching staff. The first and second exhibition projects took the University Team to Abuja in 2004 and 2005 where the University took the first position consecutively in the two years. Prof. Israel Adu, the Vice Chancellor at that time provided a massive encouragement for all interested University staff who wanted to be part of the exhibitions. Prof. Olufunmilayo Adebambo with her award-winning indigenous chickens was part of the winning team. Prof. Samuel Oluwalana and I exhibited Organic multifloral honey, honey-based herbal soap, and organic

spices such as ginger, garlic, turmeric, and cinnamon. These experiences helped Prof. Samuel Oluwalana and I in patenting three products, "Shea butter Balm", "Herbal Soap (honey-based) and "Unaab Twin Beehive." (Modern beehive)

I have maintained the production of these value–added Herbal products for about 20 years for exhibitions and as first aid herbal products for the prevention and treatment of common ailments and sickness, income for farmers, processors and students for poverty reduction and sustainable livelihood according to the Sustainable Development Goal 1.

I was appointed as an Extension Fellow in AMREC where I had the opportunity to work with farm families, farmers, processors, FUNAAB student and staff members thereby empowering and developing their empowering their entrepreneurial skills by establishing micro, small scale industries. I was part of gender integration into programs in FUNAAB policy development and institutional HIV/AIDS Policy development. There was collaboration with Cassava Adding Value for Africa (C'AVA II) and AMREC on value addition to cassava processing to gaari, odourless fufu, cassava flour for baking bread and snacks/confectionaries, starch and maggot from wastes to add to feeds for fishes.

I was part of the Researchers in AMREC that collaborated Researchers in the Institute of Food Security, Environmental Resources and Agricultural Research (IFSERAR), FUNAAB to carry out the West Africa Agricultural Productivity Programme (WAAPP) Project which took place between 2013 and 2015 (Oyedepo et al., 2019). I coordinated a Training of Trainers (ToT) for Industrial Training Fund (ITF) in 36 states of Nigeria in 2013 and 2014. Also I participated in the FUNAAB-RAAF-PASANAO R National Stakeholders Workshop on the Theme 'Building Resilience to Climate Change among Smallholders in Nigeria' (Shittu *et al., 2017)*.

3.1 Agricultural Media Resources and Extension Centre (AMREC)

I thank God because I was appointed to AMREC as an Extension fellow and anchored to the Department of Agricultural Economics and Farm Management in the College of Agricultural Management and Rural Development (COLAMRUD). I was the Programme Leader, of Gender Issues and Youth Development for five years where I was able to conduct, workshops, seminars, and conferences for FUNAAB students and members of staff. I published educational and extension training manuals and posters for information dissemination, such as the processing of tomatoes, training manuals, and different posters of indigenous knowledge, and disseminated proven findings on technologies by the Institute of Food Security, Environmental Resources and Agricultural Research (IFSERAR); formerly known as Research and Development Centre, (RESDEC), and the Colleges of farmers. Translating agricultural findings/technologies into transferable forms; using printed audio and visual media materials, collaborating with research institutes to train the Agricultural Development Programmes (ADPs) staff in production and management skills; and training and demonstrating proven and adaptable production and processing of gender-natural and gender-specific technologies for farmers' cooperatives.

During my appointment to the services of AMREC, I was privileged to have fourteen (14) letters of commendation/appreciation from different AMREC Directors and Vice-Chancellors from 2001-2018. The most recent ones were received in 2018 and 2019 for representing the University well at EXPO 2018 of the Nigerian Raw Materials (NIRAW) CAVA II – Exhibition held at Landmark Event Centre, Victoria Island, Lagos from 13th to 15th March 2018, and in 2019.

I organized a one-day integrated capacity building training workshop for leaders of women co-operatives of UNAAB's Extension Villages held on the 6th of August, 2002. Prof. Awoyemi

of the Department of Agricultural economics, University of Ibadan was the main Resource person along with prof. Grace Sokoya as the Programme leader. Side attractions include video film show on co-operative activities, physical health examination and display of food crops from women farmers. I had the opportunity to serve as Acting Director during the tenures of Professors Isa Adeoti of blessed memory and Jacob Olaoye (current Director).

3.1.1 Establishment of the Skill Development Room

I was able to establishment skill Development Room for training of FUNAAB students with the assistance of the Director, Prof. Caroline Afolami with the approval of the Vice Chancellor Prof. Olusola Oyewole. Many students were able to start their businesses after graduation with evidence of generating funds and multiple streams based on my career in the banking industry for about 20years.

3.2 My Contributions in the Centre for Entrepreneurship Studies (CENTS)

I was the Pioneer Deputy Director of Centre for Entrepreneurship Studies (CENTS). I was privileged to be the first pioneer Skill Leader (Value-addition Herbal Products Processing) in the year 2011 when the Centre was launched and Prof. Kayode Bamgbose was the Director. In 2018, I was appointed by Prof. Felix Salako as the pioneer Deputy Director when Prof. Babatunde Adewunmi was the Director (CENTS).

3.2.1 International Collaboration

During my tenure as the Deputy Director, I was privileged to handle two major collaborations with two international agencies namely, GIZ Germany Cooperation and Wadhwani foundation, USA.

3.2.1.1 GIZ Germany Cooperation

GIZ is a German leading provider of international cooperation service. As a federal enterprise, the cooperation supports the

German Government in achieving its objectives in the field of international cooperation for sustainable development. CENTS-FUNAAB was able to benefit from the support which was on "Start-Up Loop". Five academic staff were selected from Colleges in FUNAAB to be trained by GIZ in Abuja as coaches to train the participants. About fifty Entrepreneurs within Abeokuta and its environs were trained by the coaches of which Dr. Dele Adedeji (COLAMRUD), who is now the current Deputy Director of CENTS was one. Furthermore, CENTS-GIZ management team were selected as Director, Professor Adewunmi, Deputy Director, Professor Elizabeth Oluwalana who also doubled as CENTS-GIZ Monitoring and Evaluation Officer. The third person in the team was Professor Bunmi Ashimolowo. The Management team were also trained by GIZ in Abuja. During my tenure, I was privileged to act as the Director when the Director was not around.

Plate 36: GIZ Executive with Professor E.O.A. Oluwalana and a participant, Bukky Jayeola

Plate 37: GIZ Training Participants Group Photograph

3.2.1.2 The Wadhwani foundation, USA

The Wadhwani Foundation, USA is a not-for-profit with the primary mission of accelerating economic development by driving job creation through large- scale initiatives in entrepreneurship, small business growth, innovation and skills development. CENTS-FUNAAB was able to benefit from the Programme of Wadhwani Foundation through the intervention of the then Vice-Chancellor, Professor Felix Salako. Five individuals were selected from Colleges and outside the University for training as educator at Covenant University, Ota by Wadhwani Foundation team. CENTS designed and developed registration portal through ICTREC for interested 200 and 300 levels. Many students registered and benefitted from the training by the educators. I was the lead educator and the Monitoring and Evaluation Officer. The students were divided five and identified by the surname of educator. The Oluwalana Group was able to carry out the assignment of the development of prototype of any technology proposed by each group. The Group proposed biogas equipment and later developed the prototype. The Group was able to compete with other students from other Institutions internationally through the internet. The biogas prototype was judged as one of the best prototypes developed. Each of them was given certificate of participation. But unfortunately the CENTS-Wadhwani project could not be completed because of the incidence of COVID-19 all over the world.

Plate 38: Biogas Prototype

Plate 39: Group Photograph of Wadhwani Foundation Student Beneficiaries with Mr. Abayomi and Professor Elizabeth Oluwalana

3.2.2 Gender Issues and Youth Development (GIYD), AMREC

As the Programme leader GIYD, I organized a Workshop on enterprise start-up and value-addition for FUNAAB Youth Entrepreneurs. The workshop sensitized and motivated the students at 200 levels and 300 levels on the value addition processing, branding, and labelling of some of the research output of FUNAAB Enterprises and AMREC. As of November 14, 2018, over 120 students benefitted from the training, by different CENTS Skill leaders. The list of some of the patented and award products are value-added herbal soap, sheabutter body cream, oven dry fish, bread, odourless fufu, high quality cassava flour, garri (HOCF), health drinks (Smoothies, Zobo, Fruit and drinks, kunu etc.), adire and kampala designer wears, and soya beans product and Spices.

3.2.3 Gender Issues and Youth Development (GIYD) Programme

The Gender Issues and Youth Development (GIYD) Programme of AMREC-FUNAAB has the responsibility of improving the participatory capabilities of women in the University mandate area to develop themselves, their families, their communities, and the nation at large. The Gender Issues and Youth Development (GIYD) Programme of AMREC-FUNAAB focuses on the Women-specific Issues on Nutrition and Health Education, Vocation and

Agribusiness Management, Cooperative/Group Dynamics, and Self-help Revolving Loan Schemes, Gender Issues (gender-sensitive and gender-specific Projects for females and males), Youth Developments Issues (Agriculture-In-Schools Programme, Girl-Child and Boy-Child Development Programmes, Children-in-Entrepreneurship etc.

Since 1995, the GIYD Programme had improved her activities over the conventional Women-In-Development (WID) Programme by adopting the integrated farm-family approach and utilized gender-sensitive and gender-specific strategies in working with farm-families. This idea was premised on the recognition of the fact that Gender issues are not exclusively women issues, but developmental and important farm-family issues in agricultural extension, agribusiness management, vocational training and economic empowerment projects. Hence, in 2014, the former Vice-Chancellor (Professor B. O. Oyewole) and former Director, AMREC (Professor (Mrs) C. A. Afolami) encouraged Dr. Imo and Dr. E. O. A Oluwalana, the Programme Leader to extend and collaborate with the Centre for Entrepreneurial Skills acquisition among FUNAAB students/youths. Therefore, GIYD Programme introduced the youth development component directly to FUNAAB Students to fill the critical employable skills to gap in Nigeria youths that inhibits their development and entire growth of the nation.

As a Programme Leader, I employed some of the strategies in achieving the mandate of GIYD Programme in the FUNAAB mandated Areas. The strategies include alleviation of poverty and enhancing income-generating capacities of farm-family members through entrepreneurship skill development, developing strategies for the promotion and capacity building for teenagers, girl-child, boy-child and children-in-entrepreneurship. They also enhance Agricultural productivity of women farmers through transfer of proven agricultural technologies and assistance in inputs

sourcing/procurements, promoting and maintaining farm-family health through the Farm-Family Health Projects (FFAHEP). Post-harvest technologies (food processing, preservation, utilization, and storage) as well as the required knowledge and advice in the marketing of the products to farm-families and FUNAAB Youth Entrepreneurs were enhanced. Economic/income generating capacities of beneficiaries and the development and acquisition of different entrepreneurial skills (Vocational and Agribusiness were developed through promoting Linkages between farm-families, youths and collaborative Agencies such as Industrial Training Funds (ITF). Youth were empowered economically through FUNAAB Youth Entrepreneurs 'Start-Up' (FUNAAB-YES) Enterprise Development Initiative Seminar and Workshop for FUNAAB Students, adults Learners; (males & females); with the literacy and numeracy ability through Adult Education classes; and running advisory, technical support and linkages services to woman, youths, and farm-families.

3.3 My Contributions to Trade and Exhibition at Nigeria at 50

I was part of the exhibitors at the Made-in-Nigeria Goods, and services Trade Fair, Abuja. The theme of the fair is: 'Celebrating Creative Excellence and Innovation' where I was selected to represent Nigeria at Trade Exhibition and Investment Conference organized by the Nigerian-British Chamber of Commerce in collaboration with the Nigerian Export promotion Council, London, Birmingham and Coventry, 22nd-27th November 2010. My sector was under Educational Institution (Herbal: Forest Based Products). The specific business interests on the trade mission include Collaboration with other Educational Institution/Industries, Value Added Herbal/Forest products project, Posters and Paper presentation, Entrepreneurship Development in Wastes to Wealth Management, Indigenous knowledge concept development. The university and I were given the awards of best innovative exhibitor.

Plate 40: Picture of Professor Elizabeth Oluwalana at a Seminar on Herbal Therapy

Plate 38: Picture of Exhibition of Herbal Products

Plate 41: Picture of Professor Elizabeth Oluwalana at the Exhibition of Herbal Products

Plate 42: Picture of Professor Elizabeth Oluwalana with Award won during National University Commission Exhibition in Abuja

3.4 My Collaboration with other Units and Centres in FUNAAB

3.4.1 Industrial Pack Unit (IPU) now FUNAAB Integrated Ventures

I collaborated with Gari and Cashew processing by training of students and public about the processing method and marketing. I led the team of industrial Pack Unit (IPU) to exhibit FUNAAB products at the different Exhibitions of OGUN STATE ABEOKUTA. Mr. Elijah and Sesan used to represent the university while I exhibited my value – added products. Many awards and recognitions were given to FUNAAB and Prof & Prof. (Mrs) Sam Oluwalana.

3.4.2 Project on Development of Vibratory Honey Extractor in the Department of Agricultural and Bio-Resources Engineering

I was the member of Team with Dr. I. A. Ola of the Department of Agricultural and Bio-Resources Engineering on the Research Publication titled "Development of Vibratory Honey Extractor" which was adjudged the 13th Best in the Staff Publication Competition in the 2019 CODET Competition in Abuja, Nigeria (Ola *et al., 2016)*.

3.4.3 Organic Agriculture Project in Tertiary Institution in Nigeria (OAPTIN), FUNAAB

I was part of the team, along with Professor Ore Ayelaagbe, who received Professor Phils of Coventry University, UK to FUNAAB to assist in establishing organic agriculture in FUNAAB. I worked with Professors Ore Ayelaagbe, Victor Olowe, Jonathan Atunwgu and others at different times to establish organic agriculture project in tertiary institution at FUNAAB. Some of the activities are the development of curriculum for organic agriculture studies, international summer school on organic agriculture at FUNAAB (2010 -2014), organic agriculture training at Lagos State University, training on biopesticides formulation, organization of COBS family for the sales of organic products to FUNAAB

University of Ibadan in the name of Association of Organic Agriculture Practitioners in Nigeria (NOAN). Many training were organized by NOAN for the practitioners of organic agriculture in Nigeria. The Association is waxing strong every day in Nigeria like OAPTIN. I attended African Organic and Ecological Organic Agriculture Conference held at Sheraton Hotels, Lagos in 2015

3.4.4 Hults Prize on Campus

As the Deputy Director, I participated as a Judge at the Hults Prize on Campus at Federal University of Agriculture Abeokuta on 17th of December 2018 endorsed by Bill Clinton 42nd President of the United States (Clinton Global Initiative) among others.

3.5 My Collaboration and Linkages with other Agencies outside FUNAAB for FUNAAB Graduates Employability

3.5.1 Rohi-Care Nigeria Limited

I was able to collaborate with Rohi-Care Foundation, a Non-Governmental Organization (NGO) to manage FADAMA II project under the auspices of Second National FADAMA Development Project (NFDPII) in the Office of Ogun State FADAMA Development (OGSFDO). I was able to organize the beneficiaries into five FADAMA Community Associations (FCAs). Under each association were ten participants to form FADAMA Users Groups (FUGs) to make a total of 50 beneficiaries. One of the major projects done was training on beekeeping practices, honey production and marketing of honey and other beehives for Adunloyin beekeepers FUG, Itesiwaju FCA, Kango/Kofesu, Odeda L.G.A.

3.5.2 Industrial Training Fund (ITF)

I collaborated with ITF to train participants drawn from 36 states of Nigeria on skill acquisition programme under the ITF National Industrial Skills Development Programme (NISDP).

3.6 My International Collaboration and Exhibition of Value-Added Products

I collaborated with international agencies, attended conferences and exhibited on value-added products. I coordinated exhibition of Value-added Herbal Products and UNAAB Foods at public affairs section of the United States of America Consulate General, Lagos, in conjunction with "The Future Project. Held at Terra Kulture, Victoria Island, Lagos. I also participated in the exhibition of value-added products with Enterprise Promotion Academy (EPA) in collaboration with International Centre for Entrepreneurship & Career development (ICECD), Ahmedabad, India held at Muson Centre, Onikan, Lagos. The various exhibitions opened business linkage opportunities within the country and internationally. One of such was the visit of Mrs. Hina Shah, Director, ICECD, India and EPA team to introduce available training that can benefit FUNAAB staff and students. I attended conference, read paper on entreprenuership development and exhibited value added products at San-Frasisco sponsored by Tertiary Education Trust Fund (TETFUND). Furthermore, I attended conference, read paper and exhibited value added products on renewal energy organised by Universal Green Energy and Power held at Atlanta Conference Centre, Atlanta and at Grand Rochester Hotel, West Minsterin, london in 2016 and 2018 respectively. I exhibited value-added products at Trade Exhibition and Investment Conference organized by the Nigerian-British Chamber of Commerce in collaboration with the Nigerian Export promotion Council, London, Birmingham and Coventry. I was part of the team on Cassava Adding Value (C'AVA) project on the Cassava production of odourless fufu (cassava flour) and cassava based bread, and snacks. I exhibited value added products in all C'AVA projects I attended.

4.0 CONCLUSION

In conclusion, it can be said that value addition to indigenous knowledge and product is essential to generate income and maintain healthy living lifestyle among communities in FUNAAB

farmers/processors in the FUNAAB Mandate Area (Southwestern Nigeria). Several of my studies' conclusions can help non-oil sector policymakers to generate more revenue through value-added product instead of importing foreign based herbal products. In the light of the economic downturn and hardships Nigerians are facing due to the recent sharp rise in fuel prices, I have the following recommendations to enhance the value addition of agricultural and forest products through the use of herbal therapy and the development of non-oil entrepreneurial skills.

5.0 RECOMMENDATIONS

Mr. Vice-Chancellor sir, the recommendations are as follows:

1. In the light of the non-oil sector's significance as the "oxygen" of the economy and the recent spike in fuel prices, it is strongly recommended that the government subsidize the price of contemporary technology used to add value to these goods, also known as value-added herbal products. This will probably lower the cost of secondary production for the processors and raise export earnings, which will raise the nation's gross domestic product (GDP).
2. Processors should be encouraged by extension agents to form themselves into clusters, cooperative groups, to assist themselves for funding, empowerment and welfare packages.
3. In an effort to increase revenue and extend the shelf life of farm produce, processors should utilize enhanced technologies in adding value to the bumper harvest during the rainy season (glut).
4. Encouragement should be given to women in particular to engage in Agri-preneurship business to generate additional income for improved livelihood.
5. After processing, plant residues/wastes should be used, by farmers and processors, as compost manure or in the generation of biogas to develop organic value-chain production.

6. All parties involved, including academics, corporate bodies, non-governmental organizations (NGOs), and private citizens, must support appropriate technology to increase the use of traditional/indigenous knowledge, particularly in the manufacturing of herbal soap and medicinal plants.
7. To address the issue of high labour costs faced by entrepreneurs in value-added processing, government and non-governmental organizations (NGOs) should offer incentives to entrepreneurs in the form of subsidized equipment for processing and packaging, such as a cocoa husk drier, PKO pressing machine, soap cutting machine, and storage facility.

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Professor in AMREC to deliver Inaugural lecture, to God be the glory.

By God's grace, I have had opportunity to work with all the Vice-Chancellors of the institution with 16 commendation letters during the period. The first VC, Prof Number Adedipe was the Dean of Faculty of Agriculture and Forestry at University of Ibadan (U.I.) when I gained admission to study Agricultural Economics and Extension in 1978 and Mrs Omoba Bisi Soboyejo (nee Gbadebo) was the Faculty Officer of Agriculture and Forestry, U.I, both played a vital role in my life. Thank you, sir and ma.

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Finally,I am a product of grace to be alive to witness today to the glory of God. Kindly join me to sing

All Glory must be to the Lord.
For He is worthy of our praise,
No man on Earth should give glory to himself.
All the glory must be to the Lord.
Praise the Lord! Halleluyah!! Amen!!!.

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