



**Synergizing fertilizer micro-dosing and indigenous vegetable production to enhance food and economic security of West African farmers**

Project Number 107983

**Economic empowerment and marketing of indigenous vegetables**

*(Nigeria and Benin republic report)*

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## Key messages

- IV marketing in both Nigeria and Benin Republic is predominantly female dominated over 90% female participation in both countries. Whereas marketers in Nigeria are relatively older and have up to 12 years formal education their Benin counterparts are younger with fewer years of formal education.
- IV marketers in both countries do prefer to market a variety of vegetables species involving both indigenous and conventional vegetables.
- The marketers are more aware of IV drying technologies and re-bunching while they show little interest in time wasting technologies. In other words, because IVs are highly perishable, they are more interested in value adding preservative technologies.
- In marketing the IV, the main value addition techniques utilised in Nigeria is blanching (50.8%), re-bunching (47.06%) as well as packaging and sorting (30.88%), whereas in Benin Republic there is in addition to these techniques the extraction of juice/syrup by 16.3%.
- The revenue obtainable from the marketing of IV in Nigeria increased by about 119.67% over the project period and that of Benin Republic also increased by 90.12%. This shows clearly economic advantage by the participants who are mainly female and confirms the empowerment motive of the intervention.
- The economic returns obtainable from IV marketing in both countries shows a highly profitable venture. In Nigeria, the cost-benefit analysis ranged from 1.42% to 2.35%. With a market interest rate of about 20% in Nigeria, the enterprises are profitable. In Benin Republic the cost-benefit analysis ranged from 1.22-1.32% which is also a very profitable range.
- The marketers adopted new business models to boost their marketing and value addition activities in both countries. In Benin Republic the marketers were linked with micro-small enterprises to boost the sales of the improved IV products, however, in Nigeria, the IV marketers teamed up to take advantage of the existing business models to expand the volume of their sales. The export model received a boost from the MICROVEG intervention in Nigeria.

## Impact of MICROVEG Intervention on Vegetable Marketing and Value addition in Nigeria

### 1.1 Background to the study

Micro-Veg project is a collaborative research and development project funded by the International Development Research Center (IDRC). The MICROVEG project synergises innovations from two concluded projects, Nigeria-Canada Indigenous Vegetables Project (NiCanVeg Project 106511) and the Integrated Nutrient and Water Management in the Sahel (INuWaM Project 106516). It is implemented by five universities, two from Nigeria (Osun State University and Obafemi Awolowo University), one from Benin (University of Parakou) and two from Canada (University of Saskatoon and University of Manitoba) for the period of March 20, 2015 to March 20, 2018. Its goal was to increase food and nutritional food security and economic empowerment of 225,000 resource poor farming households with emphasis on women in the West African Sub-region through integrations of fertiliser micro-dosing and under-utilised vegetables innovations. It came to advance indigenous vegetables production, enhance vegetable yield, promote consumption and value addition, propel marketing, preserve soil and water ecosystems and enable fertiliser cost-savings. It intended to scale up the capsule technology to advance income through value addition and empower economically at least 50 vegetable value chain cooperative groups to develop profitable vegetable businesses in small and medium towns and large urban centres. MICROVEG project came to bridge the gap between vegetable production and consumers' preference. Four traditional vegetables are targeted: *Solanum macrocarpum* (Igbagba), *Amaranthus viridis* (Tete atetedaye), *Ocimum gratissimum* (Efinrin), *Amaranthus cruentus* and *Telfaria occidentalis* (Ugu).

Vegetable marketing in Nigeria is characterised by abundance of vegetables during the rainy season leading to low prices and scarcity during the dry season; exploitation of traders due to lack of market information; lack of inadequate market and poor transport infrastructure (Omulo, 2016) which has great implications on the livelihood and welfare of the vegetable marketers. These vegetables are mainly produced by smallholder farmers, and its marketing is influenced by some factors which are attributed to production, product and market characteristics. Many of the marketers usually cover large distances to buy the vegetables. This coupled with poor infrastructure affects the vegetables thereby increasing deterioration. As a result of this, profits of the marketers is affected. Apart from this, the product itself is highly perishable which usually starts to lose its quality immediately after harvest and this continues except a form value addition is in place to salvage the vegetables. When the quality of vegetable deteriorates, its price is ultimately affected. As result of the perishable nature of the product, there is a difficulty in scheduling supply of vegetables to meet demand. During the rainy season, abundance of vegetables is harvested and very little quantity consumed because of postharvest losses while during dry season, supply of vegetables at the market cannot meet up with the demand even at high price. This urgently necessitates the need for value addition.

Value addition refers to economically adding value to a product following a particular process in order to form characteristics that are more preferred in the marketplace. This can be either by packaging, re-bunching, chopping, sorting and hawking. It can also be processed for use as vegetable bread and vegetable chin-chin. Being able to process and increase the shelf life of vegetables is so crucial in that it will increase revenue to the marketers, allow marketers to satisfy the need of the consumers better. Value addition also increases the bargaining power of the marketers, helps the marketers to assess high value market and increase income. When value is added, vegetables become affordable for all categories of households thereby

improving food and nutrition security of the populace. In essence, MICROVEG project came to assist the marketers and the nation in being able to meet up with one of the Sustainable Development Goals.

### **Statement of research problem**

Marketing constraints or challenges arise due to many factors such as distance from the markets, poor quality of products, lack of storage facilities, low educational levels of small-scale farmers, poor agricultural extension services, and some socio-economic factors (Matungul *et al.*, 2002; Senyolo *et al.*, 2009; Antwi & Seahlodi, 2011 and Xaba & Masuku, 2012). These marketing constraints not simply constitute the greatest barrier for small-scale farmers when it comes to access high-value markets to attract better income but also restrain farmers from participating in the market (Uchezuba *et al.*, 2009 and Baloyi, 2010). These constraints eventually result in poor functioning domestic markets with little spatial and temporal integration, low price transmission and weak international competitiveness (Senyolo *et al.*, 2009).

Overcoming these challenges opens the door to value addition through processing which is intended to preserve nutrients, improve its shelf life and mitigate against climate change. Habwe *et al.* (2008) suggested that development of well-packaged vegetable products will enable the possibility of exporting indigenous leafy vegetables. Also that traditional vegetables can be processed by blanching and freeze-drying to extend the shelf life of the processed vegetables through product development as most of these vegetables are highly perishable in nature with a shelf life of less than 24 hours at room temperature (Habwe *et al.*, 2008 and Abukutsa-Onyango, 2010). Value addition through the application of appropriate production and postharvest techniques therefore ensures that high quality produce reaches the market and satisfies consumer expectations (Ebert, 2014). According to Barham and Chitemi (2009), value addition is a mechanism that can enhance market performance. Marketers can then benefit from value addition of these crops indirectly if they effectively receive a steady supply of quality produce since value addition creates a new source of employment which will eventually boost income.

Nigeria is a country with large output from indigenous vegetables especially at the Southwestern part of the country. Despite the huge harvest from vegetables, very little is usually marketed due to afore mentioned issues. Microveg project came on board in 2015 with the view of improving food and nutrition security among the vegetable farmers and the nation at large through transmission of improved value addition technologies. Several studies have been done on vegetable marketing but studies assessing the impact of MICROVEG intervention is scarce. This study comes to assess the impact of this intervention on vegetable marketing with respect to describing these marketers, their awareness of value addition techniques and the type of value addition technologies they have adopted, the evolution of marketing revenue and the business models implemented for vegetables.

## Review of relevant literature

### **Vegetable marketing**

Marketing involves all those legal, physical and economic services which are necessary to make products from the producer available to the consumers (Olukosi and Isitor, 2004). Marketing plays a central role in meeting the overall goals food security, poverty alleviation and sustainable agriculture, especially among smallholder farmers in developing countries (Xaba & Masuku, 2012, (Bothloko & Oladele, 2013). Deficiencies in rural infrastructure services result in poor functioning domestic markets with little spatial and temporal integration, low price transmission and weak international competitiveness (Senyolo et al., 2009). Marketing constraints or challenges arise due to many factors such as limited knowledge and use of market information, lack of access to high-value reliable markets, high transactional costs, distance from the markets, poor quality of products, lack of storage facilities, low educational levels of small-scale farmers, poor agricultural extension services, lack of financial support (Antwi & Seahlodi, 2011), poor communication (Senyolo et al., 2009), information regarding prices, inadequate local markets, lack of bargaining power, excess of intermediaries (Xaba & Masuku, 2012). These marketing constraints constitute the greatest barrier for small-scale farmers when it comes to access high value markets (Baloyi, 2010), and these factors restrain farmers from making decisions to participate in the market (Uchezuba et al., 2009). Access to markets is an essential requirement for the poor in rural areas. It may also be easy to access markets, but retaining one's position in the market is more difficult and participation of small-scale farmers in high-value markets is unsatisfactory (Baloyi, 2010), and the perishable nature of vegetables necessitate effective marketing channels (Xaba & Masuku, 2012). Therefore, overcoming marketing constraints is critical for small-scale farmers to access lucrative markets (Baloyi, 2010). Shifting the focus from production-oriented programmes to more market-oriented interventions will place a renewed attention on institutions of collective action, such as farmer groups, as an efficient mechanism for enhancing market performance (Barham & Chitemi, 2009)

### **Vegetable value Addition**

Enhancing quality and shelf life is one way that traditional vegetables can be marketed as shown by Abukutsa-Onyango (2010) Most of the African Leafy vegetables are highly perishable with a shelf life of less than 24 hours at room temperature. This problem could affect quality of the produce at the market and to overcome this problem, preservation and processing technologies need to be developed. A major challenge in the marketing and distribution of ALVs is their short shelf-lives, like other leafy vegetables, they are made up of more than 90 per cent water and even a slight decrease in moisture content of less than five per cent, renders them unsellable (SciDev.Net, 2015). Vegetables in general, but also many traditional vegetables such as amaranth (*Amaranthus* spp.), are of considerable commercial value and thus can make a significant contribution to household income (Ebert, 2014). A study by Biodiversity International (2013) in parts of rural Kenya indicates that farmers' incomes had increased, particularly where they had been successfully linked to markets;



## Methodology

### Study area

#### Nigeria

The study was carried out in the Southwest and North central Nigeria. The southwest part of Nigeria has six states, Ekiti, Lagos, Ondo, Ogun, Osun and Oyo. It is a major Yoruba speaking area although there are different dialects within each state. The weather conditions vary between the two distinct season in Nigeria, the rainy season march to Nov and the dry season, Nov-February. The dry season is the bringer of the harmattan dusts, cold dry winds of the Northern desert blow into the Southern regions around this time. The agro-ecological condition is conducive for the production of crops such as maize, cassava, yam, vegetables, etc. in North central Nigeria, Kwara state was used. Kwara state is a state located within the North central geopolitical zone, commonly referred to as middle belt. The primary ethnic group is Yoruba with significant Nupe, Bariba and Fulani minorities. The soil also favours production of crops such as vegetables, cereals, roots and tubers.

#### Benin

The report is a synthesis of the activities of the Micro-Veg project implemented in Benin and in the direction of improving the marketing of LFTs for the empowerment of actors in the sector. The report is therefore not an exhaustive summary of the project's actions to improve the actors' livelihood in the LFTs sector in Benin.

### Sampling technique

#### Nigeria

Purposive sampling and snowball techniques were used to interview some of the trained vegetable marketers within the MICROVEG project from four states which were Ekiti, Kwara, Lagos and Osun states. Three Innovation Platforms were purposively selected out of five within each state. Six respondents were interviewed from each innovative platform to make a total of 72 respondents in all.

#### Benin

These activities are implemented in the intervention zones of this project which cover the districts of Parakou, N'Dali, Tchaourou, Djougou, Ouaké, Natitingou, Boukoumbé, Bohicon, Djidja, Cotonou, Agbomey-Calavi, Grand Popo and Sèmè -Kpodji.

### Data collection and analysis

#### Nigeria

Primary data was collected using pre-tested structured questionnaire. Open Data Kit(ODK) technology was used to facilitate the quality of the data. Data was collected on the socio-economic characteristics of the respondents such as age, household size, gender, number of years spent at school among others. Similarly, information was gathered on the value addition processes that the vegetable marketers practice. The data was analysed using inferential and non-inferential statistics such as tables, bar chart and budgetary technique on STATA.

## Benin

Primary data was collected using the participatory observation approach in order to facilitate a better understanding of the functioning of the market models put in place by MICROVEG. The data was compared with that of the baseline study, particularly the economic profitability of marketing indigenous leafy vegetables. The objective is to make a comparative analysis in order to conclude on the contribution of the various actions implemented by the project.

## Results and discussions

### **Nigeria**

#### Results of the Socio-economic characteristics of the respondents

Findings from the result as presented in Table 1 below shows that about 41% of the respondents are above 50 years of age. This suggests that many of the vegetable marketers are gradually leaving the active age and might not be able to get involved in rigorous agricultural activity. Also, 97.1% of the farmers are female which reveals that vegetable marketing is a female dominated business. Since women are caregivers and they play vital role across households in ensuring food and nutrition, this shows that vegetable marketing is very important in sustaining household welfare. The main occupation of the marketers is trading (69.6%). This pinpoints that, the marketers are more involved in vegetable business compared to doing other things. In other words, women have better priority for the income they derive from vegetable business. In addition, about 47.5% of the vegetable marketers had number of years at school to be between 7-12 years. This shows that a good percentage of them had education up to junior secondary school level which means they can read and write and will be able to access useful information by themselves. About 81.4% of them are married which means that are women that could be saddled with one domestic responsibility or the other.

Table 1: Result of the Socio-Demographic Characteristics of Vegetable Marketers

<b>Variables</b>	<b>Categories</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Household size</b>	0	0	0
	1-5	35	51.5
	6-10	31	45.6
	11>	2	2.9
<b>Age</b>	15-19	1	1.5
	20-24	0	0.0
	25-29	3	4.4
	30-34	3	4.4
	35-39	12	17.4
	40-44	8	11.6
	45-49	14	20.3
	50 above	28	40.6
<b>Sex</b>	Male	2	2.9
	Female	67	97.1
<b>Occupation</b>	Farming	20	29.0
	Pensioners	1	1.5
	Trading	48	69.6
<b>Educational level</b>	No education	14	20.3
	1-6	12	17.4
	7-12	33	47.8
	13>	10	14.5
<b>Marital Status</b>	Never married	1	1.5
	Married	61	88.4
	living Alone	2	2.9
	widowed	5	7.3

Source: MICROVEG endline survey, 2018

## **Marketers' awareness about vegetable value addition techniques**

### Nigeria

Vegetable marketers in the study area were assessed based on their awareness about vegetable value addition techniques. The result (Table 2) shows that the marketers are aware about blanching, dewing, drying and squeezing techniques in preserving the vegetables. But, majority of the marketers are more familiar with drying of the vegetables. Next to this is aeration technique while 1.9% and 2.8% of the marketers practice blanching and squeezing techniques respectively. None of the marketers is aware of the refrigeration technique of preserving the vegetables.

### Benin

In addition to this factor, there is the enhancing in ILVs quantity sold. Micro-Veg project interventions allowed to diversify the marketing forms these ILVs. The current marketing forms are synthesized in the following Table 3 and figure 2 compared to baseline results.

## **Value addition technologies adopted.**

### Nigeria

The response of the marketers to the technologies introduced by MICROVEG is presented in Table 4 and Figure 3. Result from the table shows that majority of the vegetable marketers usually re-bunch the vegetables. Next to this is packaging and sorting. This suggests that re-bunching of vegetable is a preferred technique in increasing the shelf life of the vegetable followed by packaging and resorting. Chopping is not a technique that is common with the marketers probably because it is time consuming compared to other value addition techniques. This reveals that time saving technologies are more preferred by the vegetable marketers in the study area.

*Table 2: Marketers' awareness about vegetable value addition techniques in Nigeria*

<b>Processing techniques</b>	<b>Frequency</b>	<b>%</b>
Blanching	3	2.8
Dewing/aeration	20	18.9
Drying	26	24.5
Squeezing	2	1.9
Refrigeration	0	0.0

**Source: MICROVEG endline survey, 2018**

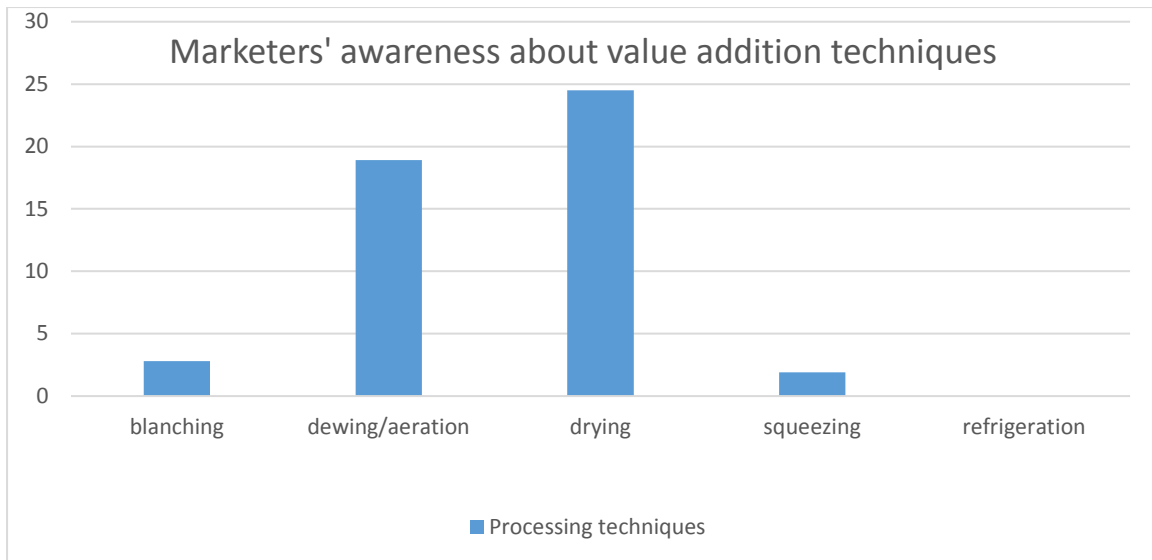


Figure 1: Marketers' awareness about value addition techniques in Nigeria

*Table 3: Value addition technologies from the baseline and endline in Benin*

<b>ILVs marketing forms (%)</b>	<b>2015</b>	<b>2018</b>		<b>All (2018)</b>
	<b>All</b>	<b>Direct Beneficiaries</b>	<b>Indirect Beneficiaries</b>	
Fresh	100.0	100.0	100.0	100.0
Dried	12.5	38.3	24.5	31.4
Blanched	17.8	53.3	48.2	50.8
Juice / syrup	0.0	21.2	11.3	16.3
Enriched food	0.0	13.1	5.5	9.3

Source: Microveg Impact data analysis, 2018

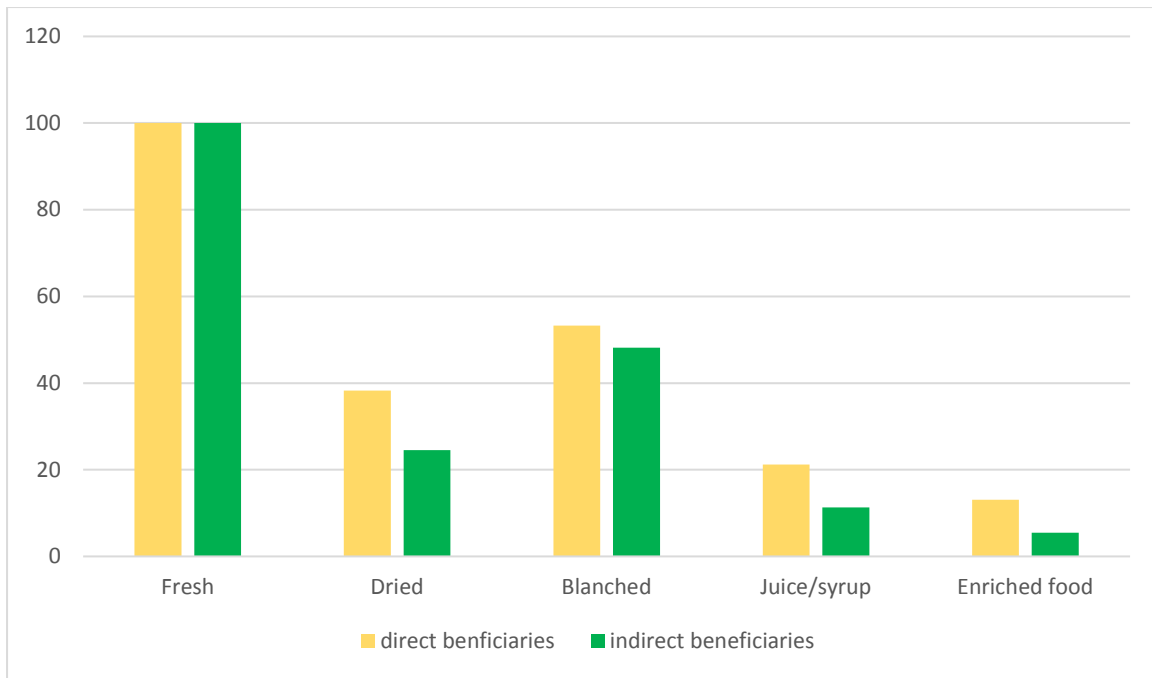


Figure 2: Value addition technologies practiced from the endline in Benin



Table 4: Type of value addition technologies adopted in Nigeria

Value addition activity	Frequency	Percentage
Packaging	21	30.88
Chopping	11	16.18
Re-bunching	32	47.06
Sorting	21	30.88
Hawking	15	22.06

Source: MICROVEG endline survey, 2018

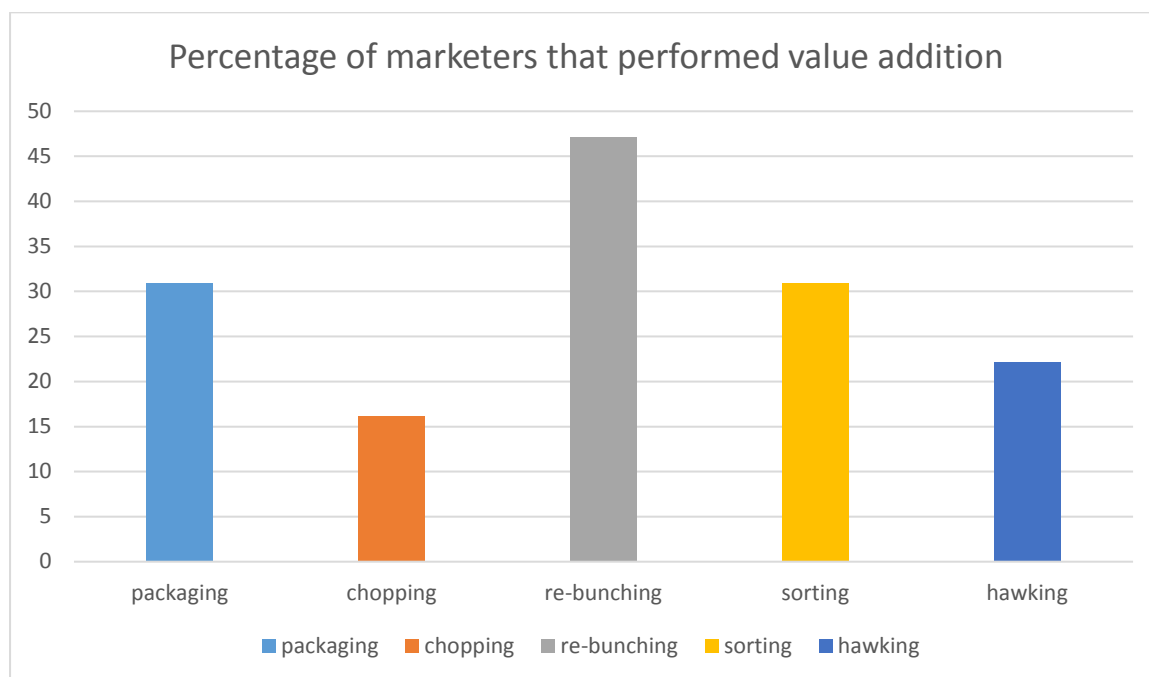


Figure 3: Type of value addition technologies adopted by vegetable marketers in Nigeria

#### 4.4 Willingness of the marketers to process the vegetables into other products

Apart the value addition technologies in Table 4 and Figure 3, the marketers were also trained on how to present the vegetables to better suit the needs of the consumers. The result of their willingness to market the vegetables as presented in Table 5 and Figure 4 shows that majority of the marketers prefer to sell the vegetables mixed with other vegetables. This means they do not like to market one particular type of vegetable but as a mixture with others. However, marketers of Ugu and Efo tete are willing to market the vegetables in dried form with respect to Ugu and Efotete and in squeezed form for Ugu vegetable only. This suggest that consumers in the study prefer to consume Ugu and Efo tete in different form compared to Gbagba and Teteatetedaye.

Table 5: Willingness of the marketers to sell the vegetables in other forms

Willingness to sell processed vegetables	Gbagba		Ugu		Teteatetedaye		Efetete	
	freq	perc	Freq	perc	freq	perc	freq	Perc
Dried	0	0.0	14	28.0	0	0.0	3	7.5
Mixed with other vegetables	4	30.8	19	38.0	2	28.6	9	22.5
Squeezed	0	0.0	6	12.0	0	0.0	0	0.0
Blanched	0	0.0	1	2.0	0	0.0	0	0.0

Source: MICROVEG endline survey, 2018

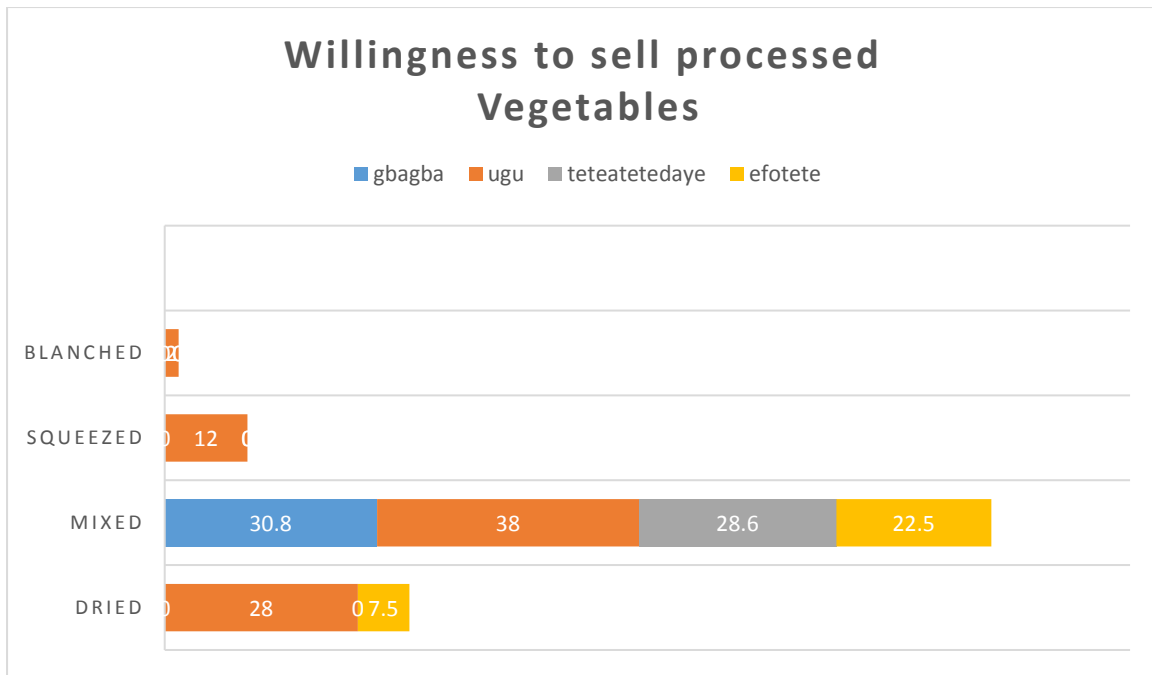


Figure 4: Willingness of the marketers to sell the vegetables in other forms

## 4.5 Weekly marketers Revenue

### Nigeria

Table 6 shows the marketers' weekly revenue from the sale of vegetables. Majority (45.59%) of the vegetable marketers receive between ₦48,000 and ₦85,000 from the sales of vegetables per week. The mean revenue from vegetable marketing is ₦79,816 with a standard deviation of ₦137,472. From Figures 5 and 6, Ugu ranks highest in revenue and this is validated in the number of marketers selling Ugu. It can then be safe to imply that a rational marketer will sell more of the vegetable that provides highest revenue. This is further corroborated by the fact that Teteatetedaye showed the least revenue and therefore records the least number of marketers (Tables 8-11).

### Benin

The results in Table 12 show the gross margin analysis of the ILVs marketers in 2015 and 2018. This results allowed to understand the improvement in marketer's income, showing economic empowerment in ILVs marketing.

Earlier, the total output and total variable cost was 19800kg and \$6934.01, while in 2018, it was 28264.50 kg and \$12153.73 respectively. Gross profit in 2015 was \$1544.48 and \$2936.32 in 2018. For every kilogram of vegetable marketed, a profit of \$0.08 and \$0.10 should be expected in both 2015 and 2018 respectively. However, cost-benefit ratio revealed that for every dollar investment invested in ILVs marketing there is likely to be an expected return of \$0.22 and \$ 0.32 in 2015 and 2018 respectively. This implies that in 2018, higher marketing output lead to higher variable cost and lower gross margin per kilogram than in 2015, the return on investment is higher in 2018 than 2015. This improvement is based on reduction on transportation cost due to network between marketers and farmers.

Table 6: Marketers weekly revenue from vegetable sales

<b>Items</b>	<b>Revenue categories ₦</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Mean ₦</b>	<b>Standard deviation ₦</b>
<b>Marketer's revenue</b>	2000-12000	14	20.59		
	12500-18000	10	14.71		
	22500-30500	10	14.71		
	35500-41400	3	4.41		
	48000-85000	31	45.59	79,816	137,472

Table 7: Margin analysis of marketers, annually in Naira

Parameter	2015			2018		
	Quantity	Unit Price	Amount	Quantity	Unit Price	Amount
Sac	2	27.60	<b>55.20</b>	3	37.95	129.40
Knife	2	24.81	<b>49.62</b>	2	23.43	46.86
Nylon	18	32.50	<b>585.00</b>	32	51.51	1,642.05
Basket	1	77.72	<b>77.72</b>	1	51.27	51.27
Transport	50	25.29	<b>1264.50</b>	52	44.95	2,337.40
Plastic bowl	10	92.68	<b>926.80</b>	19	29.49	560.30
Aluminium bowl				1	48.03	48.03
Rent	12	240.62	<b>2887.44</b>	12	2,036.02	24,432.24
<b>Total marketing costs (A)</b>			<b>5846.28</b>			<b>29,247.55</b>
Cost of vegetables(B)			<b>156,422.08</b>	2,616	100	<b>261,600.00</b>
Total Value of sales(C)	12	198,714.04	<b>2,384,568.48</b>	2,616	19.77	<b>5,172,695.28</b>
Market gross margin (C-B)			<b>2,228,146.40</b>			<b>4,911,095.28</b>
Market net margin(C-B-A)			<b>2,222,300.12</b>			<b>4,881,847.73</b>

\*values of each item are average values

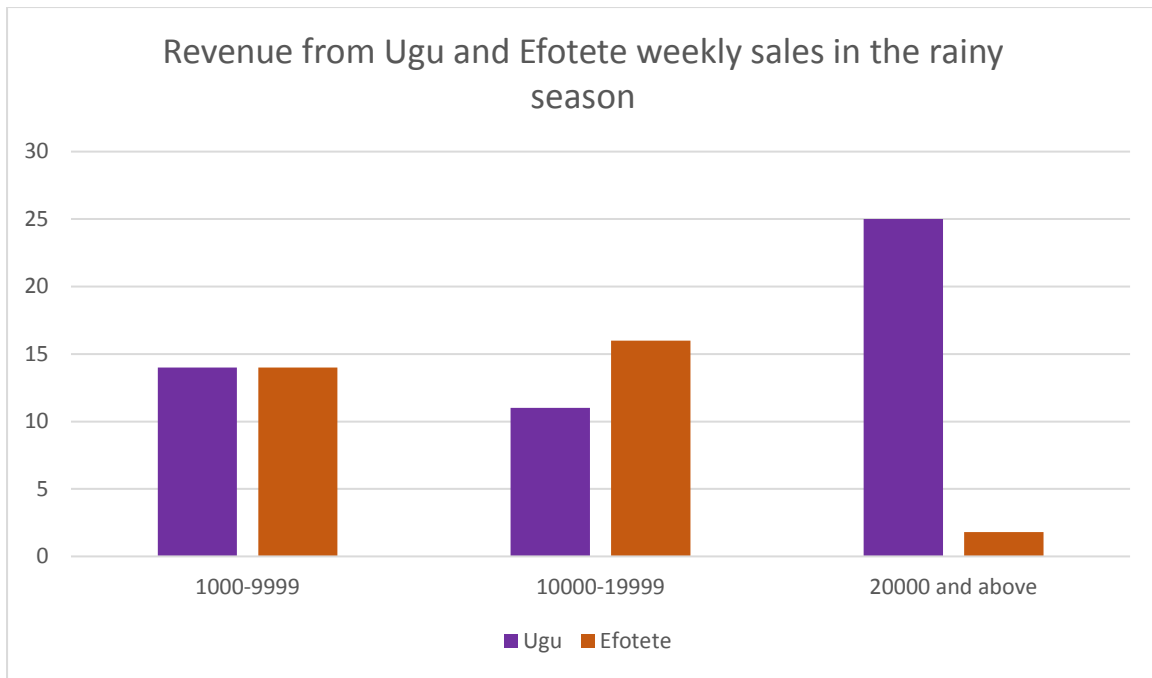


Figure 5: Weekly revenue from sales of Ugu and Efotete in the rainy season



Table 8: Weekly revenue from Ugu

<b>Rain ₦</b>	<b>freq</b>	<b>perc</b>	<b>mean</b>	<b>SD</b>	<b>Dry season</b>	<b>Freq</b>	<b>perc</b>	<b>mean</b>	<b>SD</b>
1000- 9999	14	28.0			1000- 9999	12	24.0		
10000- 19999	11	22.0			10000- 19999	13	26.0		
20000 and above	25	50.0	42656	87919	20000 and above	25	50.0	49204	102380

Table 9: Weekly revenue from Efofete

<b>Rain ₦</b>	<b>freq</b>	<b>perc</b>	<b>Mean</b>	<b>SD</b>	<b>Dry ₦</b>	<b>freq</b>	<b>perc</b>	<b>mean</b>	<b>SD</b>
1000- 9999	14	35.0			1000- 9999	14	35.0		
10000- 19999	16	40.0			10000- 19999	15	37.5		
20000 and above	10	10.0	117516	63000	20000 and above	11	27.5	117944	62923

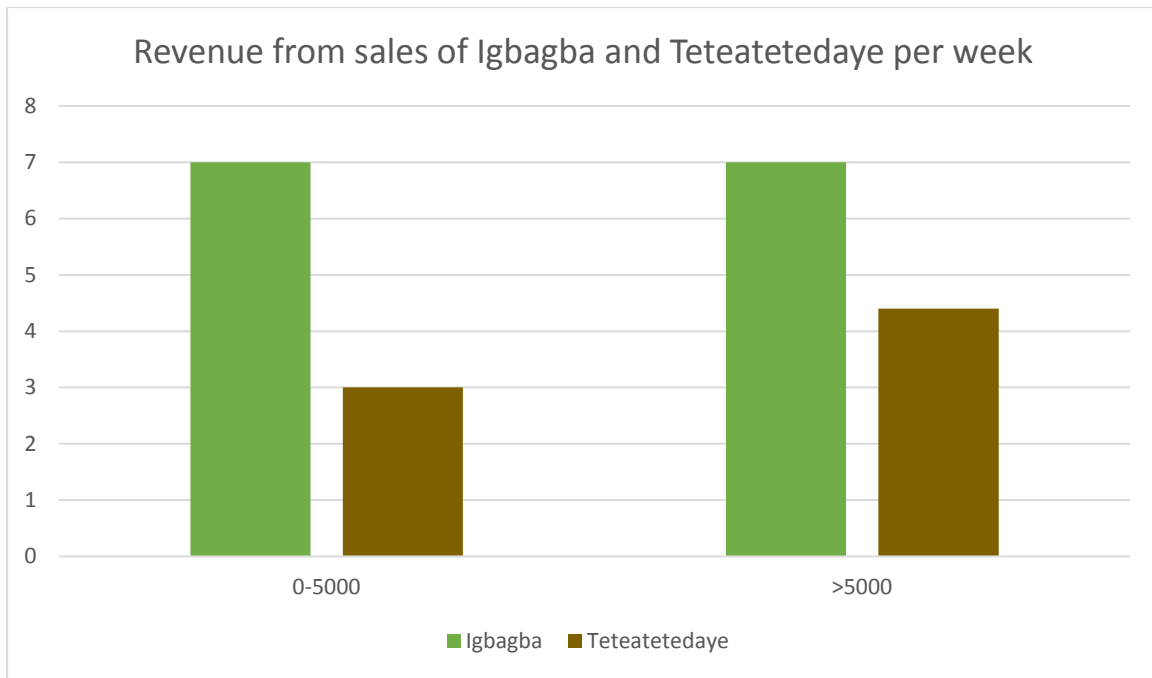


Figure 6: Weekly revenue from sale of Igbagba and Teteatetedaye

*Table 10: Weekly revenue from Igbagba during rain and dry season*

<b>Rain</b>	<b>freq</b>	<b>perc</b>	<b>Mean</b>	<b>SD</b>	<b>Dry</b>	<b>freq</b>	<b>perc</b>	<b>Mean</b>	<b>SD</b>
<b>₦</b>									
0-5000	7	50.0			0-5000	7	53.9		
>5000	7	50.0	94736	318292	>5000	6	46.2	99523	330781

Table 11: Weekly revenue from Teteatetedaye

Rain season ₦	freq	perc	Mean	SD	Dry ₦	Freq	perc	Mean	SD
0-5000	3	42.9			0-5000	3	42.9		
>5000	4	57.1	22929	25365	>5000	4	57.1	22214	24869

Table 12: Budgetary Analysis Of Selected UIVs Per Production Season

S/N	Item	Igbagba	Ugu	Teteabalaye	Tete
<b>1</b>	<b>REVENUE</b>				
<b>A</b>	<b>Average revenue (TR)</b>	57035	66937.04	5997.93	7318.32
<b>2</b>	<b>AVERAGE VARIABLE COSTS</b>				
I	Cost of seeds	672.17	3303.47	146.4075	44.25
li	Cost of labour	16777.67	18464.08	2825.38	2289.977
iii	Cost of fertilizer	1802.65	1526.27	209.7275	13.69333
lv	Cost of Agrochemicals	1441.2	1153.92	199.505	69.10333
V	Cost of fuel	44.74	134.83	21.28	17.47
<b>B</b>	<b>Total variable cost (TVC)</b>	20738.43	24582.57	3402.3	2434.493
<b>4C</b>	<b>Gross Margin (TR – TVC)</b>	36296.57	42354.47	2595.63	4883.827
<b>3</b>	<b>AVERAGE FIXED COSTS</b>				
I	Land rent	303.35	507.76	72.38333	131.4733
li	Cost of cutlass	2004.33	787.67	157.5133	352.38
lii	Cost of hoe	2367.21	913.22	195.68	430.8933
lv	Cost of scaffold	93.98	216.66	34.36	52.58
V	Cost of pumping machine	407.61	846.71	189.56	208.3
Vi	Cost of water tank	247.96	427.31	82.25	99.16
vii	Cost of well	89.94	193.13	96.59	29.42
<b>D</b>	<b>Average fixed cost (TFC)</b>	5514.38	3892.46	828.3367	1304.207
E	Total cost (TC) = (TFC + TVC)	26252.81	28475.03	4230.637	3738.7
F	Net income (NI) = (GM - TFC)	30782.19	38462.01	1767.293	3579.62
G	Profit margin = F/A *100	53.9707022	57.45998	29.46505	48.91314
H	Return per capital outlay = F/E	1.172529341	1.350728	0.417737	0.95745
I	Operating cash expenses ratio = B/A	0.363608837	0.367249	0.567246	0.332657
J	Benefit cost ratio = A/E	2.172529341	2.350728	1.417737	1.95745

Table 13: Gross Margin Analysis of ILVs Marketer In Benin Republic (in Dollar)

		2015			2018		
Parameters	Units	Quantity	Price/Unit (\$)*	Total Value (\$)*	Quantity	Price/Unit (\$)*	Total Value (\$)*
<b>Total Revenue (TR)</b>							
<b>Output</b>	Kg	19800.00	0.43	8478.50	28264.50	0.43	12153.73
<b>Total Variable Cost TVC</b>							
<b>Vegetable product</b>	Kg	20000.00	0.26	5138.48	28550	0.26	7423.00
<b>Cost of labour</b>	manday	2.00	2.57	5.14	2.00	2.57	5.14
<b>Cost of handling materials</b>	Dollar			14.19			14.19
<b>Cost of value addition</b>	Hours	200.00	8.56	1712.83	200.00	8.56	1712.83
<b>Cost of shed</b>	Dollar	Per month	5.14	61.66	Per month	5.14	61.66
<b>Transportation cost</b>	km	24.00		1.71	8,57		0.60
<b>Total Variable Cost</b>				6934.01			9217.42
<b>Gross Margin(TR-TVC)</b>				1544.48			2936.32
<b>Gross Margin per kilogram</b>				<b>0.08</b>			<b>0.10</b>
<b>Cost-Benefit ratio</b>				<b>1.22</b>			<b>1.32</b>

Source: Microveg Impact data analysis, 2018

\*\$1 = CFA 500

## 4.6 Business models for empowering LFTs actors

Various marketing models for LFTs have been developed in collaboration with stakeholders to improve their economic empowerment. These models are summarized into three. The following table presents their characteristics.

### 4.6.1 Kit-counter of sales (KCS) model description

#### Actors and roles

KCS tool is a co-design between retailers, project team and NGOs. The tool consists of a galvanized metal table for ILVs exposition, a chair for retailer and an umbrella for protecting and reducing perishability (figure 7).

Retailers are the key actors in these model. Their role is to stimulate the ILVs sales in urban market by using KCV tool. Their role is to sales ILVs. The women of this model are connected with the producers of the other models to facilitate their supply of LFTs. Figure 8 shows the traditional method of ILVs selling compared to the sales with KCS tool.

#### Observed effects and constraints of KCV tool by users

According to users' perceptions of this model, ILVs selling with KCS tool allowed to differentiate itself from other retailers. This is easily understood through the declaration of one retailer in the Arzeke market (Parakou district): "the sales of vegetables with *lema*<sup>1</sup> allowed me to know I could achieve good things with this business, because the quantity sold doubled. Customers see me before others and they just envy me".

Otherwise, retailers believe that KCS tool design seems expensive and could be a handicap for its adoption by other retailers.

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<sup>1</sup> *Lema* is traditional name of the KCS tool

Table 14 : Micro-Veg Actors' mobilization models

<b>Models</b>	<b>Keys actors</b>	<b>Innovations</b>	<b>objective / vision</b>	<b>Model target</b>
Kit-counter of sales (KCS)	ILVs retailers	KCS tool	Stimulate sales based on differentiation	ILVs sales in the markets Connection with the small producers to guarantee supplying
Young Innovative Club (YIC)	Students (school, university)	New actors insertion Marketing models	Encourage entrepreneurship with diploma training	ILVs production Training on ILVs University, school, police station , etc. supply in ILVs
Small Innovative Companies (SIC)	Small agricultural entrepreneurs and NGOs	Products derived from ILVs Marketing models	Improve ILV production with products diversification	ILVs production Seeds production ILVs processing





*Figure 7 : KCV tool presentation*



*Figure 8 : ILVs sales with KCV tool in Arzéké market compared to traditional sales method, Parakou district, Benin republic*

## Conclusion

Vegetable marketing is a female dominated business in the study area. The marketers have high priority for the income they derive from vegetable marketing. The results established that the vegetable marketers can access useful information and are people with domestic responsibilities. In addition, the marketers are more aware of vegetable drying technology and re-bunching while they show no preference for time wasting technologies. It was also discovered that the marketers do not like to sell only one type of vegetable and are willing to process the vegetables and sell in dried form. Further still, the results revealed that Ugu ranks highest in revenue provision and records the highest number of marketers.

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