

Marketing of Selected Non Wood Forest Products in Asaba, Delta State

Oghenekevwe Abigail OHWO¹ , Theophilus Miebi GBIGBI^{2*} , Ofeoritse Gift DAJE¹ 

¹Delta State University- Faculty of Agriculture - Department of Agronomy, Forestry and Wildlife,
Anwai, Delta, NIGERIA

²Delta State University- Faculty of Agriculture- Departmen of Agricultural Economics And Extension,
Anwai, Delta, NIGERIA

*Corresponding Author: gbigbitheophilusmiebi@yahoo.com

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Abstract

Aim of study: Non-timber forest products have diverse benefits to man and the environment. Hence, this study was carried out to provide information on the types of NWFPs sold, marketing channel, structure, performance and challenges faced by marketing of selected NWFPs.

Area of study: This study was conducted in Asaba, Delta State.

Material and methods: Simple random sampling was used to select 105 respondents from five major markets in Asaba using structured questionnaire. Descriptive statistics (frequency count, percentage, means, charts), costs and return, likert scale and chi square analysis were the analytical tools used.

Main results: Females were the major participants in the markets for NWFPs. Varieties of species were sold with various marketing participants and routes. These routes ensure the delivery of the NWFPs to the end users. An imperfect market structure exists for most of the selected NWFPs except for *Aldabrachelys gigantean* with a good profit margin. Of the selected NWFPs, *Aldabrachelys gigantean* and *Chrysophyllum albidum* were the most profitable with an index of 0.97 kobo (US\$0.00027) and 0.89 kobo (US\$0.00029) respectively for every ₦1 (\$0.003) investment.

Highlights: The markets for NWFPs were faced with numerous constraints amongst them were high price fluctuation and perishability of the products. The implication is that most of these NWFPs when not quickly sold out are subjected to degradation which leads to their eventual disposal and wastage of natural resources. To combat these constraints, good storage and processing facility should be made available for storing NWFPs to ensure their availability in all seasons and to limit wastage.

Keywords: NWFPs, Market, Performance, Structure

Delta Eyaleti, Asaba'da Seçilmiş Odun Dışı Orman Ürünlerinin Pazarlanması

Öz

Çalışmanın amacı: Ahşap olmayan orman ürünlerinin insana ve çevreye çeşitli faydaları vardır. Bu nedenle, bu çalışma, satılan NWFP türleri, pazarlama kanalı, yapısı, performansı ve seçilen NWFP'lerin pazarlanmasının karşılaştığı zorluklar hakkında bilgi sağlamak için yapılmıştır.

Çalışma alanı: Bu çalışma Delta Eyaleti, Asaba'da yapılmıştır.

Materyal ve yöntem: Basit rastgele örnekleme, yapılandırılmış anket kullanılarak Asaba'daki beş büyük pazardan 105 katılımcıyı seçmek için kullanıldı. Tanımlayıcı istatistikler (sıklık sayısı, yüzde, ortalamalar, grafikler), maliyetler ve getiri, likert ölçeği ve ki kare analizi kullanılan analitik araçlardı.

Temel sonuçlar: Kadınlar, NWFP'ler için pazarlarda ana katılımcılardı. Çeşitli pazarlama katılımcıları ve rotaları ile tür çeşitleri satıldı. Bu yollar, NWFP'lerin son kullanıcılara teslim edilmesini sağlar. İyi bir kar marjına sahip *Aldabrachelys devi* haricinde, seçilen NWFP'lerin çoğu için kusurlu bir piyasa yapısı mevcuttur. Seçilen NWFP'lerden *Aldabrachelys gigantean* ve *Chrysophyllum albidum*, her ₦ 1 (0,003 \$) yatırım için sırasıyla 0,97 kobo (US \$ 0,00027) ve 0,89 kobo (US \$ 0,00029) endeksiyle en karlı olanlardı.

Araştırma vurguları: NWFP pazarları, aralarında yüksek fiyat dalgalanmaları ve ürünlerin bozulabilirliği gibi çok sayıda kısıtlamayla karşı karşıya kaldı. Bunun anlamı, bu NWFP'lerin hızlı bir şekilde satılmadıklarında bozulmaya maruz kalmaları ve bu da onların nihai olarak elden çıkarılmasına ve doğal kaynakların israfına yol açmasıdır. Bu kısıtlamalarla mücadele etmek için, NWFP'lerin her mevsim kullanılabilirliğini sağlamak ve israfi sınırlamak için iyi bir depolama ve işleme tesisi sağlanmalıdır.

Anahtar Kelimeler: NWFP'ler, Pazar, Performans, Yapı



Introduction

In the early days, man lived by collecting and harvesting both food and meat from the forest (Ekeke, 2003). Non Wood Forest Products (NWFPs) are all resources from the wild both plants and animals such as wild fruits, nuts, eatable roots, honey, palm, mushroom, forest plants, mushroom, wild animals and service. NWFPs include thousands of plant and tree species, such as fruits (*Chrysophylulum albidum*: Africa star apple), (*Persea Americana*: avocado pear), vegetables (*Gnetum africanum*: ukazi), (*Pergularia daemia*: Utazi) (Kumar, 2016); and animal species such as snails and antelopes (Shomkegh & Tem, 2008).

Forest products excluding timber have been widely acknowledged for their unique biological nature that maintain the livelihoods of billions of rural dwellers, as they contribute greatly to their food and health requirements (Balgis et al., 2009). Majority of the rural inhabitants close to the forest were sustained from the harvesting and sales of NWFPs thereby enhancing the quality of life and standard of living (Chidebere et al., 2016). Inclusive to this fact, huge number of rural families depends on forest products to provide some of their nutritional needs, and earn some of their income from the sale of these products (Tilling et al., 2015).

In spite of the benefits (nutritional, medicinal and economic) of NWFPs, majorities are underexploited, over exploited while some are rarely utilized. Various NWFPs are harvested, processed and sold by marketers to generate income. An estimated value of 11 billion US dollars (\$11.000.000.000) was earned from trade in NWFPs annually in developing countries (Latsamy et al., 2013). In Laos, a country in Asia, NWFPs values about US\$320 and \$7 to 8 million annually for individual household and the nation respectively. Globally, China and India are the largest producers, processors and consumers of NWFPs with well-established NWFPs markets (FAO, 2002). In Osun State Nigeria, marketers of NWFPs earned between ₦10000 (US\$27.77) to ₦60000 (US\$166.64) monthly (Aiyeloja & Ajewole, 2006). In Oyo State, rural women were found to make between ₦115 (\$0.32) to

₦500 (\$1.39) daily in gathering and sales of fruits (Famuyinde et al., 2013).

The processes involved in the collection, processing and sale of NWFPs are scarcely researched in Delta State. Over the years, the contribution of Forestry sector to the country's GDP has declined. This is attributed to lack of monitoring and assessment of the market and revenue generated from NWFPs which are rarely captured in forest valuation, limiting the contribution of Forestry sector to the nations GDP to timber market, further heightening the undervaluation of the forest estate. Unlike the market for timber and other agricultural goods, the markets for NWFPs in Nigeria are complex as various market structures exist. Dearth of information exists on the complexity and challenges of NWFP markets in Delta State.

As a result of deforestation and population expansion, most of the NWFPs are scarce (Nwoboshi, 1986). Long gone are the days when NWFPs were readily available and completely free for anyone to enter into the forest to harness (Shylajan & Mythili, 2007). Also, with the current knowledge of their importance, these resources have gained additional value and are highly marketable (FAO, 2005). Conventional markets for most products have faded with competing synthetic materials while new markets have emerged especially with the increasing attention in natural products (Chidebere et al., 2016). The profitable and tangible nature of marketable goods, their prices, production and consumption pattern strongly influenced the nature of marketing system (Ruoxi, 2015). This in turn will determine the price and profit margin generated by marketers (Ohwo & Adeyemi, 2015). The benefits of market functioning can only be attained via efficient pricing which also depends on the market structure (Arowosoge et al., 2011). The prices of various NWFPs reflect the value and revenue generated from their sales (Mukhtar et al., 2017).

Various works have been conducted on marketing of NWFPs (Aiyeloja & Ajewole, 2006; Babalola, 2009; Piya et al., 2011; Latsamy, 2013; Akitan et al., 2013; Kumar, 2016; Chidebere et al., 2016) but none covered the study area. This study was carried out to provide information on the types of

NWFPs sold, marketing channel, structure, performance and challenges faced by marketing of selected NWFPs in Asaba and environs, Delta State.

Material and Methods

Study Area

The research was carried out in Asaba metropolis, Delta State Nigeria, located on latitude 6° 30' and longitude 6°45' of the equator with an estimated area and population of 200 square kilometers and 1.723.745 respectively (Ejemeyovwi, 2015). Asaba experiences a mean annual rainfall of 1.254–3.032mm, temperature of 26.7°C, relative humidity of 69-80% and sunshine of 4.8 bars (Asaba Meteorological Bulletin, 2009). The vegetation is tropical evergreen rainforest with tall trees and undergrowth (Ejemeyovwi, 2015).

Simple random sampling was used to select marketers from the five major markets (Abraka, Cable, Ogbeogonogo, Mile five and Ugbolu) in Asaba metropolis. Six plants and one animal based NWFP were examined for the study. Three (3) marketers for each NWFP were selected from the five markets. A total of fifteen (15) marketers for each NWFP were examined giving a total of 105 respondents for the study. Primary data for the study was obtained through the use of questionnaire and interview schedule. Information on the list of NWFPs sold in the market, their availability and accessibility, market structure, market performance (profitability) and challenges of NWFP marketers were captured by the questionnaire. Data on the types and species of NWFPs traded in the market was obtained and information on cost of purchase, processing, transportation and revenue generated as well as nature of the market was obtained for the selected NWFPs.

Descriptive statistics was used to itemize the types of NWFPs available, the marketing channel of NWFPs, marketing structure of NWFPs and the challenges faced by the marketers. Profitability analysis was used to analyzed the performance of the selected NWFPs. A 5 point likert scale was used to obtain information on the access level to and availability of NWFPs in the market as well as regularity of the markets. The scale is described as follows: always available (AA) =

5, readily available (AR) = 4, rarely available (RA) = 3, Scarce (SA) = 2 and Unavailable (UA)= 1; Daily (D) = 5, Weekly (W) = 4, Monthly (M) = 3, Quarterly (Q) = 2 and Annually (A) = 1. To obtain the availability index, the total mean for each statement on the NWFPs availability was computed. The total mean divided by the number of NWFPs considered gave the grand mean. Division of the grand mean by the scale point (5) gave the availability index (Gbigbi, 2020).

Model specification on profitability

$$P = RGS - CM \quad (1)$$

Where,

P = Net Income

RGS = Revenue generated from sales

CM = Total cost of marketing

$$PIR = \frac{P}{CM} \quad (2)$$

Where,

PIR = Profitability Index Ratio

Chi-square was used to test if relationship exists between profit generated and educational background of respondents.

$$\chi^2 = \sum \frac{(O-E)^2}{E} \quad (3)$$

Where,

χ^2 = Chi square

O= observed frequency

E= Expected frequency

Results and Discussion

List of NWFP Traded in Asaba, Delta State

The list of NWFPs traded in Asaba is presented in Table 1. It shows that 23 plants and 9 animal based NWFPs belonging to 25 families were traded in Asaba. Amongst them were *Garcinia kola*, *Azadiracta indica*, *xylophia aesthiopica* and *Aldabrachelys gigantean*, *Thryonomys swinderianus*, *Slyvicapra griminia* for plant and animal based respectively. The six plants and one animal based species selected for the study were *Irvingia wombolu* (Figure 1), *Aframomum melegueta* (Figure 2), *Cola nitida* (Figure 3), *Dennettia tripetala* (Figure

4), *Chrysophyllum albidum* (Figure 5), *Dialium guineense* (Figure 6) and *Aldabrachelys gigantean* respectively. The study observed that NTFPs ranged from fruits, seeds, pods, leaves and games. This corroborated the findings of (Aiyeloja & Ajewole, 2006; Babalola, 2009; Luni et al., 2011; Akintan et al., 2013; Latsamy et al., 2013; Chidebere et al., 2016; Kumar, 2016) who observed that various NTFPs were collected, processed and sold in Osun State, Nigeria; Southwest Nigeria; Chepang community in Nepal; Odigbo Local

Government Area of Ondo State, Nigeria; Luang Namtha Province; Ikuano Local Government Area, Abia State, Nigeria; and at a proposed UNESCO heritage site of Arunachal Pradesh, India respectively. The following species were identified by these authors; *Irvingia spp*, *Russula lepida*, *Cinnabris species*, *Arenga westerhoutii*, *Cerasus cersoides*, *Piper pedicellatum*, *Russula lepida*, *Cinnabris species*, *Arenga westerhoutii*, *Zanthophyllum zanthoxonoides*, *Rauwolfia vomitoria* and *Magnolia champaca*.

Table 1. List of NTFPs traded in Asaba, Delta State

S/N	Botanical name	Family	Common name	Parts collected
Plant Based				
1	<i>Gracinia kola</i>	<i>Clusiaceae</i>	Bitter kola	Fruit
2	<i>Cola nitida</i>	<i>Malvaceae</i>	Native kola	Fruit
3	<i>Azadirachta indica</i>	<i>Meliaceae</i>	Dongoyaro	Leaf, bark
4	<i>Chrysophyllum albidum</i>	<i>Sapotaceae</i>	African star apple	Fruit
5	<i>Xylopia aethiopica</i>	<i>Annonaceae</i>	African guinea pepper/uda	Seed
6	<i>Irvingia gaboneensis</i>	<i>Irvingiaceae</i>	Bush mango/ugiri	Fruit
7	<i>Irvingia wombolu</i>	<i>Irvingiaceae</i>	Bush mango/ogbono	Fruit
8	<i>Agaricus boporium</i>	<i>Agaricaceae</i>	Mushroom	Plant
9	<i>Pentachletra macrophylla</i>	<i>Leguminosae</i>	Oil bean seed/ugba	Seed
10	<i>Gnetum africanum</i>	<i>Genetaceae</i>	Ukazi	Leaf
11	<i>Pergularia daemia</i>	<i>Ascepiadaceae</i>	Utazi	Leaf
12	<i>Gongronema latifolium</i>	<i>Apocynaceae</i>	Utaezi	Leaf
13	<i>Zingiber officinale</i>	<i>Zingiberaceae</i>	Ginger	Root
14	<i>Aframomum melegueta</i>	<i>Zingiberaceae</i>	Alligator pepper	Seed
15	<i>Vernonia amygdalina</i>	<i>Asteraceae</i>	Bitter leaf	Leaf, stem and root
16	<i>Partia biglobosa</i>	<i>Fabaceae</i>	African locust bean/dawadawa	Fruit
17	<i>Plukenetia conophora</i>	<i>Euphorbiaceae</i>	African walnut	Fruit
18	<i>Tetrapleura tetraptera</i>	<i>Fabaceae</i>	Oshosho	Stem/bark
19	<i>Thaumatococcus danielli</i>	<i>Marantaceae</i>	Moi moi leaf	Leaf
20	<i>Spondias mombin</i>	<i>Anacardiaceae</i>	Ngulungwu	Fruit
21	<i>Piper guineense</i>	<i>Piperaceae</i>	Uziza pepper	Seed
22	<i>Dennettia tripetala</i>	<i>Annonaceae</i>	Pepper fruit/mmimmi	Fruit
23	<i>Digllium guineense</i>	<i>Fabaceae</i>	Velvet	Fruit
Animal based				
24	<i>Aldabrachelys gigantean</i>	<i>Testudinidae</i>	Tortoise	Whole animal
25	<i>Thryonomys swinderianus</i>	<i>Thryomyidae</i>	Grass cutter	“
26	<i>Archachatina marginata</i>	<i>Helicinidae</i>	Snail	“
27	<i>Slyvicapra griminia</i>	<i>Bovidae</i>	Antelope	“
28	<i>Atherurus africanus</i>	<i>Erethizontidae</i>	Porcupine	“
29	<i>Crocodylus niloticus</i>	<i>Crocodylidae</i>	Crocodile	“
30	<i>Erythrocebus patas</i>	<i>Cercopithecidae</i>	Monkey	“
31	<i>Anomalurus spp</i>	<i>Anomaluridae</i>	Squirrel	“
32	<i>Varanus niloticicus</i>	<i>Varanidae</i>	Monitor lizard	“

Source: Field data (2019)



Figure 1. *Irvingia wombolu*



Figure 2. *Aframomum melegueta*



Figure 3. *Cola nitida*



Figure 4. *Dennettia tripetala*



Figure 5. *Chrysophyllum albidum*



Figure 6. *Dialium guineense*

The demographic characteristics of respondents are presented in Table 2. The female folks dominated the market of the selected NTFPs with the exception of *Cola nitida* and *Aldabrachelys gigantean* where male dominated the market with 53.3%. Most of the respondents were married, ranged between 41-50 years of age, had secondary school education with family sizes of 2-5 persons. The high level of involvement of

married female with secondary education in the sales of selected NTFPs showed trade in NTFPs as a source of employment. This agreed with the reports of (Babalola, 2009; Anosike et al., 2011; Amusa et al., 2011; Akitan et al., 2013) who stated that most married women are involved in the harvesting and sale of NTFPs as a means of poverty alleviation.

Table 2. Demographic characteristics of NWFP traders

Variable	<i>Irvingia wombolu</i>	<i>Aframomum melegueta</i>	<i>Cola nitida</i>	<i>Dennettia tripetala</i>	<i>Chrysophyllum albidum</i>	<i>Dialium guineense</i>	<i>Aldabrachelys gigantean</i>
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Gender							
Male	1 (6.7)	0	8 (53.3)	0 (0)	0 (0)	0 (0)	8 (53.3)
Female	14 (93.3)	15 (100)	7 (46.7)	15 (100)	15 (100)	15 (100)	7 (46.7)
Total	15 (100)	15 (100)	15 (15)	15 (100)	15 (100)	15 (100)	15 (100)
Marital status							
Single	0 (0)	0 (0)	3 (20.8)	4 (26.7)	2 (20.0)	0 (0)	2 (13.3)
Married	15 (100)	15 (100)	12 (80.0)	11 (73.3)	13 (80.0)	15 (100.0)	12 (80.0)
Widowed	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (6.7)
Divorced	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100.0)	15 (100)
Age							
15-30	0 (0)	0 (0)	0 (0)	0 (0)	2 (13.3)	0 (0)	1 (6.7)
31-40	6 (40)	4 (26.7)	5 (33.3)	5 (33.3)	7 (46.7)	11 (73.3)	6 (40.0)
41-50	9 (60)	11 (73.3)	10 (66.7)	10 (66.7)	6 (40.0)	4 (26.7)	8 (53.3)
51-above	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100.0)
Religion							
Christian	15 (100)	12 (80)	15 (100)	15 (100)	15 (100)	15 (100)	14 (93.3)
Islam	0(0)	3 (20)	0 (0)	0 (0)	0 (0)	0 (0)	1 (6.7)
Total	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)
Education Level							
No formal education	0 (0)	0 (0)	0 (0)	0	0 (0)	0 (0)	0 (0)
Primary	0 (0)	4 (26.7)	0 (0)	0 (0)	0 (0)	1 (6.7)	1 (6.7)
Secondary	11 (73.3)	11 (73.3)	12 (80.0)	13 (86.7)	13 (86.7)	13 (86.7)	10 (66.7)
Tertiary	4 (26.7)	0 (0)	3 (20.0)	2 (13.3)	2 (13.3)	1 (6.7)	4 (26.7)
Total	15 (100)	15 (100)	15 (100.0)	15 (100.0)	15 (100)	15 (100)	15 (100)

Table 2 (Continued)

Variable	<i>Irvingia wombolu</i>	<i>Aframomum melegueta</i>	<i>Cola nitida</i>	<i>Dennettia tripetala</i>	<i>Chrysophyllum albidum</i>	<i>Dialium guineense</i>	<i>Aldabrachelys gigantean</i>
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Family size							
2-5	14 (93.3)	15 (100)	0	0	15 (100)	15 (100)	14 (93.3)
6-10	1(6.7)	0 (0)	0	0	0 (0)	0 (0)	1 (6.7)
11 above	0 (0)	0 (0)	15 (100)	15 (100)	0 (0)	0 (0)	0 (0)
Total	15 (100)	15 (100)	15 (100.0)	15 (100.0)	15 (100)	15 (100)	15 (100)
Occupation							
Trader	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)
Civil servant	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)

Source: Field data (2019)

Market Structure for Selected NWFPs

The market structure for the selected NWFPs is presented in Table 3. The market structure revealed that most (*Irvingia wombolu*, *Aframomum melegueta*, *cola nitida*, *Dialium guineense*) of the NWFPs traded

have barriers to entry as result of the existence of market union, union fee which often is fixed by the union chairman. However, the market for *Aldabrachelys gigantean* does not have the above barriers.

Table 3. Market structure of selected NWFPs

Variable	<i>Irvingia wombolu</i>	<i>Aframomum melegueta</i>	<i>Cola nitida</i>	<i>Dennettia tripetala</i>	<i>Chrysophyllum albidum</i>	<i>Dialium guineense</i>	<i>Aldabrachelys gigantea</i>
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
Free entry and exit							
Yes	2 (13.3)	0 (0)	5 (33.3)	15 (100)	15 (100)	0 (0)	15 (100)
No	13 (86.7)	15 (100)	10 (66.7)	0 (0)	0 (0)	15 (100)	0 (0)
Total	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)
Market union							
Yes	15 (100)	15 (100)	10 (66.7)	15 (100)	15 (100)	14 (93.3)	3 (20)
No	0 (0)	0 (0)	5 (33.3)	0 (0)	0 (0)	1 (6.7)	12 (80)
Total	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)
Union fee							
Yes	15 (100)	15 (100)	10 (66.7)	15 (100)	15 (100)	14 (93.7)	4 (26.7)
No	0 (0)	0 (0)	5 (33.3)	0 (0)	0 (0)	1 (6.7)	11 (73.3)
Total	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)
Union fee fixer							
Chairman	15 (100)	15 (100)	10 (66.7)	15 (100)	15 (100)	14 (93.3)	4 (26.7)
No	0 (0)	0 (0)	5 (33.3)	0 (0)	0 (0)	1 (6.7)	11 (73.3)
Total	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)	15 (100)

Source: Data analysis (2019)

Market Channel of Selected NWFPs

The market channel of the selected NWFPs is presented in the figure below. Four marketing channels exist for *Irvingia wombolu* (figure 7) and *Aframomum melegueta* (figure 8). *Cola nitida* (figure 9), *Dennettia tripetala* (figure 10), *Chrysophyllum albidum* (figure 11) and *Aldabrachelys gigantean* (figure 13) have three marketing routes while *Dialium guineense* (figure 12) has a market channel.

The market channels of the selected NWFPs showed that marketing participants ranged from NWFPs collectors, rural buyers are marketers that buy NWFP directly from collectors, urban buyers are marketers that buy NWFPs from rural buyers for sale in urban areas, retailers and final consumers. This is consistent with the findings of (Aiyelaja & Ajewole, 2006; Babalola, 2009; Great Lakes Forest Alliance, 2012; Latsamy et al., 2013; Chidebere et al., 2016). The NWFPs market chain starts with the NWFPs

collectors in rural areas and then moves in the direction of the final users. At each stage along this chain, the middlemen perform the duties of buying, selling, transporting and adding value. Importantly, information about the product qualities is dispersed through the middlemen to the public. When the NWFPs are properly marketed by the middlemen, it stimulates greater production and supply efficiency. The implication is that the forestry sector will focus on NWFPs production and protection for continuous marketing (Langley et al, 2017). The study further revealed that the market structure for the selected NWFPs was basically an imperfect market structure. This is because of it features such as barriers to entry, price regulation and control and varieties of non identical products sold to an unlimited number of wholesalers and consumers with a perfectly elastic demand curve. Perfect market structure exists for *Aldabrachelys gigantean* with no barrier to entry, no price control and no market union.

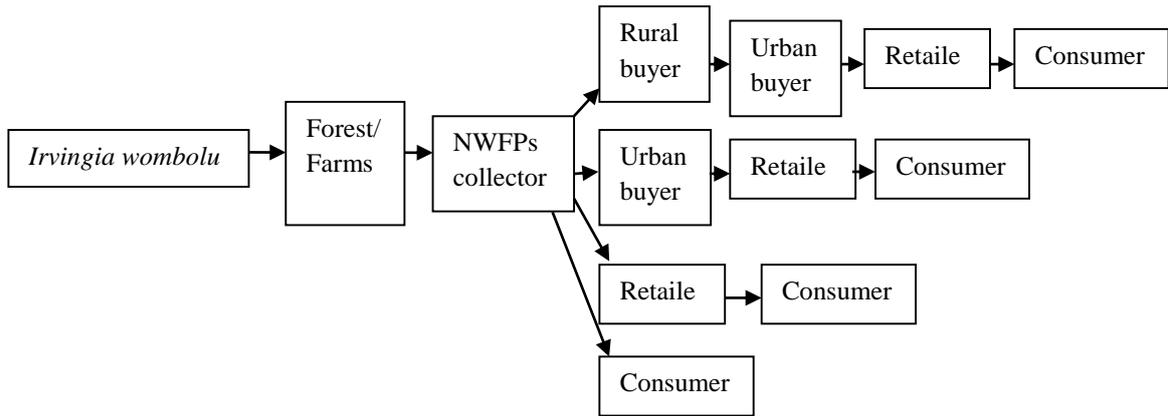


Figure 7. Market channel of *Irvingia wombolu*

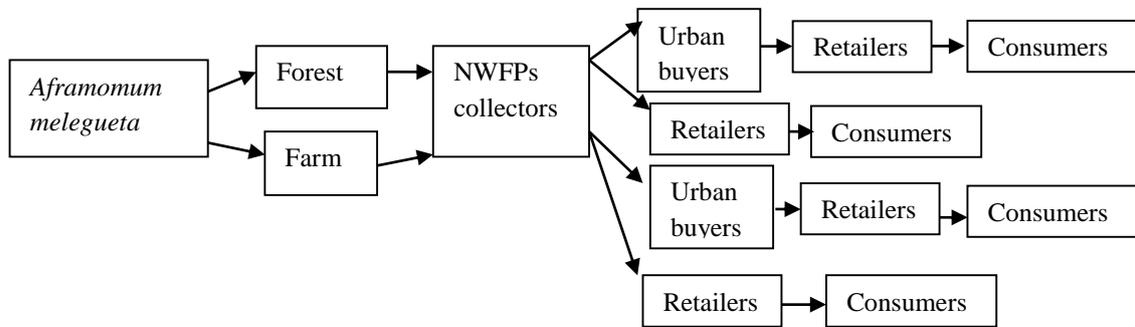


Figure 8. Market channel of *Aframomum melegueta*

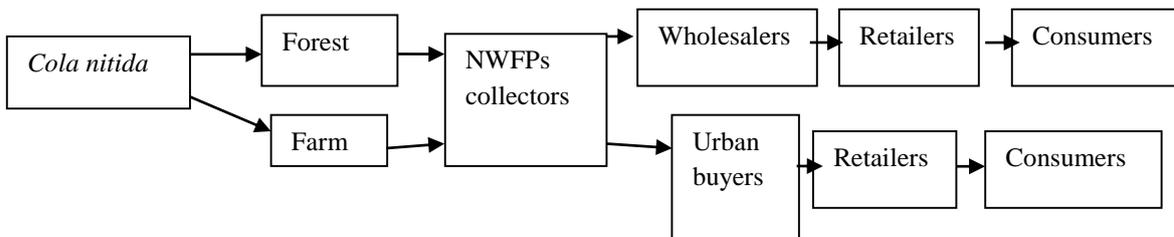


Figure 9. Market channel of *Cola nitida*

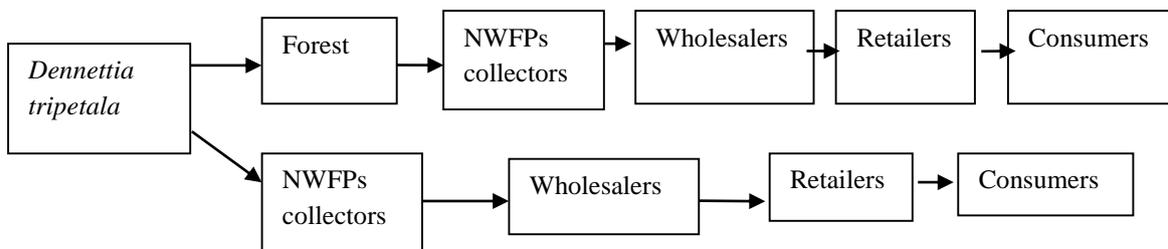


Figure 10. Market channel of *Dennettia tripetala*

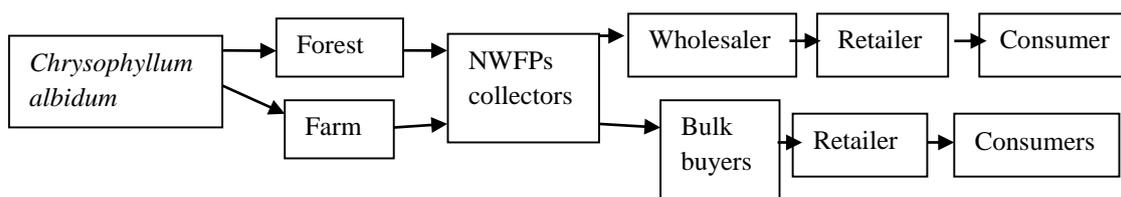


Figure 11. Market channel of *Chrysophyllum albidum*

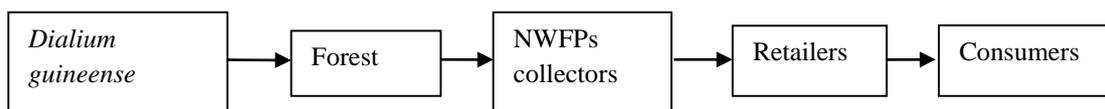


Figure 12. Market channel of *Dialium guineense*

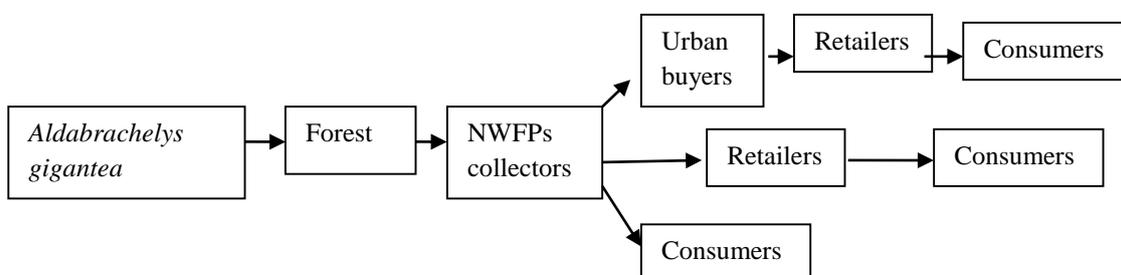


Figure 13. Market channel of *Aldabrachelys gigantea*

Market Performance of Selected NWFPs

The market performance of the selected NWFPs focused on the availability of traded NWFPs, percentage response of respondents on the availability status of the selected NWFPs, profitability analysis and test of relationship between profit generated and educational level, and the results are presented in Tables 4, 5 and 6 respectively. The result in Table 4 showed the mean score response of respondents on the availability level of selected NWFPs, and revealed that *Irvingia wimbolu* (mean=4.35), *Aframomum melegueta* (mean=4.43), *Cola nitida* (mean=4.39), *Dennettia tripetala*

(mean=4.18), *Chrysophyllum albidum* (mean=3.64), *Dialium guineense* (mean=3.70) and *Aldabrachelys gigantea* (mean=4.07) were all above the mean cut-off score of 3.0 which shows that these NWFPs are available as agreed by the marketers respectively. This is confirmed by the availability index of 0.82, which suggest that the marketers have 82% certainty of the availability of NWFPs in the marketing chain. The observed level of availability of the selected NWFPs showed that season, location and sources of information affects the accessibility to the traded NWFPs.

Table 4. Availability status of selected NWFPs

NWFPs	A.A	A.R	R.A	SA	U.A	Total	Mean	Remark
<i>Irvingia wombolu</i>	52	38	15	0	0	457	4.35	Available
<i>Aframomum melegueta</i>	56	40	7	2	0	465	4.43	Available
<i>Cola nitida</i>	43	60	2	0	0	461	4.39	Available
<i>Dennettia tripetala</i>	29	66	10	0	0	439	4.18	Available
<i>Chrysophyllum albidum</i>	18	35	48	4	0	382	3.64	Available
<i>Dialium guineense</i>	21	33	49	2	0	388	3.70	Available
<i>Aldabrachelys gigantea</i>	30	55	17	3	0	427	4.07	Available
<i>Total mean</i>							28.76	

Source: Data analysis (2019)

N.B: Always available (AA) = 5, Readily available (AR) = 4, Rarely available (RA) = 3, Scarce (SA) = 2, Unavailable (UA) = 1

Above 3.0= Available; Below 3.0= Not available

Grand availability mean = 4.11

Availability index= 0.82

Profitability Analysis of The Selected NWFPs

The profitability analysis of the selected NWFPs presented in Table 5 showed a net income of ₦20,400 (\$56.66), ₦27113.33 (\$75.30), ₦8707.33 (\$21.18), ₦1284.67 (\$3.57), ₦993.33 (\$2.76), ₦1006.67 (\$2.80), ₦11,026.67 (\$30.62), for *Irvingia wombolu*, *Aframomum melegueta*, *Cola nitida*, *Dennettia tripetala*, *Chrysophyllum albidum*, *Dialium guineense* and *Aldabrachelys gigantea* respectively. The profitability index revealed that for every one naira spent in the purchase of *Irvingia wombolu*, *Aframomum melegueta*, *Cola nitida*, *Dennettia tripetala*, *Chrysophyllum albidum*, *Dialium guineense* and *Aldabrachelys gigantea*, a 0.24 kobo (US\$0.0000072), 0.09 kobo (US\$0.0000027), 0.38 kobo (US\$0.000011), 0.21 kobo (US\$0.0000063), 0.89 kobo (US\$0.000027), 0.45 kobo (US\$0.000014), 0.97 kobo (US\$0.000029), was gained respectively (exchange rate of US\$1 to ₦360.06 and US\$0.00003 to 1k @ www.exchangerate.org.uk).

The profitability analysis showed marketing of NWFPs as a profitable ventures and leads not only to income generation but also, to poverty alleviation of the respondents. This agreed with the findings of (Aiyelaja & Ajewole, 2006; Famuyinde et al., 2013; Chidebere et al., 2016). These authors stated that price for NWFPs in Nigeria ranged between ₦10 (US \$0.03) to ₦10,000 (US \$27.77) in Osun State; rural women made between 115 (US \$0.32) to 500 (US \$1.39) naira in gathering and sale of NWFPs; forests have continually provided varieties of ecological goods and services for household utilization, income generation and sales of fruits; and a profitability index of 0.18kobo (US\$0.0000054) and 0.16kobo (US\$0.0000048) was obtained from the sales of 2kg of *Gnetum africanum* and *Pentacletra macropylla* respectively. Furthermore, Adepoju & Salau, 2007 stated that the market for NWFPs and the medicinal values grew annually from thirteen to twenty percent (13% - 20%) over the last decade.

Table 5. Profitability analysis of the selected NWFPs

Variables/Species	<i>Irvingia wombolu</i> (bag)	<i>Aframomum melegueta</i> (bag)	<i>Cola nitida</i> (seat)	<i>Dennettia tripetala</i> (basket)	<i>C. albidum</i> (basket)	<i>Dialium guineense</i> (bag)	<i>Aldabrachelys gigantean</i> (whole)
Revenue (₦)	103733.30	340066.70	31830.00	7560.00	2386.67	3320.00	22406.67
Variable cost (₦)							
Cost of good	79893.33	304733.33	21066.67	5480.00	526.00	27200.00	8646.67
Cost of processing	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nylon bag	2186.67	3793.33	316.00	369.33	110.00	0.00	0.00
Transport	1253.33	4426.67	1740.00	176.67	483.33	5450.00	2733.33
Total cost	83333.33	312953.33	23122.67	6026.00	1119.33	2210.00	11380.00
Gross profit	20400.00	27113.33	8707.33	1534.00	1267.33	1110.00	11026.67
Tax	0.00	0.00	0.00	249.33	94.00	103.33	0.00
Net income	20400.00	27113.33	8707.33	1284.67	993.33	1006.67	11026.67
Profitability index (kobo)	0.24	0.09	0.38	0.21	0.89	0.45	0.97

Source: Data analysis (2019)

Relationship Between Profit and Educational Level

The test of relationship between educational level and profitability of the respondents presented in Table 6 showed that no significant relationship ($P > 0.05$) existed between educational level and net income of the respondents, with a Chi square (χ^2) value of 2.00, 0.68, 1.46, 0.58, 2.64, 1.15 and 4.34 for *Irvingia wombolu*, *Aframomum melegueta*, *Cola nitida*, *Dennettia tripetala*, *Chrysophyllum albidum*, *Dialium guineense* and *Aldabrachelys gigantea* respectively. The Phi values (0.37, 0.31, 0.42) showed a weak strength of association between educational level and profitability of the respondents for

Irvingia wombolu, *Cola nitida* and *Chrysophyllum albidum*. A very weak strength of association was observed for *Aframomum melegueta*, *Dennettia tripetala* and *Dialium guineense* with a Phi score of 0.21, 0.20 and 0.28 respectively. The Phi values (0.54) for *Aldabrachelys gigantean* showed a strong strength of association between educational level and profitability. The lack of relationship between profitability and educational level of the respondents showed that marketing is a business subjected to the power of negotiation between buyers and sellers. This corroborated the reports of Courtois & Subervie, 2013 and Velázquez et al., 2017.

Table 6. Relationship between profit generated and educational level

Variable	Value	Degree of freedom	Asymp.sig
<i>Irvingia wombolu</i>	a.2.00	3	0.57
	b.0.37		0.57
<i>Aframomum melegueta</i>	a.0.68	1	0.41
	b.0.21		0.41
<i>Cola nitida</i>	a.1.46	2	0.48
	b.0.31		0.48
<i>Dennettia tripetala</i>	a.0.58	2	0.75
	b.0.20		0.75
<i>Chrysophyllum albidum</i>	a.2.64	1	0.10
	b.0.42		0.10
<i>Dalium guineense</i>	a.1.15	4	0.89
	b.0.28		0.89
<i>Aldabrachelys gigantean</i>	a.4.34	6	0.63
	b.0.54		0.63

Source: Data analysis (2019)

a = pearson chi square value shows significant association

b = phi value shows strength of association

Challenges Faced by NWFP Marketers

Seasonal variation, competition, perishability, handling and expensive transportation were some of the problems faced in the marketing of NWFPs in Asaba, Delta State as shown in Tables 7. The identified challenges observed in the marketing of the selected NWFPs were similar to the findings of Babalola, 2009; Latsamy et al., 2013; Kaushalendra, 2016. These authors observed

that spoilage of NWFPs during transportation to the market, poor transport facilities, middle men exploitation inconsistency of middle men and customers, products devaluation, high price fluctuation, reduced productivity level, low quality, lack of technology, processing, instability of the market and low prices of NWFPs causing low income were the problems identified in the marketing of NWFPs.

Table 7. Challenges faced by NWFP traders

NFTP	Challenges
<i>Irvingia wombolu</i>	Very expensive
	Competition
	Community youth disturbance
	Seasonal change affects availability
<i>Afromomum melegueta</i>	Change of season affects availability
	Trust issues from customers in purchasing quality products
	Very expensive
<i>Cola nitida</i>	Scarcity of product
	Not enough profit
	Conflict with customers
<i>Dennettia tripetala</i>	Spoilage of product affecting price
	Expensive
	If not sold on time will get bad
<i>Chrysophyllum albidum</i>	Gets bad if not sold on time
	Transportation to the market is expensive
	Gets bad if not sold on time
<i>Dialium guineense</i>	It depreciates with time
<i>Aldabrachelys gigantean</i>	Sometimes can be expensive when not available

Source: Field survey (2019)

Conclusion

Female were actively involved in the markets of NWFPs. Varieties of species were sold with various marketing participants and routes. These routes ensure the delivery of the NWFPs to the end users. An imperfect market structure exists for most of the selected NWFPs except the market of *Aldabrachelys gigantean* which has a perfect structure with a good profit margin. Of the selected NWFPs, *Aldabrachelys gigantean* and *Chrysophyllum albidum* were the most profitable with an index of 0.97 kobo (US\$ 0.000029) and 0.89 kobo (US\$ 0.000027) respectively for every ₦1 investment. A weak strength of association existed between the profit earned by the respondents and their level of education for all the selected species with the exception of *Aldabrachelys gigantean* which had Chi square and Phi values of 4.34 and 0.54

respectively. The markets for NWFPs were faced with numerous constraints amongst them were high price fluctuation and perishability of the products. The implication is that most of these NWFPs when not quickly sold out are subjected to degradation which leads to their eventual disposal and wastage to natural resources. To combat these constraints, good storage and processing facility should be made available for storing NWFPs to ensure their availability in all seasons and to limit wastage. Innovation of good technology for processing and transformation of perishable NWFPs to varieties of products via value addition with good road network for timely movement of NWFPs from point of collection to the market is paramount to achieving efficiency in these resources utilization.

Ethics Committee Approval

This research was conducted with the Approval of the Ethical Committee of the Department of Agricultural Economics and Extension, Delta State University, Asaba Campus on the 24/07/2019 (Ethics committee approval number: 06-2019/0056).

Peer-review

Externally peer-reviewed.

Author Contributions

Conceptualization: O.A.O., T.M.G., O.G.D.; Investigation: O.A.O., O.G.D.; Material and Methodology: T.M.G.; Supervision: O.A.O., T.M.G.; Visualization: O.A.O., O.G.D.; Writing-Original Draft: O.A.O., T.M.G.; Writing-review & Editing: - O.A.O., T.M.G., O.G.D. All authors have read and agreed to the published version of manuscript.

Conflict of Interest

The authors have no conflicts of interest to declare

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