

SOCIO-ECONOMIC IMPACTS OF THE DISTRIBUTION OF FOREST RESOURCES: A CASE OF OMO FOREST RESERVE

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Abstract

Forest products supply chains can be seen as large networks through which wood fiber is gradually transformed into consumer products. In the various supply chains, the production network is linked to a procurement network that starts in the forest which is the basis of this work. Primary and secondary data were collected for the purpose of the study. The primary data were collected through the use of questionnaire while the secondary data were collected from the records of OMO Forest Reserve and Ogun State Ministry of Forestry. The descriptive research design was adopted for the study. The data collected were analysed using descriptive statistics such as simple percentage and bar charts. Three research objectives were analysed. The findings revealed the various timber and non-timber forest products from the reserve and their socio-economic impact on the stakeholders (merchants, drivers, and operators). The results from the analysis showed that factors such as the consumer demand for forest produce, and the season of the year (dry season) were major determinants of the regularity of supply of forest produce to urban areas.

Keywords: Forest Resources, Non-Forest Resources, Supply Chain, Social Impact, Economic Impact, Ogun State.

Introduction

The target for supply chain is expected to improve the overall profitability and competitiveness of forestry activities (Ellram 2019; Pu Ikki 2001; Fisher 2017; Christopher 2018; Mentzer, et al 2001). Matching supplies with consumer demand along the entire supply chain requires a commitment to coordination of material flows across companies through sharing of information, risks, costs, and gains between the actors involved (Enabor, & Popoola 2014; Lambert & Cooper. 2000; Lee, et al. 2017a; Stank et al. 2019; Lee, et al 2017b). However, complex structures and relationships between actors can hinder progress in supply chains. Baldwin (2023) established the Theory of Constraints (TOC) and how to use them. He posited that TOC is a crucial process improvement tool that enables businesses to identify, exploit, subordinate and elevate bottlenecks within their system. There are always constraints which limit how you can produce or deliver. In the case of forest resources in Owo Forest Reserve where every action or process is interconnected, the ability to recognize and ultimately alleviate constraints within the system is an opportunity to embrace in this study.

Fisher (2017), in particular, argues that despite access to state-of-the-art technology, the performance of many supply chains has never been bad. This is due to a lack of understanding on

how to apply supply chain management (SCM) techniques across different products and markets to better serve the consumer, while simultaneously improving performance and profits.

A supply chain begins with the supply of raw materials for the products, passes through one or several steps for manufacturing, storing and distributing, and ends at the customer for the final consumption of the products.

Forest products supply chains can be seen as large networks through which wood fiber is gradually transformed into consumer products. In the various supply chains, the production network is linked to a procurement network that starts in the forest. The production network is also linked to a distribution network that ends with merchants or retailers, who, along with end users, constitute the sales network. Different modes of transportation (e.g., trucks, trains and ships) are used to transport the various products from one network to the other (Mentzer et al., 2008).

Forest product supply chains comprise of many interconnected business units that are constrained by their divergent processes. For example, one supply chain can include the producers who manage a mix of species in the forest, the various entrepreneurs who convert these trees into logs or chips, the sawmills that cut the logs into boards or dimension parts, and the pulp and paper mills that use the wood chips to create reels of paper that are then cut into smaller product rolls or sheets. These varied processes make the task of integrating the procurement, production, distribution and sales activities very complex, given that these activities are always bounded by the tradeoffs between yield, logistical costs and service levels.

The pattern of world vegetation is strikingly similar to those of the world climate. This is because plant being subject to their environment can only continue to exist in any region by adapting to the conditions of weather and climate and to a lesser degree on the conditions of soil fertility, drainage, and forest management by human activities on it. The dominant natural vegetation, can be classified simply under three heading; forest, grass and shrubs. (Jenkins and Groombridge, 2014).

Forest is one of the resources found in different continents of the world. Forest, according to Allen and Sharp as cited in Roy (2000) is a community of trees and associated organisms covering a considerable area; utilizing air, water and minerals to attain and to produce itself and capable of furnishing man and land with indispensable products and services.

Forests can be classified in different ways and to different degrees of specificity. One such way is in terms of the "biome" in which they exist combined with leaf longevity of the dominant species (whether they are evergreen or deciduous). Another distinction is whether the forests composed predominantly of broad leaf trees, coniferous (needle-leaved) trees, or mixed.

In Nigeria, forests are recognized as formidable base for sustaining the economy of the country and the livelihood of the rural populace (Ogundele and Ayo, 2006). According to oral tradition, it has been serving as provision of raw materials for both primary and secondary industries while generating social contacts and employment for a large number of the people.

The Federal Department of Forestry and other recognized forestry departments like Forestry Management Evaluation and Coordinating Unit (FORMECU) and National Forestry Action Program were all established to ensure the proper management and development of forest resources in Nigeria. Despite the contribution of these bodies, the supplies of forest resources are discovered to be ineffective and inefficient. This, according to Aruofor and Bainbridge (2019), can be attributed to the rising wave of uncontrollable exploitation of forest resources resulting in increasing rate of deforestation and the use of forest estate for other uses. For instance based on

the supply record book of Omo Forest Reserve in Ogun State, it was discovered that the produce of the reserve are not effectively distributed since only three depots are supplied. This study is therefore designed to investigate the causes and effect of the ineffective supply of forest produce from Omo Forest Reserve of Ogun State.

Supply chains are not limited to the physical products but includes the information used to manage and control all of the elements within the supply chain. Examples of this information include the demand forecast by the various manufacturing facilities: pulp mill, saw mill, and veneer mill from customers for their final products that it then translated into a demand for logs. Other information includes the production rates for the harvesting and hauling contractors are important to ensure that the forecasted demand can be met with a given harvesting capacity. Forest inventory, the prediction and estimation of various products that can be produced from the forest is a key component in supply chain management (FDF, 2018).

Finally, the actual quantity of the material that is moved from the forests, to the various manufacturing centers and having the final products shipped to customers between the elements need to be accounted for to allow for all of the parties to be paid for their activities according to their contracted rates.

Forest products supply chains can be seen as large networks through which wood fiber is gradually transformed into consumer products. In the various supply chains, the production network is linked to a procurement network that starts in the forest. The production network is also linked to a distribution network that ends with merchants or retailers, who, along with end users, constitute the sales network. Different modes of transportation (e.g., trucks, trains and ships) are used to transport the various products from one network to the other (Christopher 2018).

Christopher (2018) conducted an Operational Research for Supply Chain Planning in the Forest Products Industry. The paper presented a description of the wood fiber flow from forest to customer, providing details about the major supply chains of the forest products industry, which are the forest, the pulp and paper, the lumber, panel and engineered wood and the energy supply chains. The study dealt with a wide range of problems, ranging from long-term strategic problems related to forest management or company development to very short-term operational problems, such as planning for real-time log/chip transportation or cutting.

The study observed that, while operational planning problems usually need to be solved rapidly, within seconds or minutes, strategic planning problems can be solved over a longer period of time, sometimes taking many hours. For this reason, heuristic, meta-heuristic and easy-to-solve network methods are generally used for operational problems, whereas mixed Integer Programming (MIP) and Stochastic programming method are better for tactical and strategic planning problem (Aruofor, 2000 and Bainbridge, et al 2019).

Fisher (2017) proposed an idea for optimizing the structure of multinational pulp and paper production/distribution networks. In their article, the authors identified the main factors that have an international impact on the industry and show how these factors can be taken into account when designing a supply chain. The main factors include national taxation legislation, transfer price regulations, environmental restrictions, trade tariffs and exchange rates. However, adding these features to the planning model considerably increases the complexity of the problem (Rask, 2001; Cleaver 2009; Lee, & Belington, 2012 and Bovel & Martha 2000).

The essence of reviewing the above literature is to establish existing knowledge in supply chain of forest products. From these literature, there is the gap of socio-economic implications of supply of forest products from Owo Forest Reserve which this study intends to assess.

Research Methods

The data for this study was obtained through questionnaire administered to samples selected for the study in Owo Forest Reserve. The respondents were selected through stratified random sampling where samples were picked from the operators of the wood-cutting machines (fellers), merchants (forest contractors), transporters, log loaders, security personnel and marketers of timbers using tables of random numbers. The data was analysed using frequencies, tables and percentages.

Primary data were from questionnaire designed for the purpose which sought information such as the main forest products in the Owo forest reserve, as well as the availability of cottage and small scale industries.

Secondary data were on the supply and demand of forest produce in the Ogbere (Area J4) Forest Reserve. They were also collected from the Ogun State Ministry of Forestry. The researcher also conducted interview with the officials from Ogun State Ministry of Forestry, Range Officers, Divisional Forest Officers as well as Road Safety Officials to get adequate information that buttress the data for the analytical objectives.

Administrative Records: The secondary data collected for this study include the names and figures of trees felled by type and Local Government Area in Ogun State from 2005-2009 and also the total number of sawmills in Ogun State on a zonal basis for the year 2008 and 2009. These data were gotten from Ogun State Ministry of Forestry.

The researcher first visited the study area for reconnaissance survey. In subsequent visitation, the researcher conducted in-depth interviews with the workers in the reserve. The interviewees were encouraged to relate their own experiences to the research objectives. This also afforded the researcher the opportunity to probe into the activities of the stakeholders (producers, sawmill workers, pulp and paper mill workers, transporters, retailers and consumers) and understand the distribution processes.

A set of the research instrument used for this study was prepared for the government workers working in OMO Forest Reserve, the transporters and the saw millers. A total of 10 questionnaire were administered to the government workers while 10 and 50 were given to the transporters and saw millers respectively. The questionnaire had two sections (Section A and B). Section A sought information on bio- data of the participants while Section B sought information on the objectives of the study. Emphases on the latter were on dominant products harvested in the forest, the effectiveness or otherwise of the distribution, the implication of the effectiveness on the social and economic lifestyle of the people regarding sustainable resource development.

Results and Discussion

Table 1: The total number of sawmills in Ogun State on a zonal basis for the year 2021

S/n	Zones	Number of Sawmills
1.	Egba	57
2.	Remo	27
3.	Ijebu	48
4.	Yewa	25
	Total	209

Source: Ogun State Ministry of Forestry (2022)

There are a total of 209 sawmills in Ogun State with Egba Zone having the highest of 57 sawmills. Some of the sawmills located at Ijebu Ogbera, Abeokuta, Ijebu Igbo, Owode Yewa, Ijebu Ode and Shagamu were visited by the researcher and field assistants for the administration of the questionnaires.

Table 2: Products from the Forest

S/N	Products	Frequency	Percent
1	Beam	19	38.0
2	Plank	13	26.0
3	Firewood	7	14.0
4	Tyrod	5	10.0
5	Sawdust	1	10.0
6	Plywood	5	10.0
	Total	50	100.0

Source: Author's Fieldwork, 2021.

From the study, it was revealed that the lists of products that are generated from the logs in order of significance are beam, plank, firewood, plywood and sawdust. Also, the findings revealed that timber and charcoal are the main forest products in order of economic significant.

The socio-economic importance of the tree species encountered in the study area cannot be overemphasized. Timber is economically the most important of the products. They are sources of raw materials for several sawmills and cottage industries in the urban and rural areas in the study area and beyond.

Some cottage and small-scale industries in the rural areas depended so much on the produce for craftworks (e.g. basket weaving), carving and production of farm tool handles as well as chewing sticks, firewood, stakes, poles, nuts, honey, fruits, fodder, drugs, fibres, spices, resins and gum. This implies that harvesting the forest produce and marketing of same serve as means of economic livelihood and social interrelationships among the participants in the community.

The study reveals that the producer which involves the Ministry of Forestry, Ogun State manages the Forest Reserve through the Divisional Forest Planning Officer who monitors and evaluates forest activities being implemented by the Range Officers and forest management unit. The middlemen are the forest contractors (merchants) who have been allotted forest spaces. The

forest guards keep watch over illicit felling, removal of timber, encroachment and wildlife poaching. They also supervise the activities of the merchants to ensure their compliance with the regulations of the reserve while the fellers are contracted by the merchants for the cutting of timbers in the reserve.

Furthermore, the transporters work in line with the merchants. They transport the logs to the final consumers (sawmills) or ports for export. In terms of safety and security, the police help to apprehend forest offence culprits while the road safety officials ensures that the transporters comply with traffic/road laws and regulations. The road safety officials also provided the necessary education and training in safe-driving practices to the transporters through the transport union.

The survey revealed that the demand for forest produce was the highest (70%) followed by maturity of trees (20%) and season (10%). To the transporters, the season of the year was a major determinant for the movement of logs.

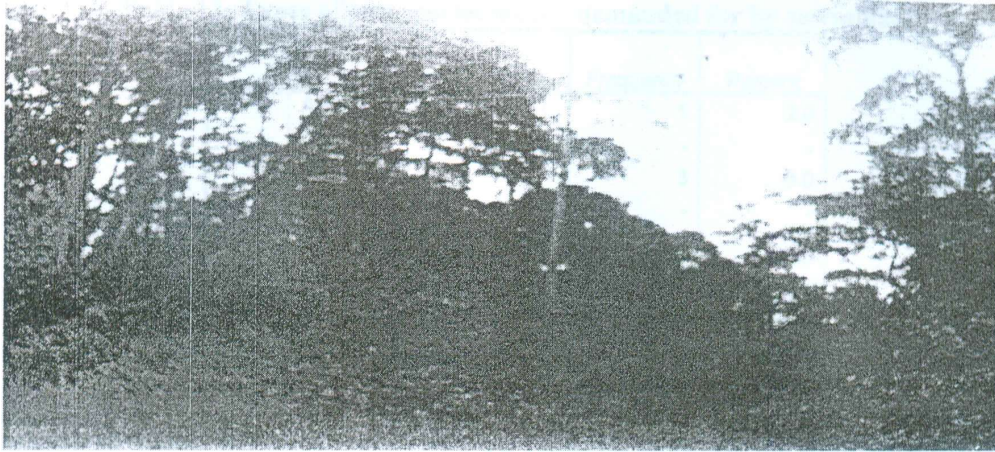


Fig 1: OMO Forest Reserve
Source: Field Survey (2021)



Fig. 2: Truck Conveying Logs on Untarred (Seasonal) Roads
Source: Field Survey (2021)

As shown on Figure 1, the season of the year (dry) determines the supply of forest produce. This can be adduced to poor accessibility to the forest reserve during the raining season as seen with trucks parked by the roadside as well as high demand for processed logs by construction companies and various consumers during the dry season. This also correlated with the findings that the consumer's need determines the demand for forest produce from the reserve. The study revealed that the rate of tree planting and resuscitation in the reserve is much lower than the rate of harvesting which has a negative impact on the effectiveness of the supply chain network. This is also in line with the study of La Londe (2014) and Kio et al (2012) when they stated that the extent of afforestation has not kept pace with the rate of deforestation in Nigeria, thus, creating a negative balance. This could drawback the continuous flow of forest products and services.

Forest dwellers interviewed in most of the enclaves reported a fall in the quality and quantity of forest resources with continuous forest degradation through over exploitation. The resources mentioned include timber and non- timber forest products namely chewing sticks, firewood, stakes, poles, nuts, honey, fruits, fodder, drugs, fibres, spices, resins and gum.

Conclusion

Forest product supply chains comprise of many interconnected business units that are constrained by their divergent processes. For example, one supply chain can include the producers who manage a mix of species in the forest, the various entrepreneurs who convert these trees into logs or chips, the sawmills that cut the logs into boards or dimension parts, and the pulp and paper mills that use the wood chips to create reels of paper that are then cut into smaller product rolls or sheets.

This study has brought to light some facts on the supply chain of forest produce in the study area. The channels involved in the supply chain of forest produce from the reserve to the consumers include the contractors, transporters and saw millers. A substantial number of people earn their livelihood from timber and timber related industries. To keep this business alive, it is the deliberate policy of the Ministry of Forestry through the Forest Reserve to allocate a part of its plantation to timber contractors for controlled exploitation (FAO, 2004).

The information obtained in this study clearly indicates the diversity of tree species in OMO Forest Reserve Area of Ogun State. If reproduction enhancement and conservation of use are not factored into the extraction of these products now, a situation could well arise in the future where these resources could become less available. This is already symptomized by the issues identified by the respondents as the problems they face in extraction and transportation, storage, and seasonal scarcity.

Recommendations

To achieve sustainable resource development in the supply chain management of forest resources in Omo Forest Reserve, inefficient use of forest produce should be discouraged. Inefficient use of resources could result in huge loss of income and alarming deforestation. The loss of income as a result of wastage of wood resource could impair economic growth, stability, and provision of social infrastructures.

The government workers identified that sustainable management of the reserve could be achieved through effective forest policy and encouragement of private sector participation in the reserve. This corroborated with Handfield's (2019) position where he stated that weaknesses in implementation of the forest policy could result in under or over exploitation of the forest resource, thus leading to inefficiency of the reserve. Also, based on the result generated from the

findings, the respondents identified several safety measures to be put in place in order to achieve effective network of supply chain of forest produce. Common to them all are good road network, proper maintenance of the vehicles, and orientation of the drivers and provision of equipment such as cranes for on-loading and off-loading of logs.

In view of the continuous demands from the reserve, integrated land use planning and management may become very important in the near future. Forest funding [or afforestation may have to shift from government to private sector and therefore, the participatory approach may become very important in sustaining the Forest Reserve.

From the study conducted, it is of the opinion of the researcher that there is need to intensify the management of the Forest Reserve, controlling the intensity of tree harvesting, improving logging practice and stopping illegal felling of trees in order to enhance the effectiveness of the supply chain network of the forest produce. Also, reduction in wood waste generated in the wood industries through adequate maintenance of machines and establishment of integrated wood industries will go a long way in reducing the pressure on the forest.

References

- Adeyaju, O. A. (2001). Time-based Manufacturing Logistics. *Logistics Information Management*. 8(3): 30-36.
- Aruofor, R.O. (2000) Review and Improvement of Data Related to Wood Products in Nigeria. Report Prepared for FAO: Rome, August 2000.
- Ben Baldwin (2023) The Theory of Constraints and How to Use Them, Evolution of the Integrated Logistics Concept. In: *The Logistics Handbook*. J.F. Robeson and W.E. Copacino, (eds). The Free Press: New York, USA. 933 pp.
- Bovel, D. and Martha, J. (2000). From Supply Chain to Value net. *Journal of Business Strategy*. 23(4): 23-28.
- Bainbridge, D. A. and S. M. Mitchell. (2019). Sustainable Agriculture for California: A Guide to Information. California: University of California Sustainable Agriculture Research and Education Program.
- Christopher, M. (2018) *Logistics and Supply Chain Management - Strategies for Reducing Cost and Improving Service*. Prentice Hall: London, 294 pp.
- Cleaver, I. and Schreaber, A. (2009). Socio-economic Problems Affecting Forestry in Sub-Saharan Africa. In: *Private Sector and Socio-economic Assessment Report*. FORMECU, Abuja, Nigeria. 5th March, 1998. pp. 13.
- Ellram, L.M. (2019). Supply Chain Management: The Industrial Organisation Perspective. *International Journal of Physical Distribution & Logistics Management*. 21.(1): 13-22.
- Enabor, E. C. and Popoola, L. (2014). Nigeria Forest Revenue System Review and Proposal. Unpublished. FORMECU, Abuja, 17pp
- FAO. Country profile. Prepared by the Forestry Planning and Institutions Services of FAO, Rome. Internet address: www.fao.org/forestry/site/23747/en/nga 2004-25-06.
- FDF. (2018). Country Report; Nigeria. in: 11th session of African Forestry and Wildlife Commission, Dakar, Senegal. 8- 17, April, 2018. Federal Department of Forestry, Abuja, Nigeria.
- Fisher, M.L. (2017). What is the right supply chain for your product? *Harvard Business Review*. (March-April): Pp.1 05-116.
- Handfield, R.B. and E.R. Nichols, Jr. (2019). *Introduction to Supply Chain Management*. Prentice-Hall Inc.: New Jersey, USA. 183 pp.
- Jenkins M.D. and Groombridge B.,(2014) *World Atlas of Biodiversity: Earth's Living Resources in the 21st Century*, World Conservation Monitoring Centre, United Nations Environment Programme, retrieved 4th of August 2022.
- Kio, P.RO., Abu, J.E and Lowe, R.G. (2012). High Forest Management in Nigeria. Invited Paper for the IUFRO Centennial Conference, Eberswalde, Germany.
- La Londe, B.J. (2014). Evolution of the Integrated Logistics Concept. In: *The Logistics Handbook*. J.F. Robeson and W.E. Copacino, (eds). The Free Press: New York, USA. 953 pp.
- Lambert, D.M. and Cooper, M.C. (2000). Issues in Supply Chain Management. *Industrial Marketing Management*. 29 (1): 65-83.

- Lee, H.L. (2000). Creating Value Through Supply Chain Integration. *Supply Chain Management Review*. 4(5): 30-39.
- Lee, H.L. and Billington, e. (2012). Managing Supply Chain Inventory: Pitfalls and Opportunities. *Sloan Management Review*. 33(3): 65-73.
- Lee, H.L., Padmanabhan, V. and Whang, V. (2017a). The Bullwhip Effect in Supply Chains. *Sloan Management Review*. 38(4): 93-102.
- Lee, H.L., Padmanabhan, V. and Whang, V. (2017b). Information Distortion in a Supply Chain: The Bullwhip Effect. *Management Science*. 43(4): 546-558.
- Mentzer, J.T., W. DeWitt, J.S. Keebler, S. Min, N.W. Nix, C.D. Smith, and Z.G. Zacharia. (2001). What is Supply Chain Management? In: *Supply Chain Management*, J.T. Mentzer, ed. SAGE Publications, Inc.: Thousand Oaks, California, USA. pp. 1-25.
- Ogundele, F.O. and Ayo, O. (2016) Changing Forest Biodiversity in Southwest Nigeria between 1985 and 1995: A case Study of Ondo State. *Indonesia Journal of Geography*, Vol. 38, NO.2, Pp.126-141.
- Pu Ikki, R. (2001). Role of Supply Chain Management in the Wise Use of Wood Resources. *Southern African Forestry Journal*. 191: 89-95.
- Rask, L-O. and Andersson, P.(2001). Supply Chain Configuration and Logistical Solutions in Swedish sawmilling Industry: A Contingency Approach. Working Paper. School of Industrial Engineering, Vaxjo University, SE-351 95, Vaxjo, Sweden. 17 pp.
- Roy, P.K. (2000), *Resources Studies*. Calcutta: Central Educational Enterprises.
- Stank, T., M. Crum, and M. Arango. (2019). Benefits of Interfirm Coordination in Food Industry Supply Chains. *Journal of Business Logistics*. 20(2): 21-43.