

**PROCESSING AND MARKETING OF GUM ARABIC
IN BORNO STATE, NIGERIA.**

BY

SAMBO, MATTHEW BATSAA

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DEDICATION

This study is dedicated to the Glory of God and my beloved parents; Late Sambo and aged Mary.

DECLARATION

I hereby declare that this thesis was written by me and that it is a record of my own research work. It has not been presented before in any previous application for a higher degree or reputable presentation elsewhere. All borrowed ideas have been dully acknowledge by means of references.

Sambo, Matthew Batsaa

Date

The above declaration is confirmed by

Prof. A.O. Ogungbile
Chairman Supervisory Committee

Date

CERTIFICATION

This thesis entitled “Processing and Marketing of Gum Arabic in Borno State” by Sambo, Matthew Batsaa meets the regulations governing the award of the degree of Masters of Science in Agricultural Economics of Ahmadu Bello University, Zaria and is approved for its contribution to scientific knowledge and literary presentation.

Prof. A.O. Ogungbile
Chairman Supervisory Committee

Date

Dr. J.F. Alamu
Member Supervisory Committee

Date

Dr. Benjamin Ameh
Head of Department
Agricultural Economics and Rural Sociology

Date

Dean, Postgraduate School

Date

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ABSTRACT

The study investigated the processing and marketing systems of Gum Arabic in Borno State. Five local government areas were purposively selected for the study based on availability of the produce under review. A total of 192 respondents were sampled for the study. They include: Farmers/Collectors (106), Rural Assemblers (78) and Urban Assemblers/Processors (8). Structured questionnaire and oral interviews were used for primary data collection. Data collected were analyzed using descriptive statistics, simple index number, gross margin and marketing performance measuring techniques; marketing margin and efficiency.

The results of the study show that, the average age of the respondents was 45 years. Also, about 40% of females mostly from nomadic families participated as collectors while male dominate other areas of processing and marketing of Gum Arabic. A seven-year simple index number analysis indicated an annual price increases from 1998 – 2003 with a more than 30% remarkable price increased from 2003 - 3004. The result of gross margin and average rate of returns analysis shows that, for each metric tonne of grades I, II and III Gum Arabic processed, a gross margin of ₦21,800, ₦9,120 and ₦1,660 respectively was received. Also average rate of returns of ₦1.32, ₦1.26 and ₦1.08 was received for every one naira invested in processing each metric tone of grades I, II and III Gum Arabic respectively. The Urban Assemblers recorded the highest average marketing margin of 24.8%, 22.8% and 36.1% for grades I, II and III respectively. Commission agents who acted on behalf of their client, received the lowest

marketing margin of 3.2%, 3.6% and 3.1% for grades I, II and III respectively. The marketing efficiency analysis for the five markets studied shows that Maiduguri market recorded the highest average efficiency of 116% while; Kukawa market recorded the lowest average efficiency of 62% for grades I,II and III. The first three major problems of the processors were adulteration of produce, lack of industrial processing facilities and financial problems, while adulteration of produce, poor market information and financial problem were the first three major problems of the marketers.

The study suggested that Gum Arabic testing and other marketing facilities should be provided by NAGAPPEN and Government at the market and processing areas. Traders and manual processors of Gum Arabic should form co-operative Societies in order to facilitate loans procurement and repayment from financial sources and also to ease flows of market information. Gum Arabic producing States should build and equip processing facilities in their states which can be later privatized.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Gum Arabic is an exudate from the stem and branches of *Acacia spp.* a native to hot, dry and barren regions of Africa and the Middle East. The exudate, dries to form crystal nodules which are white or brown in colour. Traditionally, the best gum was obtained from the region of Sudan where it has been reportedly traded for over 4,000 years (Streed, 1991). The Gum Arabic tree often referred to as “Desert Gold” is the most important economic tree naturally well adapted to Sudan-Sahelian ecological zone (Abubakar, 1998). There are many plantations of *Acacia Spp.* in Nigeria where Gum Arabic has never been harvested. These trees were planted for afforestation; yet remain untapped resource National Association of Gum Arabic Producers, Processors and Exporters of Nigeria (NAGAPPEN, 2002). This important tree could be found growing wildly or in plantations in ten (10) States of Nigeria. These states include: Adamawa, Bauchi, Borno, Jigawa, Kano, Kebbi, Plateau, Sokoto, Yobe and Zamfara (Yakasai, 1998 and Raza *et al*, 2001).

The old Borno State (now Borno and Yobe) may very well top the list among the states that produce this important forest resource (Odo, 1994). Available records from Borno State Ministry of Agriculture and Rural Development (BSMARD) and NAGAPPEN show that, Borno state’s total production capacity of Gum Arabic presently is put at 4,500-5000 m/t per annum for grades I, II and III. The annual production capacity of grade I

alone is put at about 2,000-2,500 metric tonnes. With an increase in the production of improved seedling, better agricultural (silvicultural) practices; good harvesting and post harvesting practices, production capacity of Borno State can be increased by three times in the next 5–10 years (NAGAPPEN, 2002 & BSMARD, 2003). Although, there are about 1,000 species of *Acacia*, only few species have been identified to produce gum of desirable quality or grade. Presently, there are three known grades of Gum Arabic.

They include: -

- (i) Grade I (*Acacia senegal*) Dakwara
- (ii) Grade II (*Acacia sieberiana*) Dushe
(*Acacia seyal*) Farar Kaya
(*Acacia saeta*) and
- (iii) Grade III (other *Acacia spp*). It is important to note that there are some non *Acacia spp* that produce grade III gum. The largest amount of grade I is produce in the Borno, Yobe and Jigawa States. The best type of grade II is from Plateau and Bauchi States, while the best of grade III is from Bauchi State (Yakasai, 1998, Raza *et al*, 2001 and NAGAPPEN, 2002).

Processing is the conversion of a commodity from its raw state to a form more acceptable to buyers or to the next stage in the distribution chain (Olukosi, and Isitor, 1990). The gum Arabic in its raw form is normally of hard texture and is usually contaminated with foreign matters, which should be removed before use. To achieve this, centrifugal or filtering at 30% w/v

solution at about 90⁰C (194⁰F) is an effective method of cleaning. Spray drying can be used to obtain the gum in powder form, which dissolves more readily than the raw product (Lees and Jackson, 1973). Processing of Gum Arabic adds value to the produce. Raza et al, (2001) reported that when unprocessed Gum Arabic was sold at \$2,500 per metric tones, the processed one was sold oat \$14,000 per metric tonnes.

According to Lawal (1998), Nigeria has no adequate facilities to process Gum Arabic into semi-finished or finished products. Also Raza, *et al*, (2001), reported that there are no processing and testing facilities in Borno State, but that such facilities only exist in Dangote Gum Arabic Company in Kano. Processing of Gum Arabic in Borno State is therefore reduced to sieving, cleaning and sorting of the gum into different grades.

Marketing is the organization, planning and controlling of the firm's resources, policies and activities with a view to satisfying the need of a chosen customer or group (William, 1971 and Ifezue, 1990). It therefore envisages storage, transportation, processing and delivering of the final product to the end users. According to Kotler (2003), Marketing is a societal process by which individual and group obtain what they need and want through creating, offering and freely exchanging products and services of value with others. Agricultural marketing on the other hand is the performance of all business activities, which direct the forward flow of Agricultural goods and services to consumers in order to accomplish the producer's objectives (Olukosi and Isitor, 1990).

Gum Arabic has been traded in the world with European countries importing the commodity or product (Gum Arabic) mostly from Sudan. Today, at least ten (10) countries from Sahelian region of Africa produce and export Gum Arabic. These countries include: Sudan, which before 1980 provided 75-85% of the world export, Mauritania, Senegal, Mali, Nigeria, Niger, Chad, Tanzania, Ethiopia, Somalia and Libya (NAOS 1978 and Yakasai, 1998) The international market is highly monopolized through a

cartel of about five companies operating in Europe USA and Japan. This group of company has a network of agents and has the capacity to buy almost all raw Gum Arabic directly from the producing nations (Lawal, 1998).

In Nigeria, marketing of Gum Arabic domestically is liberalized and is in the hands of private traders/merchants from farm gate to export. The sale of Gum Arabic in the local market is in Mudus or 50kg bags (Yakasai, 1998). Available records show that the volume of Nigerian Gum Arabic traded in the world market within the last 21years and before 1994 in the then Borno State total 1.6 million m/t (Mshelia 1994). In 1998, the annual export volume of Gum Arabic in Nigeria stood at about 7000-8,000 m/t (Lawal, 1998). Presently, Nigeria has the potentials of producing and exporting over 9000 m/t of Grade I of Gum Arabic (NAGAPPEN, 2002 & BSMARD, 2003). Today, Borno State produces over 2,400 m/t of grade I gum Arabic and has the potential of producing over 4,700 m/t in the next six (6) to seven (7) years. (NAGAPPEN, 2002 & BSMARD 2003).

The price of Gum Arabic in Nigeria fluctuates within a year and between years. The price variation of Gum Arabic depends on grade and season.

Table 1.1 Annual exports Price Variations of Gum Arabic (1989-1998)

Year	Grade/ Price ₦/tonne	
	Grade I	Grade II
1989	45,000	7,500
1990	40,000	10,000

1991	50,000	15,000
1992	75,000	18,000
1993	60,000	20,000
1994	190,000	30,000
1996	200,000	35,000
1998	260,000	40,000

Source: Lawal, 1998: Exports marketing of Gum Arabic; Nigerian experience

Gum Arabic (*Acacia spp*) has a wide range of economic importance. It is used in the following areas: -

- i. Environmental protection and improvement
- ii. Food industry as emulsifier, stabilizer, flavour, adhesive etc.
- iii. Pharmaceutical and Cosmetics as stabilizers and emulsifiers
- iv. Lithography as sensitizer for lithographic plate and element in light sensitive composition
- v. Pottery as a glazing agent
- vi. Surgery as adhesive to graft destroyed peripheral nerves
- vii. For producing high quality paper and textile materials (NAOS, 1979, FAO, 1984, streed 1991, Ubi, 1994, Umar, 1998 and TIC. 2002).

1.2 Problem Statement

Considering the high economic potential of Gum Arabic in Nigeria, the Government of Federal Republic of Nigeria has deliberately attempted to boost the production of Gum Arabic. To achieve this objective, policies

and programmes aimed at promoting the cultivation of *Acacia spp* from which Gum Arabic is produced were initiated. To this effect, *Acacia spp* especially *Acacia Senegal* from which grade I Gum Arabic is produced is one of the eight tree crops considered for the National Accelerated Industrial Crop Production (NAICP) programme. The forestry department of the Federal Ministry of Agriculture and Rural Development in conjunction with state Ministries of Agriculture and Rural developments have produced more than 1.8 million of Gum Arabic seedlings (Emecheta, 1994 and Bello, 2002).

To gear up the effort of Government, research has been conducted and papers presented in the area of raising of seedlings (Emechata, 1994), field management practices (Odo, 1994), pest and disease control (Anaso, 1994) and economic importance of Gum Arabic (Ubi, 1994). But hitherto, the Gum Arabic full potential has not been explored due to un-regulated processing and poor marketing development among other problems (Abubakar, 1998). However the processing and marketing of Gum Arabic in most of the producing areas are characterized by dearth of records, which are hardly updated. This suggests that the areas has not been given the adequate attention required by individuals, groups and government.

This study therefore, was aimed at addressing some relevant research questions as follows: -

- i. What are the socio-economic characteristics of Gum Arabic participants in processing and marketing in the study area?

- ii. What is the organizational frame for processing of Gum Arabic?
- iii. What are the costs and proceeds from processing of Gum Arabic in the study Area?
- iv. What are the marketing seasons and price variations of Gum Arabic in the study area?
- v. What are the marketing structure, conduct and performance of Gum Arabic in the study area?
- vi. What are the problems militating against the processing and marketing of Gum Arabic?

1.3 Objectives of the Study

The broad objective of the study was to investigate the processing and marketing system of Gum Arabic in Borno state. The specific objectives are to: -

- (i) identify the socio-economic characteristics of participants in processing and marketing of Gum Arabic in the study area.
- (ii) identify the organizational frame for processing of Gum Arabic.
- iii) determine the cost and returns of processing Gum Arabic.
- iv) examine the Gum Arabic seasonal marketing and price variation within and between seasons.
- v) determine the market structure, conduct and performance of Gum Arabic.
- vi) identify problems militating against the processing and marketing of Gum Arabic

1.4 Justification of the Study

Gum Arabic is produced in area where conventional agriculture is very difficult; poverty is rife and economic development extremely difficult. These conditions make the production, processing and marketing of the Gum Arabic worthy ventures. The processing and marketing ventures of Gum Arabic generate employment and improve the economic power and welfare of the local inhabitants in the Gum Arabic producing area (NAOS, 1978 and Yakasai, 1998). These benefits can be achieved through the active participation of both the rural and urban inhabitants in not only the production, but also processing and marketing of Gum Arabic.

This study can be justified in the following ways: - The study will provide domestic data base on processing and marketing of Gum Arabic that could help to stimulate more rural and urban participation (employment) in the economic activities of Gum Arabic processing and marketing. The proceeds from processing and marketing of Gum Arabic received by the participants will improve their economic empowerment. It is also envisaged that the study will provide current national database on Gum Arabic processing and marketing that could attract foreign investments in processing and marketing activities of Gum Arabic in Nigeria.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Classifications and Habitat of Acacia Species

Acacia Senegal is a Xerophytic plant that grows in dry habitats of Sudan and Sahel Zones. The plant tolerates water deficit and therefore able to endure condition of prolonged drought associated with the arid region (Purseglove, 1972, Gibbon & Pain 1988 and Emecheta, 1994). Also the plant can grow well on poor, coarse-texture soils and even on Rocky areas difficult for other crops to grow (NAGAPPEN, 2002). In Nigeria specifically, Yakasai (1998), reported that the plant thrive in areas of rainfall ranging between 250-1000mm and temperature ranging between 20-40⁰C. However, he noted that some *spp such as*: - *Acacia dudgeoni*, *Acacia gourmaensis* and some species of *Acacia sieberain* are found in as far as the old Oyo State, thereby donating a difference in term of weather conditions.

There are over 100 species of acacia known to exude Copious amount of gum. However, few species have been identified to produce Gum of commercial promises and deserve exploratory research attention from industrial chemist and Agronomist (NAOS 1979, Streed, 1991 and Yakasai, 1998). Some of the few *acacia spp* of economic value are: -

- *Acacia senegal* (Dakwara)
- *Acacia leata*
- *Acacia sayel* (Dushe)
- *Acacia sieberiana* (Farar Kaya)

- *Acacia albida* (Gawo)
- *Acacia macrothepsa* (Gwanno)
- *Acacia pothacantha* (Farichin Haramata)
- *Acacia nilotica* (Bagaruwa)
- *Acacia dudgeoni*
- *Acacia gournaensis*
- *Acacia macrostachya* (Gardaye)

A. Senegal is an extremely drought resistant plant. This species initially was not usually cultivated but the wild trees are owned. The young trees are protected to some extent from grazing by goats and other animals (Anaso, 1994). However, some plantations have been seen established by government, communities and individual farmers. Example of these plantations is Alhaji Muhammed Kurama Plantation, which was established in 1987 and by 1994, the plantation was due for tapping (Odo, 1994). Also some state governments e.g. Jigawa state has established state own Gum Arabic plantation (Bello, 2001). Today the effort of both federal and state governments of Nigeria through the Ministry of Agriculture has resulted to the production of 1.8 million of Gum Arabic seedlings for plantation (Bello, 2002).

2.2 Economic Importance of Gum Arabic (*A. Senegal*)

Gum Arabic plant often referred to as “Desert Gold” has a wide range of economic importance. The Gum Arabic producing communities and those

involved in its trading, benefit financially. Initially, Gum Arabic was used locally as additive in ink (Tawada), adhesive and few minor uses.

As a leguminous plant, *Acacia Senegal* has been found to have the capacity of fixing Nitrogen in the soil, enhances soil moisture conservation, and reduces desertification and soil erosion. Its leaves are palatable and are readily consumed by livestock: Goats, Sheep, Cattle and even Chickens (Ubi, 1994, Wickens *et al*, 1984 and FAO, 1984). In Northern Kordofan of Sudan, agricultural production cannot be taken separately from the production of *A Senegal* since they are closely linked. In the region, returns to crop production over the 20 years rotation period reflect the indirect environmental benefits of Gum Arabic planting in terms of maintaining soil stability and fertility, water retention, dune stabilization and wind protection (Sharawi, 1986).

Gum Arabic is useful in confectioneries: Preparation of sweets chocolates, pies and pastry. It is also used as emulsion in many diet, drinks, and drugs. It is used in ink, paints industry, as adhesive, in paper and textile industry to produce high quality paper with glossy appearance and quality textile materials. Also Gum Arabic is used in Pharmaceutical and Cosmetics; as stabilizers and emulsifiers, lithography; as sensitizer for lithographic plate and element in light sensitive composition, pottery; as a glazing agent, surgery; as adhesive to graft destroyed peripheral nerves (Ubi, 1994, Emecheta, 1994, Streed, 1991, FAO, 1984, NAOS, 1979 Lee and Jackson, 1973 and NAGAPPEN, 2003).

No artificial or synthetic substitute has been found that can match Gum Arabic extraordinary foam forming and emulsifying quality, despite every incentive to find one, it is not likely that it will be replaced by an artificial alternative because of its unique natural characteristics (Turaki, 2002).

Today Gum Arabic is an export commodity that is not only economically viable, but also rated among most economically promising agro-forestry commodity in the country (Yakasai, 1998). In the South Darfur system of Sudan, poor annual crop performance means that Gum Arabic cultivation is the only activity that has positive returns (Barbier, 1992). In view of the wide range of gum Arabic economic importance, dealers of Gum Arabic are searching for it frantically. Any meaningful afforestation programme in Sudan- Sahel zone of Nigeria should therefore, prominently feature Gum Arabic (Ubi, 1994).

2.3. Processing of Gum Arabic

Nigeria, according to Lawal (1998), lack adequate facilities for processing of Gum Arabic into Semi-finished or finished products. Effort put forward by Raw Materials Research and Development Council (RMRDC), former Borno State (Borno and Yobe) and private entrepreneur in the area of Gum Arabic processing some years ago, is yet to yield the desired result. Nigeria can only boast of the modern laboratory for Gum Arabic analysis and quality control, which is at the mercies of private entrepreneur (Dangote

Group). In Africa, only Sudan has adequate facilities to process Gum Arabic in various form, grades and specifications (Lawal, 1998).

Naturally, good Gum Arabic is colourless odourless and tasteless (Anaso, 1994). Fruit or processed Gum Arabic is normally of hard texture and is produced from any of the three grade of Gum Arabic (Lees and Jackson, 1973). In recipes, the amount of Gum Arabic exceeds the quantity of ingredients and is therefore a major factor in determining the texture of final product. Before processing Gum Arabic, it should be broken into pieces by means of a kibbling machine to achieved easier formation of solution (*Lees and Jackson, 1973*).

2.3.1 Gum Arabic Formation

The precursors, enzymes and pathway of the biosynthesis of Gum Materials are not precisely known. Although, the phenomenon of Gum formation termed “*Gumosis*” occurs in the cavities (Gum ducts) localized in the bark of *Acacia senegal* (Falu, 1982). The cambium is involved in the formation of the special group of parenchymatious cells, which subsequently form gum duct when gumosis starts. Gum formation therefore result from the metamorphosis of the organized cell wall materials into unorganized amorphous substances, which is the gum (Brown *et al*, 1952). Starch is the major ingredient utilized as source for gum formation.

Greater amount of gum formation is induced by harsh environmental conditions. Hence, the tapping of Gum Arabic usually commences at the end of

the raining season and during on-set of hamattan period, Oct.-March (Odo, 1994).

2.3.2 Tapping of Gum Arabic

Tapping required skillful removal of about 1-3cm wide strips of bark of the gum Arabic tree. The width of the strip often depends on the thickness of the branches being tapped. It is however important that tapping is maintained on one side of the branches for each year. In the following year, tapping may then be shifted to the other opposite side of the branches. With good tapping *Acacia senegal* can continue Producing for 10-15 years or even more (Odo, 1994). Proper tree care and harvesting techniques make good business sense. These techniques according to NAGAPPEN 2002, include:

- i. Make the incision only on trees that are as tall as or taller than an adult person.
- ii. Make the incision on a line equal to or higher than your waist.
- iii. Cut on limbs that are equal to or smaller than the size of your wrist. Smaller limbs give better gum and greater quantities.
- iv. Cut as wide as two fingers and as long as out stretched hand. Do not cut more than 20% of the circumference of the limb.
- v. Cut through the back and the real part of the wood just until you see the white center.
- vi. Make only one cut for every metre of branch. Too many cuts can hurt the tree and reduce gum quality.

- vii. After you have made cuts in the tree, gum start to ooze in 2-3 days. It will be ready to pick in 2 weeks.
- viii. Where possible, collect gum by hand. If you are using a long stick to knock down the gum, spread a cloth tarp on the ground first to keep the Gum from falling onto the dirt.
- ix. Harvest gum only during the cool and dry season (Dec.-April).

2.3.3 Cleaning and Grading of Gum Arabic

Gum Arabic received from farmers/collectors should be cleaned of any impurities (Wood and other foreign particles) and danger (Dark Reddish Gum). Danger, if allowed can change the colour of a whole batch. Cleaned gum should not contain more than 4% level of impurities. Cleaning is often carried out manually (Umar, 1998).

Grading is based on degree of cleanliness and purity. It is therefore important to collect clean and pure Gum Arabic to attract higher market price (Odo, 1994). The most commonly used method of grading of Gum Arabic in Nigerian's local markets is by attaching numerical value to the quality. Presently, there are three grades: -

Grade I (*Acacia senegal*) Dakwara

Grade II (*Acacia sueberiana*) Dushe

(*Acacia seyal*) Farar Kaya)

Grade III (Other *Acacia spp*).

The largest amount of grade I is produced in the old Borno State (now Borno and Yobe) and Jigawa State. The best type of grade II is from Plateau and Bauchi, while the best of grade III is from Bauchi State (Yakasai, 1998).

2.3.4 Step-by-Step Processing of Gum Arabic

The Gum Arabic in its raw state is normally of hard texture and is usually contaminated with sand and bark of the tree. The Kibbled Gum Arabic should be dissolved in cold water in the proportion of 80 parts of Gum Arabic to 100 parts of water. The gum should then be slowly steam heated at low pressure to bring about solution. After the gum has completely dissolved it should be sieved and cleaned by passing through a series of sieve of filter cloth or by centrifugal methods. To aid filtration, sugar solution may be added to gum prior to cleaning (Lees and Jackson, 1973).

2.4 Marketing of Gum Arabic

Traditionally, the best Gum Arabic was obtained from the Kordofan region of Sudan from where it has been traded for over 4000 years. Much of the gum now available is obtained from variety of countries in the Sahel region of Africa (Streed, 1991).

Marketing of Gum Arabic is recently getting more organized and more sophisticated as against its initial local marketing. It involves the use

of capital, time, skill and expertise. However, there is little involvement of Government in local marketing of Gum Arabic in Nigeria (Yakasai, 1998).

2.4.1 Market Structure And Channel

The marketing of Gum Arabic occurs in four or five stages; i.e. farmers/collectors, Agents, local dealers, whole sellers/merchants, exporters/export merchants and importers (Lawal, 1998 and Yakasai, 1998). The farmers/collectors transport their Gum Arabic in small quantities to nearby market for sale to agents and local dealers. The agents and local dealers, who are experts in quality control, carry out their transactions on a commission basis. They act on behalf of the whole sellers/merchants or exporters/export merchants. The wholesalers now sale to the exporters who in turn sale to the importers.

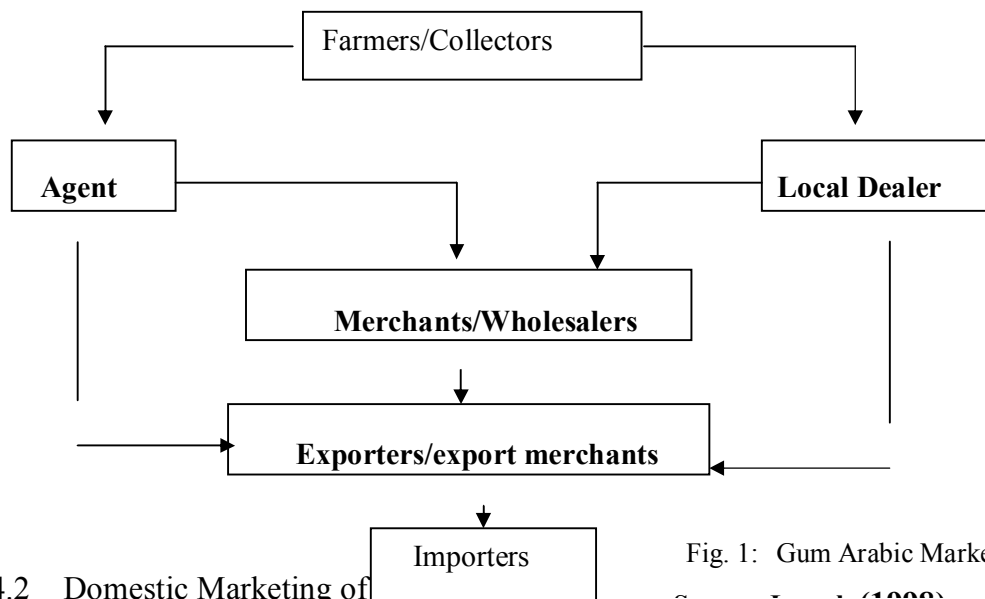


Fig. 1: Gum Arabic Market channel

2.4.2 Domestic Marketing of

Internal or domestic marketing of Gum Arabic as reported by Lawal (1998), is carried out under private sector arrangement. The marketing of the product is liberalized and is in the hands of private traders/merchants from the collection point to export.

The sale of Gum Arabic in the local market is in *mudu* or 50kg bags (Yakasai, 1998). Once farm-gate purchase is made, the marketing role of the farmers/collectors ceases. Sometimes, local prices according Lawal (1998), are higher than what is obtained in the international market.

It has however, been observed that Gum Arabic is often the principal source of revenue for semi-nomadic people. These primary Gum Arabic collectors often receive little proceeds from the middlemen. Hence, proper monitoring and regulation of the marketing of Gum Arabic may be required to Curb with this problem (Mshelia, 1994).

2.4.3 International Marketing of Gum Arabic

The American and European Countries have over some years imported Gum Arabic mainly from Sudan and Arab Countries, hence the name. But today, more than ten (10) countries, mostly African countries including Nigeria produce and export Gum Arabic in commercial quantities (NAOS, 1979, Wickens *et al*, 1984).

The price in the world market depends on grade. The Sudanese production and hence the bulk of the world market supply has always been

based on two *Acacia species*: *Acacia senegal* (Gum Hashab), which is the superior grade and *Acacia seyal* (Gum Tahla), which is the inferior grade. The price of Gum Arabic in export Sudan in 1983 was 1500 US dollars per tonne (Wickens *et al*, 1984). Also, the Sudanese Gum Arabic received as high as \$17,400 per m/t in 1997, and \$24,000 per m/t in 2001 in the International market.

Nigeria, according to Lawal 1998, is the second world producer of Gum Arabic with an annual estimate of 8000-9000m/t of both Hashal, and Tahla spp in three known grades. Annual export volume stood at about 7000-8000m/t. Mshelia (1994), reported that the three grades of Gum Arabic in the market attract different prices. These prices ranges between N2, 000-N10, 000 per 50kg bag. Yakasai (1998), also reported that in Kano market, the price of gum Arabic ranges between N11, 000 per tonne to N60, 000 per tonne at peak period of production and N20, 000 per tonne to N100, 000 per tonne at low period of production, These price ranges cut across the three grades of the Gum Arabic.

The international marketing system is highly monopolized through a cartel of about five companies operating in Europe, USA and Japan. This group of companies has a network of agents. The cartel has the capacity to buy almost all raw Gum Arabic directly from the producing nations such as Sudan, Nigeria, Senegal, Chad and Niger. This group resells the product (Gum Arabic) to end users at optimum profit (Lawal 1998). Export of Gum Arabic from Nigeria has suffered some setbacks due to poor quality, adulteration of grades, poor packaging and sometimes-falling world market price.

CHAPTER THREE

3.0 METHODOLOGY

3.1 The Study Area

The study was conducted in Borno State of Nigeria. Borno State is located in the northeast corner of Nigeria between latitudes 10°10' and 13°40'N and longitudes 12°50' and 14°20'E within the Guinea, Sudan and Sahel ecological zones of Nigeria where *Acacia Senegal* thrives very well. The state occupies a total land area of about 76,050km² and has a population of about 2.6 million people based on the 1991 census. There are many ethnic groups, with Hausa, Kanuri Bura and Marghi widely spoken as the common languages. The major occupations of the people are farming, livestock rearing and fishing.

3.2 Sampling Procedure

The field survey covered five (5) local government areas that were purposely selected based on the availability of the produce under review. They include: Maiduguri, Gubio, Monguno, Guzamala and Kukawa. One major market from each Local Government was selected for the study. They include: Maiduguri, Gubio, Monguno, Guzamala and Kukawa markets.

3.3 Sampling Frame and Samples Size

An estimated population of 1060 farmers/collectors, 390 Rural Assemblers and 40 Urban Assemblers (Manual processors) as obtained from Borno State Ministry of Agriculture and Rural Development (BSMARD) and National Association of Gum Arabic Producers, Processors and Exporters of Nigeria (NAGAPPEN) were in processing and marketing of Gum Arabic in the study area. Ten percent (10%) of the farmers/collectors, twenty percent (20%) each of Rural Assemblers and Urban Assemblers (Manual processors) were sampled. Details of the samples size is given in Table 3.1.

TABLE 3.1: Samples Size of Farmers/collectors, Rural and Urban Assemblers

MARKET/LGA	FARMERS (COLLECTORS)	RURAL ASSEMBLERS	URBAN ASSEMBLERS (MANUAL PROCESSORS)
Maiduguri	-	-	8
Gubio	31	25	-
Monguno	29	21	-
Guzamala	25	17	-
Kukawa	21	15	-

Total	106	78	8
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Table 3.1 shows that one hundred and six (106) farmers, seventy eight (78) Rural Assemblers and Eight (8) Urban Assemblers were sampled for the study. This gives a total of 192 respondents for the three (3) categories of Gum Arabic participants in processing and marketing of Gum Arabic in the study area.

3.4 Data Sources and Collection

Primary and secondary data were used for the study. The secondary data were sourced from previous records of prices, estimated volume of Gum Arabic traded by the marketing participants. Also, data on some of the major constraints to processing and marketing of Gum Arabic were collected. These data were collected from relevant Government Agencies e.g. Borno State Ministry of Forestry and Wildlife, Farmers, Traders of Gum Arabic and Gum Arabic Association e.g. National Association of Gum Arabic Producers, Processors and Exporters of Nigeria (NAGAPPEN).

The primary data were collected in 2004 with the aid of structured questionnaire and oral interviews. The questionnaire was divided into sections to cover all types of participants in processing and marketing of Gum Arabic. The data collected included: Socio-economic

characteristics of the farmers/collectors, processors and traders such as: age, educational status, marital status, household size, source of finance and cooperative membership. Cost and proceeds (returns) from processing and marketing of Gum Arabic were analyzed. To determine marketing and price efficiency of Gum Arabic, data on price fluctuations, cost of marketing services and marketing margin and efficiency were collected and analyzed. Also current data on processing and marketing constraints were collected from processors and traders of Gum Arabic.

3.5 Analytical Techniques

The choice of analytical tools used depended on the nature of data available and the objectives of the study. Based on these considerations, the following analytical tools were used to analyze the data collected in order to achieve the objectives of the study.

- i) Descriptive statistics
- ii) Gross margin analysis
- iii) Price relative or simple index number.
- iv) Marketing performance measuring techniques; Marketing Margin and Efficiency.

3.5.1 Descriptive Statistics

Descriptive statistics such as mean, range, percentages were used.

This tool was used to achieve objectives 1 and 6

3.5.2 Gross Margin Analysis

The Gross Margin Analysis determines the difference between the Gross farm income (GI) and the total variable cost TVC (Olukosi and Erhabor, 1988). In this study the gross margin analysis was applied to measure the cost and returns for Gum Arabic processors. The formula for calculating the gross margin is given as follows:

$$GM = TR - TVC \dots\dots\dots(1)$$

Where

GM = Gross Margin

TR = Total Revenue

TVC = Total Variable Cost

$$TVC = \sum_{i=1} x_i r_i \dots\dots\dots(2)$$

Where

TVC = Total cost of processing per tone

X_i = Quantity of input used in processing one tone of Gum Arabic

r_i = Price per unit of input

n = Number of respondents

$i = 1,2,3 \dots\dots\dots n$

Revenue

$$TR = QP \dots\dots\dots(3)$$

Where

TR = Total Revenue derived from selling the quantity of processed Gum Arabic obtained from one tone of unprocessed Gum Arabic.

P = Average selling price of the processed Gum Arabic

In this study, the processor variable cost items include unprocessed Gum Arabic, transportation, market tax, loading/off loading, storage cost, cleaning, sorting into grades, packaging. The fixed costs (warehouse) in their activities were almost non-existent because the fixed items are hired and paid for per duration.

The gross margin analysis from the foregoing becomes applicable in analyzing the profitability of the Gum Arabic processing as undertaken in Borno State.

The tool was used to achieve objective 3

3.5.3 Price Relative or simple index number

This technique was used to determine price variation of Gum Arabic over a given period of time (7 years). The simple index number analysis helps to explain by how much the price of Gum Arabic in a given year has changed over the price of the base year (1988). The formula for the simple index number is given as follows:

$$P = \frac{P_1}{P_0} \times \frac{100}{1}$$

Where

P = Simple Index number or Price Relative

P_1 = Price in a given year

P_0 = Price in a base year

The tool was used to achieve objective 4.

3.5.4 Marketing Performance Measuring Techniques

The marketing performance measuring techniques used to determine the overall marketing performance of Gum Arabic in the study area were, Marketing margin and marketing efficiency.

3.5.4.1 Marketing Margin

This refers to the differences between the prices paid by consumer and that received by producers (Olukosi and Isitor 1990).

Marketing margin is given by the formular:

$$M_m = \frac{S_p - B_p}{S_p} \times \frac{100}{1}$$

Where

M_m = Marketing Margin

S_p = Selling Price

B_p = Buying Price

The tool was used to achieve part of objective 5

2.5.4.2 Marketing Efficiency

Efficiency is a marketing as well as engineering terminology, which measures the ratio of output to input. In marketing, efficiency can be define as the maximization of the ration of marketing outputs to inputs. The marketing output connotes consumer's satisfaction or utilities created, or the value added to the commodity as it passes through the marketing system, while the marketing inputs are the different resources employed to provide marketing services (Olukosi & Isitor, 1990). In engineering, the efficiency of any machine is defined as, the ratio of the useful work done by the machine to the total work put into the machine (Abboh, 1969, Hill and Bennett, 1980 Gad, 1982 and Eastop & McConkey, 1993).

The formular of marketing efficiency is given as follows:

$$M_E = \frac{V_A}{Cms} \times \frac{100}{1}$$

Where

M_E = Marketing Efficiency

V_A = Value added= selling price less buying price less cost of marketing services.

Cms = Cost of marketing services = cost of transportation, loading/offloading, market charges, commission, storage, cleaning, sorting and packaging

This tool was used to achieve part of objective 5.

3.6 Limitations of the Study

The major limitations of this study include the following:

- i) Poor memory recall of the respondents: Most of the respondents were illiterates and do not keep proper records of their business. Thus, they sometimes out of poor memory recall, give inaccurate information.**
- ii) Market information: Some of the processors and traders, especially the Urban assemblers were reluctant to disclose market information**

on prices and output for possibly fear of competitors and government taxation.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 SOCIO-ECONOMIC CHARACTERISTICS OF PARTICIPANTS IN PROCESSING AND MARKETING OF GUM ARABIC

4.1.1 Age Distribution of Participants in Processing and Marketing of Gum Arabic

The result of Age distribution of respondents as presented in Table 4.1 shows that most of the participants were above 31 years.

Table 4.1. Distribution of Respondents in the Processing and Marketing of Gum Arabic According to age.

Age Range	Farmers / Collectors		Rural assemblers		Urban assemblers (Manual processors)	
	Freq.	%	Freq.	%	Freq.	%
0-20	10	9	2	3	0	0
21-30	20	19	12	15	1	12.5
31-40	31	29	20	26	2	25
41-50	23	22	30	38	2	25
51-60	14	13	10	13	2	25
61-abv.	8	8	4	5	1	12.5
Total	106	100	78	100	8	100

Majority of collectors/farmers as indicated in Table 4.1 were between the age range of 31-40 (29%) and 41-50 (22%). The Rural Assemblers recorded (26%) for 31-40 years age range and 38% for 41-50 age range. The Urban assemblers (manual processors) recorded 25% for 31-40, 41-50 and 51-60 age ranges respectively. The average ages for collectors/farmers, Rural Assemblers and Urban Assemblers were 38, 46 and 52 respectively, with an overall average age of 45 years for the respondents.

4.1.2 Educational Background of Participants in the Processing and Marketing of Gum Arabic

The result of educational background of participants in processing and marketing of Gum Arabic as presented in Table 4.2 indicated that the basic and major education acquired by most of the participants was Islamic education.

Table 4.2: Distribution of Respondents in the Processing and Marketing of Gum Arabic According to Educational Background

Education Background	Farmers / collectors		Rural Assemblers		Urban assemblers (Manual processor)	
	Freq.	%	Freq.	%	Freq.	%
Primary	11	10	10	13	0	0
Secondary	1	1	5	7	2	25
Tertiary	0	0	1	1	2	25
Islamic	94	89	54	69	4	50
Others	0	0	8	10	0	0
Total	106	100	78	100	8	100

The result in table 4.2 shows that 89% of the farmers/collectors, 69% of the rural assemblers and 50% of the urban assemblers acquired Islamic education. In addition to Islamic Education acquired, 50% of the urban assemblers acquired formal education. This enables most of them to cope with some of the modern processing and marketing dynamics, especially in the area of sourcing and managing of processing and market information. However, the result shows that only 10% of the farmers/collectors and 21% of rural assemblers acquired formal education. This could probably be a major contributing factor for poor formal market information flows among those groups of the participants.

4.1.3 Marital Status of Participants in Processing and Marketing of Gum Arabic

All the participants in processing and marketing of Gum Arabic were married.

4.1.4 Sex Composition of the Participants in Processing and Marketing of Gum Arabic.

Men dominated processing and marketing activities of Gum Arabic in the study area. The result of sex composition as presented in Table 4.3 indicates that, females only participated in the Gum Arabic marketing as collectors, constituting 40%. Most of the females participating in marketing were from the semi-nomadic families. There were 100% male participation in the other areas of processing and marketing of Gum Arabic. Islamic Religion injunctions of not allowing women to mix freely with men (Kule) observed by most Muslim in the study area, traditions, lack of awareness and poor financial status could be the result of less women participation in the marketing of Gum Arabic in the study area.

Table 4.3: Distribution of Respondents in the Processing and Marketing of Gum Arabic by Sex Status.

Sex	Farmers / collectors		Rural Assemblers		Urban Assemblers (Manual processors)	
	Freq.	%	Freq.	%	Freq.	%
Female	42	40	0	0	0	0
Male	64	60	78	100	8	100
Total	106	100	78	100	8	100

4.1.5 Processing and Marketing Experience of Participants in the Processing and Marketing of Gum Arabic

The result of processors and traders experience as presented in Table 4.4, shows that more than 60% of farmers, rural assemblers and urban assemblers (manual processors) have been in marketing of Gum

Arabic for between 11-30 years. However, less than 30% of the participants have been in the business for more than 30 years. Table 4.4 also shows that new entry (less than 10 years) into the processing and marketing of Gum Arabic was more in rural and urban assemblers (manual processors) recording 23% and 25% respectively.

Table 4.4: Distribution of Respondents According to Processing and Marketing Experience

Expt./years	Farmers / collectors	Rural Assemblers	Urban Assemblers (Manual processors)
Status	Freq. %	Freq. %	Freq. %
0 - 10	8 8	18 23	2 25
11 – 20	32 30	24 31	4 50
21 – 30	38 36	25 32	2 25
30 – Abv.	28 26	11 14	0 0
Total	106 100	78 100	8 100

4.2 ORGANIZATIONAL FRAME FOR PROCESSING GUM ARABIC

4.2.1 Identification of different Grades

There were three (3) types of grades, (Grade I, II and III) processed and traded in the study area. The grades I and II were the most widely processed and traded grades in the study area. The marketing participants identified the different grades using Four (4) major methods. These methods include: -

- i) Source or type of tree.
- ii) Shape of the nodules
- iii) Colour of nodules
- iv) Odour (inhalation)

The farmers used source, shape and colour in grades identification. They reported that, grade I is from a tree called *Dakwara (A Senegal)*, grade II is from a tree called *Farar Kaya (A Senyal)*. Grade III was reported to be from other related Gum Arabic trees. Traders and manual processors reported that they used colour, by holding the Gum Arabic to sunlight and studying the reflection. Also, they used shape of the nodules and odour (inhalation) of Gum Arabic to identify grade.

4.2.2 Organizational Frame for Processing of Gum Arabic

The organizational framework for processing of Gum Arabic involves manual processing and industrial processing.

- 1. Manual Processing:** The manual processing of Gum Arabic involves cleaning, sorting into different grades and packaging. Manual processing was the common method of processing of Gum Arabic in the study area.
 - i. Cleaning:** This is the removal of non Gum Arabic materials e.g. bark of trees, stones etc from the Gum Arabic nodules harvested. Mostly women casually employed by Urban Assemblers carry out the cleaning of Gum Arabic. The women spread the Gum Arabic in locally made trays or steel trays and hand picked the barks of trees and stones. The women also winnowed the smaller non-Gum Arabic materials from the Gum Arabic. The cleaning takes place in the warehouse of the Urban Assemblers. The Urban Assemblers pay an average of ₦1,000 per tone of Gum Arabic cleaned. Farmers and Rural Assemblers carried out minimal cleaning before selling their Gum Arabic.

- ii. Sorting of Gum Arabic:** Sorting of Gum Arabic is the separating of mixed grades into their individual grades by hand picking of other grades from the main grade.. Farmers and Rural Assemblers do minimal or no sorting of Gum Arabic before selling their product. The Urban Assemblers paid ₦1,000 to sorted one tone of Gum Arabic.
- iii. Packaging of Gum Arabic:** The cleaned and sorted Gum Arabic is packaged in either 50kg or 100kg polythene bags. The packaging is in triplicate bags with the inner bag being airtight. It cost the Urban Assemblers an average of ₦3,000 to purchase bags, thread and pay for the packaging of one tonne of Gum Arabic. It cost the manual processors an average of ₦1,800 to transport one tonne of Gum Arabic from the markets to their warehouses in Maiduguri, ₦500 for loading and off loading one tonne, ₦500 as market charges for one tonne and ₦600 as storage cost for one tone of Gum Arabic stored for more than 3 months.

2. **Industrial Processing of Gum Arabic**

The industrial processing of Gum Arabic involves the use of machinery and equipment to test the quality of the manual processed Gum Arabic, formulate and process Gum Arabic step by step. The machinery and equipment for testing, formulation and processing are found in Dangote Gum Arabic Processing Company, Kano.

Testing of Gum Arabic: The manual processed Gum Arabic is subjected to physical, chemical and microbiology test before the

industrial processing. This is to ensure that correct and quality grades of Gum Arabic are processed and to minimize defects of processed Gum Arabic.

- i. Physical Testing:** The Gum Arabic is tested physically to determine the quality of grades. Some of the equipments used for physical testing of Gum Arabic, which are available in Dangote Gum Arabic Processing Company, include:

Weight Balances: It is used to determine weight of samples

Moisture Analyzer: It is used to determine the moisture content of the gum.

Furnace: This is used to determine the ash content (indigestible matter) of the gum

Polarimeter: This is used to test the optical rotation of the gum

Spectrophotometer: This is used to check the brilliance of the gum.

Viscometer: This is used to test the viscosity of the gum

PH meter: This is used to test the acidity level of the gum.

Fume cupboard: This is used to control air pollution resulting from liberated offensive acid from the laboratory environment.

- ii. Chemical Testing:** The physically tested Gum Arabic is further tested in the

chemical laboratory to determine the presence of gums that are not of Gum Arabic origin. This is because the physical analysis sometimes fails to detect Gums that are not Gum Arabic.

- iii. Microbiology Testing:** The Gum Arabic is also tested in the microbiological laboratory to determine the existence and type of

microorganism in the gum. After undergoing testing processes, the tested Gum Arabic is ready for formulation

Gum Arabic Formulation: The standard formulation of Gum Arabic for industrial processing as given by Lees and Jackson (1973) and Streed (1991). Gum Arabic processing industries used the formulation sometimes with some modifications depending on the objective of the processing industry. The formulation is as follow:

PART 'A'	PART BY WEIGHT (kg)
Gum Arabic	80
Cold water	100

PART	
Sugar	90
Glucose	14
Water	15

Colour, flavour and acid can be added to desired shade and taste.

Step by Step Processing of Gum Arabic: The solution of gum formulated is slowly steam heated at low pressure, sieved, cleaned and dried. The steps of processing are as follow:

- i. **Slowly steam heats the formulated gum at low pressure to bring about solution.**
- ii. Carefully sieve the solution through a fine sieve or cloth or by centrifugal method to remove impurities and extraneous materials.

- iii. Dissolve the sugar in water and add the glucose syrup and boil to 124°C (1156°F)
- iv. Add the boiled solution to Gum Arabic solution and mix well.
- v. Add colour, flavour and acid solution to shade, taste and mix.
- vi. Deposit into starch mould
- vii. Transfer the molded impressions to well-ventilated store and hold until the desired hardness is achieved.
- viii. Thoroughly clean the gum jellies and glaze

It is however important to note that if the gum is required in liquid form, then the processing should stop at stage six (6). Also if gum is required in powdered form as processed by Dangote Gum Arabic factory in Kano, the mixture at stage six (6) should be dried. The organizational chart for processing of Gum Arabic is shown in Figure 2

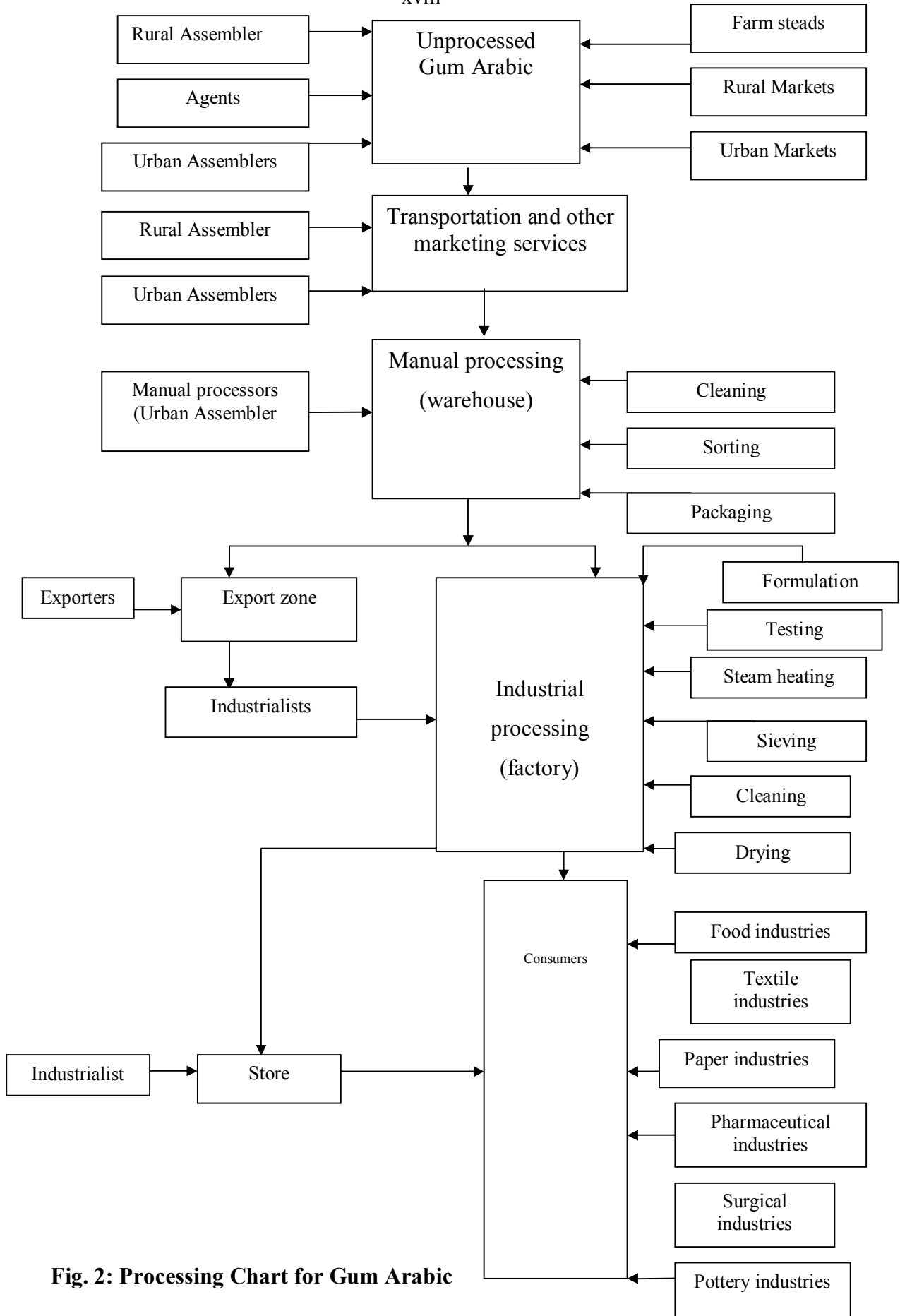


Fig. 2: Processing Chart for Gum Arabic

4.3 COST AND RETURNS OF PROCESSING GUM ARABIC

4.3.1 Gross Margin Analysis

The cost and returns associated with processing of Gum Arabic as obtained from the gross margin analysis is presented in Table 4.5

Table 4.5: Average Cost and Returns of Processing Gum Arabic (₦/Tonne)

Operation	Grade		
	I	II	III
a. <u>Returns ₦/Tonne</u>			
Returns from processed one tonne of Gum Arabic	90,000.00	44,000.00	22,000.00
b. <u>Cost of processing ₦/Tonne</u>			
Unprocessed Gum Arabic	59,800.00	26,480.00	11,940.00
Transportation	1,800.00	1,800.00	1,800.00
Loading/offloading	500.00	500.00	500.00
Market charges	500.00	500.00	500.00
Storage	600.00	600.00	600.00
Cleaning	1,000.00	1,000.00	1,000.00
Sorting	1,000.00	1,000.00	1,000.00
Bags/packaging	3,000.00	3,000.00	3,000.00
Total processing cost (b)	68,200.00	34,880.00	20,340.00
c. <u>Gross Margin ₦/Tonne</u>			
a - b	21,800.00	9,120.00	1,660.00
d. <u>Average rate of returns (₦)</u>			
a / b	1.32	1.26	1.08

1 Tonne = 1000kg

The average cost of processing one tonne of unprocessed Gum Arabic as shown in Table 4.5 was ~~₦~~68,200, ~~₦~~34,880 and ~~₦~~20,340 for grades I, II and III respectively. The average selling price of one tonne of processed

Gum Arabic was ₦90,000, ₦44,000 and ₦22,000 for grades I, II and III respectively. The gross margin hence profit of processing one tonne of Gum Arabic was ₦21,800, ₦9,120 and ₦1,660 for grades I, II and III respectively. The average rate of returns for processed one tonne of Gum Arabic was ₦1.32k, ₦1.26k and ₦1.08k for grades I, II and III respectively. This means that for each ₦1.00 invested in processing one tonne of grades I, II and III Gum Arabic, 32k, 26k and 8k respectively were realized as profit.

The gross margin analysis shows that processing of Gum Arabic is profitable in the study area. The gross margin results in Table 4.5, shows that grade I has the highest gross margin and average rate of returns. This result could be explained by the fact that grade I (Gum Arabic) has the highest industrial value; hence it was highly demanded by the exporters in the study area. Also, grade III has the lowest industrial value hence the lowest gross margin and average rate of returns.

It was observed that processors in the study area processed an average of 68, 40 and less than 5 tonnes of grades I, II and III respectively in a season (year).

4.4 GUM ARABIC SEASONAL MARKETING, PRICE VARIATIONS WITHIN AND BETWEEN SEASONS

4.4.1 Marketing of Gum Arabic

Marketing of Gum Arabic commences as soon as harvesting of Gum Arabic begins. Harvesting of gum begins when harmattan period sets in (Nov/Dec.). The farmers and rural assemblers traded Gum Arabic for an average of four (4) months in a season (Dec-Mar). The Urban assemblers and exporters, who performed time utility, traded Gum Arabic for an average of seven (7) months in a season (Jan-July). However, it was reported that export transactions sometimes take place after July.

4.4.2 Peak and Off Peak Period Price Variations in a Season

Price of Gum Arabic in the study area varies during peak and off peak period of production. Some of the reasons identified for the variations are: -

- i) Volume of Gum Arabic traded in a period
- ii) Number of buyers and sellers available in a given period
- iii) Market strategies adapted mostly by the assemblers.

It was observed that during the peak period of production, prices are low because there are many producers in the market than the assemblers. Producers hardly store Gum Arabic hence they received low prices of peak period. The assemblers particularly the urban assemblers who store and process Gum Arabic received high prices of off peak period.

TABLE 4.6: Peak and Off Peak Period Price Variations in a Season

Grade	Price ₦/Kg	
	Peak period	Off peak period
I	55	115
II	25	53
III	11	23

The result in Table 4.6 shows that the peak period prices of Gum Arabic were ₦55, ₦25 and ₦11 for grade I, II and III respectively. The off peak period prices were ₦115, ₦53 and ₦23 for grade I, II and III respectively. The remarkable prices differences between the two periods could be as a result of time utility (storage) services

4.4.3 Price Variations between Seasons

Gum Arabic price variations from one season to another in the study area were considered. A seven years (seasons) price relatives or simple index number analysis is given in Table 4.7.

Table 4.7: Price Relative or Simple Index Number for Gum Arabic in Borno State.

Price /Index Number	Grade	Year						
		1998	1999	2000	2001	2002	2003	2004
Average Annual Price ₦/Tonne	I	41,500	45,500	50,000	55,500	63,000	70,000	90,000
	II	22,000	23,000	25,500	27,000	30,500	35,000	44,000
	III	12,500	13,000	13,800	14,700	16,000	18,000	22,000
Index Number (%)	I	100	108	121	134	152	169	217
	II	100	105	116	123	139	159	200
	III	100	104	110	118	128	128	176

The results in Table 4.7 shows that lowest price movement of 8%, 5% and 4% for grades I, II and III respectively was recorded in 1999 over the base year (1998). The highest price movement of 117%, 100% and 76% for grades I, II and III respectively, was recorded in 2004 over the base year 1998. There was a low price movement from

1998 to 2003 seasons but a more than 30% remarkable price increase from 2003-2004 seasons.

The higher price movement recorded from 2003 to 2004 could probably be as a result of the recent European and American nations increased demand for Nigeria Gum Arabic as reported by Urban Assemblers and exporters. They reported that, because of high government regulated export procedures in Sudan, its internal political crisis in the Gum Arabic producing areas such as Dahfur and its sour relationship with U.S.A. (major world importer of Gum Arabic) as result of U.S.A September 12 attacked, demand and supply quantities of Gum Arabic from Sudan in the International market has dropped. Also, Nigeria deregulated market drive policy has facilitates export of Gum Arabic from Nigeria easily. Gum Arabic from Sudan, Chad and Niger, now pass through Nigeria borders to U.S.A and Europeans countries

4.5 MARKET STRUCTURE, CONDUCT AND MARKETING PERFORMANCE OF GUM ARABIC IN THE STUDY AREA

4.5.1 Market Structure and Conduct

The market structure, describes the channel, type and number of participants in a market. The market conduct, deals with the behaviour of firms (participants). The reflection of the impact of structure and conduct on product price, cost of marketing services, the volume and quality of output determines the performance of the market. These interrelated elements determine the level of competition and efficiency

of the marketing system. Parameters such as; type of participants, number of participants, marketing channels, product differentiation, condition for entry and exit, market information, sources of finance and market strategies were analyzed.

4.5.1.1 Types of Marketing Participants

The types of marketing participants identified in the study area can be classified into five. They include: farmers/collectors, rural assemblers, urban assemblers, commission agents, and exporters. These participants performed the marketing functions at different stages to facilitate the utilities of time, place, form and possession. Their nature and roles in the marketing system are briefly discussed as follows: -

i. Farmers/Collectors

The farmers/collectors were resident in their villages or semi-nomadic people. They take title of their produce harvested from their farms (inherited or planted), government plantation and/or wild farms. Marketing of their product could be in their homes, nearby village's market or the major market, mostly located at their local government area headquarter. They sell their product to the rural assemblers, commission agents and sometime to the urban assemblers mostly on an earlier agreement. They could sell to traditional and herbal doctors. They usually receive low price possibly because of poor market information, season and immediate needs for the money (poverty).

ii. **Rural Assemblers**

The rural assemblers purchased their produce from the farmers/collectors in the village markets or the major markets of the local government areas. They also buy from government forest reserves but usually at low prices. They sometimes purchased from their fellow rural assemblers that have smaller volume of the Gum Arabic. They take title of their produce or buy on behalf of their urban assemblers on commission. The price or commission they receive depends largely on their bargaining power and season.

iii. **Commission Agents**

The commission agents purchase Gum Arabic on behalf of either rural assemblers or urban assemblers on commission. They do not take title of the product. They operate in the rural areas as rural commission agents or in the urban areas as urban commission agents.

iv. **Urban Assemblers**

The urban assemblers were mostly resident in the urban area (Maiduguri town). They purchase their product from rural assemblers, government forest reserves and sometimes directly from farmers. They also buy from other producing states and countries. They take title of their products or buy on behalf of exporters on commission. They also carry out manual processing of Gum Arabic.

v. **Exporters**

Majority of the exporters were based in Lagos with few found in Kano and Maiduguri. They were mostly Indians, Lebanese and Chinese. There were however, few indigenous exporters located in Kano and Maiduguri, The only two exporters identified in Maiduguri rarely export Gum Arabic and had skeletal export data. The exporter's prices depend largely on grade, season and demand.

4.5.1.2 Number of Participants in the Marketing System

The number of participants in the marketing system of Gum Arabic in the study area, varies with the type of participants (farmers/collectors, rural assemblers etc) and the markets. There were about 80% of participants at the down stream of Gum Arabic marketing system (farmers/collectors and Rural assemblers) and 20% of participants at the upper stream of the marketing system (Urban assemblers, commission agents and exporters). At the peak period of marketing, at least fifty(50) participants operate in each market day of the five (5) markets studied (Maiduguri, Gubio, Monguno, Guzamala and Kukawa).

4.5.1.3 Marketing Channel of Gum Arabic

The Gum Arabic marketing channel identified in the study area indicated participation of five (5) actors. These participants were involved in the channeling of Gum Arabic from the producers to the importers. At each stage of the marketing channel, the marketing participants performed marketing functions such as loading, off-loading, transportation, storage, packaging, manual processing. These participants include: farmers/collectors, rural assemblers, urban assemblers (manual processor), commission agents and exporters. Figure 3 shows the marketing channel of Gum Arabic in the study area.

Rural Commission Agents

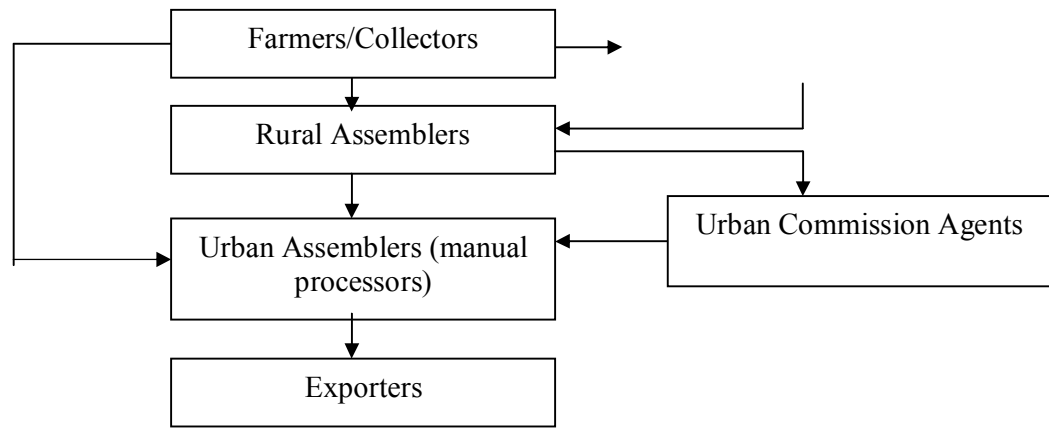


Figure 3: Gum Arabic Marketing channel in Borno State

4.5.1.4 Product Differentiation

Agricultural products are generally homogenous. However, Gum Arabic in the study area was found to be differentiated into three grades: Grades I, II and III. The differentiation was based on source, colour, shape of nodules and odour. Grading of Gum Arabic commences from harvest (source) by the farmers through to the urban assemblers and exporters who package the product for export.

4.5.1.5 Conditions For Entry And Exit

There were no apparent restrictions for entry and exit from Gum Arabic trading. However, inheritance, market information and size of capital identified to some extent influenced the conduct of the marketing participants. About 80% of the marketing participants interviewed responded that entering to or moving to another status in the marketing system of Gum Arabic is largely influenced by market information and size of capital. Movement from a lower (rural assembler) to higher status (urban assembler and exporter) in the marketing system required

more capital base. Inheritance and lack or poor market information influence or restrict free entry. There was no restriction to exit from the marketing system.

4.5.1.6 Informal Market Information

Informal market information among the Gum Arabic participants in the study area was found to be more rapid and effective among the urban assemblers and the few exporters. These groups of participants were residents in Maiduguri and all have access to personal or public telephone.

They restrict the market information to themselves making it difficult for new entry. There was poor flow of market information among the producers. They equally lack formal education. Ninety percent (90%) of the rural assemblers interviewed, reported that they obtained market information from colleagues and rarely from urban assemblers. Also, ninety-five (95%) percent of the farmers/collectors reported that they are either not accessible to market information or obtained poor market information from commission agents and rural assemblers.

4.5.1.7 Sources of Finance

The study identified four (4) major sources of finance used by the marketing participants of Gum Arabic in the study area. These sources include: -

- i) Contracting clients (agents)
- ii) Personal saving
- iii) Informal financial institutions
- iv) Financial institutions

Finance from contracting clients comes from exporter to the urban assembler, then to other participants in the marketing system. About 45% of finance for Gum Arabic marketing comes from this source. Personal saving contributed 30% of the sources of finance, informal financial sources contributed 20% while; financial institutions contributed only 5%. Some urban assemblers and exporters benefited from the formal financial institution source.

4.5.1.8 Marketing Strategies

Marketing participants in the study area adopted some marketing strategies. Exporters induced urban assemblers, by giving them funds before harvest time and a promise of good purchasing price or commission. The Urban assemblers induced rural assemblers and farmers by buying them salt and kola nut prior to harvesting period to make them sell their produce to them at harvest.

The Gum Arabic assemblers reported that producers sometimes mixed Gum Arabic with non-Gum Arabic materials e.g. stones and barks of trees. Urban assemblers also reported that, exporters reduced price or threaten to reject consignment on the ground of product adulteration.

4.5.2. Marketing Performance Analysis

The results of marketing margin and efficiency which were used to determine marketing performance in the study area are presented in Table 4.9 and Table 4.10 respectively. Meanwhile, average prices and cost of marketing services data in Naira per 50kg bag of Gum Arabic in the study area are presented in Table 4.8. The data in Table 4.8 were used to calculate marketing margin and efficiency.

Table 4.8 Average Prices and Cost of Marketing Services of Gum Arabic (₦/Bag)

Market services/ participants	Markets / Prices and cost of Marketing services (₦)							
	Grade	Maiduguru	Gumbio	monguno	Guzamala	kukawa	Average	
a) <u>Producer Price</u>	I	2,900	2,200	2,150	2,150	2,100	2,300	
	II	1,230	1,050	1,000	1,000	950	1,046	
	III	575	390	360	350	350	405	
b) <u>Commission Agent</u>	I	100	100	100	100	100	100	
	II	50	50	50	50	50	50	
	III	20	20	20	20	20	20	
c) <u>Cost of Marketing Services</u>	Transportation	70	80	80	90	90	82	
	Market charges	25	20	20	20	20	21	
	Loading/offloading	25	20	20	20	20	21	
	Storage	30	-	-	-	-	6	
	Cleaning	50	-	-	-	-	10	
	Sorting	50	-	-	-	-	10	
	Bags/packaging	150	50	50	50	50	70	
	Sub Total (c)	400	170	170	180	180	220	
	d) <u>Assemblers Price</u> (Selling Price)	I	4,500	3,000	2,950	2,900	2,800	3,230
		II	2,200	1,300	1,290	1,280	1,250	1,464
III		1,100	600	575	570	560	681	
e) <u>Value added</u> d- (a + b+ c)	I	1,100	530	530	470	420	610	
	II	470	80	70	50	70	148	
	III	105	20	25	20	10	36	

4.5.2.1 Marketing Margin Analysis for Participants in Marketing of Gum Arabic

The results of marketing margin of participants in marketing of Gum Arabic as presented in Table 4.9 shows that Assemblers in Maiduguri (Urban Assemblers) recorded the highest margin for the three

grades. The other assemblers (rural assemblers) in Gubio, Monguno, Guzamala and Kukawa recorded between 18-36% margins for the three grades. The highest Margin recorded by the Urban Assemblers could be as a result of the manual processing carried out by the Urban Assemblers, their ready access to market information and their direct transaction with the exporters. On the other hand, the relatively lower marketing margin recorded by the rural assemblers in Gubio, munguno, Guzamala and Kukawa markets could possibly be as result of the fact that they do not process their Gum Arabic. Also they are not ready access to market information and exporters. However, on the average, assemblers in all the market studied recorded, 24.8%, 22.8% and 36.1% for grades I,II and III respectively. The lowest average marketing margin of 3.2%, 3.6% and 3.1% for grades I,II and III respectively, was recorded by the commission Agents. The Commission Agents purchase on behalf of the clients on commission. They do not take possession of the Gum Arabic purchased.

Table 4.9 Marketing Margin of Participants in Marketing of Gum Arabic

Type of marketing participants	Markets Margin (%)						
	Grade	Maiduguri	Gubio	Manguno	Guzamale	kukawa	Average
i) Producer price share $\left(\frac{a}{d} \times \frac{100}{1} \right)$	I	64.4	73.3	72.9	74.1	75.0	71.9
	II	55.9	80.8	77.5	78.1	76.0	73.6
	III	52.3	65.0	62.6	61.4	62.5	60.7
ii) Commission Agents share $\left(\frac{b}{d} \times \frac{100}{1} \right)$	I	2.2	3.3	3.4	3.5	3.6	3.2
	II	2.3	3.8	3.9	3.9	4.0	3.6
	III	1.8	3.3	3.5	3.5	3.6	3.1
iii) Assemblers share $\left(\frac{d-(a+b)}{d} \times 100 \right)$	I	33.3	23.3	23.7	22.4	21.4	24.8
	II	41.8	15.4	18.6	18.0	20.0	22.8
	III	45.9	31.7	33.9	35.1	33.9	36.1

a, b and d are defined in Table 4.8

4.5.2.2 Marketing Efficiency for Five Markets of Gum Arabic

The results of marketing efficiency for five markets of Gum Arabic studied in Table 4.10 shows that Maiduguri market recorded the highest marketing efficiency of 220%, 104% and 25% for grades I, II and III of Gum Arabic respectively. The lowest marketing efficiency of 150%, 30% and 5% for grades I, II and III respectively, was recorded in Kukawa, market. Manguno market recorded an efficiency of 196%, 32% and 13% for grades I, II & III respectively. Also Gubio market recorded 196%, 36% and 11% for grades I, II & III respectively.

The highest efficiency recorded in Maiduguri Market could be as a result of manual processing and availability of some good marketing facilities such as road, telephone and market structures. Some of these facilities were either not available in the other markets or were not in good working conditions.

The average marketing efficiency for the 5 markets was 186%, 45% and 13% for grades I, II & III respectively, given an overall average efficiency of 81% for the three grades.

Table 4.10 Marketing Efficiency for Five Markets of Gum Arabic (₦/Bag)

Marketing Activity	Markets / Marketing Efficiency (%)						
	Grade	Maiduguri	Gubio	Manguno	Guzamale	Kukawa	Average
i) Cost of Marketing services (b + c)	I	500	270	270	280	280	320
	II	450	220	220	230	230	270
	III	420	190	190	200	22	240
ii) Value added d- (a + b + c)	I	1,100	530	530	470	420	610
	II	470	80	70	50	70	148
	III	105	20	25	20	10	36

iii) Marketing Efficiency(%)	I	220	196	196	168	150	186
$\frac{\text{value added}}{\text{cost of mktg ser.}} \times \frac{100}{1}$	II	104	36	32	22	30	45
	II	25	11	13	10	5	13
	X	116	81	80	67	62	81

a, b, c and d are defined in Table 4.8

4.6 PROBLEMS MILITATING AGAINST PROCESSING AND MARKETING OF GUM ARABIC IN THE STUDY AREA

The major processing and marketing constraints of Gum Arabic as reported by processors and traders are presented on

Table 4.11

Table 4.11 Major Problems of Processing and Marketing of Gum Arabic

Type of participant	Type of problem	No of respondents	% Respondents	Ranking of problem
Manual processors	Transportation	5	63	6 th
	Storage facilities	6	75	5 th
	Processing facilities	7	100	1 st
	Financial problem	7	88	3 rd
	Adulteration of grades	8	100	1 st
	Poor processing knowledge	7	88	3 rd
Marketers	Transportation facilities	56	65	5 th
	Market charges	50	58	7 th
	Storage facilities	58	67	4 th
	Financial problem	63	73	3 rd
	Adulteration of grades	80	93	1 st
	Market information	75	87	2 nd
	Unregulated marketing system	55	64	6 th

- i. **Lack of processing facilities:** In Table 4.11, all the manual processors reported that there were no industrial processing facilities for Gum Arabic in the study area and that they lacked the financial capability to build and equip factories that can test and process Gum Arabic. This problem has reduced their motivation to increase their manual processed volumes and hindered them from benefiting from the high price of industrially processed Gum Arabic.

- ii. **Poor processing knowledge:** - There was poor knowledge of industrial processing of Gum Arabic in the study area. In Table 4.11, about 88% of the manual processors reported that, they were not accessible to detail technical and processing technologies of Gum Arabic. Also it was difficult for them to get detail knowledge from the countries that are already processing Gum Arabic.
- iii. **Adulteration of grades:** - The major problem affecting the market value of Nigerian's Gum Arabic in the domestic and international market as reported by the manual processors and the traders is grades adulteration. The problem begins from harvesting where different grades are harvested together by the collectors. This problem results to poor domestic and international prices. Sometimes exporters attempt to reject manual processors consignment. All the manual processors and 93% of the traders reported that adulteration of grades was a major problem to them.
- iv. **Poor marketing information:** - There was higher degree of poor information flow among the marketing participants. In Table 4.11, about 87% of the traders reported that there was poor market information flow. Such information includes: current and previous prices, volume traded (demand and supply) and sources of Gum Arabic. The rural assemblers reported that urban assemblers, who have access to telephones, postal services and exporters, restrict market information to themselves. Urban

assemblers equally reported that exporters marginalized them from international market information. It was difficult to extract marketing and processing information from the traders and manual processors even for this research purpose.

- v. **Inadequate finance:** - The Gum Arabic Processors and Traders particularly, the rural assemblers have a low propensity to save. They reported that they find it difficult to save in order to generate funds for processing and marketing of Gum Arabic. About 50% of the manual processors and 45% of assemblers depended on exporters for processing and marketing funds; hence they sometimes traded on agreement or commission. In Table 4.6, about 73% of traders and 88% of the manual processors reported that inadequate processing and trading funds has hindered them from improving and expanding their businesses. They reported that sourcing funds from formal financial sources was difficult and that even when the funds are available, the interest charges are high for any gainful business.
- vi. **Storage facilities:** - In Table 4.11, about 67% of the traders reported that lack or poor storage facilities has make them not to enjoy high prices of off-peak period. Also 75% of manual processors reported that storage facilities were expensive to maintain or rent since they were mostly located in the Maiduguri town.
- vii. **Transportation problem:** - In Table 4.11, about 65% of traders and 63% of the manual processors reported that transportation cost was

sometimes high due to poor and inadequate transportation facilities such as road and vehicles. The rural assemblers reported that roads to rural markets were either not motor able or were in bad conditions. Sometimes, they have to use animals since there are few or no vehicles using such roads.

- viii. **Unorganized marketing system:** The marketing system of Gum Arabic as reported by 64% of the traders in the study area was poor and unorganized. This problem affected demand, supply and prices of the produce especially at the export level.
- ix. **Market charges:** In Table 4.11, about 58% of the traders reported that high and sometimes double market charges increase the cost of marketing services.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

Gum Arabic has enormous economic and environmental benefits. It is used in Food, Pharmaceutical, Textile, Pottery, Surgical, Lithographic and Paper Industries. Also Gum Arabic tree often referred to as “Desert Gold” is used for environmental protection, soil fertility and conservation, animal feed and source of energy. The organizational framework for processing of Gum Arabic involved manual processing and industrial processing using machinery and equipments. Manual processors in the study area received a gross margin of ₦21,800, ₦9,120 and ₦1,660 and an average rate of the returns of ₦1.32, ₦1.26 and ₦1.08 for processing one tonne of grades I, II and III respectively. The gross margin and average rate of returns analysis for manual processors, shows that processing of Gum Arabic in the study area was profitable.

The market structure analysis revealed the participation of five major types of participants from the farmers/collector to the exporters. These participants include: farmers/collector, commission agents, rural assemblers, urban assemblers (manual processors) and the exporters. These groups of participants perform general marketing function such as transportation and specific marketing functions such as processing, storage and packaging. Marketing strategies such as buying of gifts (salt and colanut) and sometimes mixing of grades were used by some participants in the study area. The participants in processing and

marketing of Gum Arabic identified grades base on colour, shape of Gum Arabic nodules, odour and reflection when held to sunrays.

The price of Gum Arabic in the study area depends on grades, seasons, market location and marketing services performed. The marketing margin analysis shows that commission agents who acted on behalf of their clients received the lowest marketing margins of 2.3%, 3.3% and 1.8% for grades I, II and III respectively. Assemblers in Maiduguri market (urban assemblers) who carried out manual processing received the highest margin of 33.3%, 41.8% and 45.9% for grades I, II and III respectively. The marketing efficiency analysis for five markets studied, shows that Maiduguri market was more efficient than the other markets recording 220%, 104% and 25% efficiency for grades I, II and III respectively. Kukawa market recorded the lowest market efficiency of 150%, 30% and 5% for grades I, II and III respectively. The average marketing efficiency for the five market was 186%, 45% and 13% for grades I, II and III respectively, given an overall average efficiency of 81% for the three grades.

The major constraints associated with processing and marketing include: adulteration of grades, inadequate processing and marketing facilities, poor processing and marketing information and control of processing and marketing funds by few stake holders (exporters) in the system.

5.2 Conclusion

Based on the findings of this study, it can be concluded that Gum Arabic processing is profitable and marketing of Gum Arabic is economically viable. However, there are problems of adulteration of grades, poor flow of market and processing information and strict control of processing and marketing funds by some few stake holders in the system. These problems make it difficult for prices to be determined by economic forces prevailing in a competitive market. Gum Arabic marketing system therefore, exhibits some monopoly characteristics.

5.3 Recommendations

- i) Gum Arabic testing facilities should be provided by Government and NAGAPPEN at the market and processing centers to enable traders and processors test the quality of Gum Arabic. Collectors of Gum Arabic especially from wild sources should be educated the more by extension agents on grades differences and the need to collect different grades separately.
- ii) The National Association of Gum Arabic Producer, Processors and Exporters should further constitute their members into smaller co-operative units. This will facilitate procurement and repayment loans (soft) from financial institutions such as, Nigeria Agricultural, Co-operative and Rural Development Bank, Community Bank and other financial Institutions (Formal and Informal). This will also ease market information flows.

- iii) Government should provide good roads network, market structures and other marketing facilities especially in the rural areas to facilitate marketing activities in general and Gum Arabic in particular.
- iv) The government of Gum Arabic producing states especially those developing Gum Arabic shelter belts, should emulate Jigawa state by building and equipping Gum Arabic processing factories and later privatized them. The should also, encourage private sector participation in processing of Gum Arabic by providing the basic infrastructure and incentive that will attract private investment in Gum Arabic processing.

5.3.1 **Further Research**

The study was carried out in Borno State only. Similar study can be carryout in the other Gum Arabic producing states in the country in order to produce a national processing and marketing data base for Gum Arabic. Also study on how to create awareness among the teaming unemployed youth on the economic potential of production, processing and marketing of Gum Arabic can be carry out.

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APPENDIX 1

PROCESSORS AND TRADERS OF GUM ARABIC. QUESTIONNAIRE

SECTION A : **BACKGROUND INFORMATION**

This section is to be completed by all respondents.

1. Name of respondent/Company_____
2. Address of respondent/Company _____
3. Name of market or area:_____
4. Name of Local Government Area._____
5. Age of Respondent/Company_____
6. Sex of respondent_____
7. Marital status
 - i. a. Married [] b. Single []
 - ii. a. Number of wives [] b. No. of Children []
8. Educational status
 - i. Primary Education []
 - ii. Secondary Education []
 - iii. Tertiary Education []
 - iv. Adult Education []
 - v. Islamic Education []
 - vi. Others specify []

SECTION B. PROCESSORS OF GUM ARABIC

This section is to be completed by processors

1. Do you process Gum Arabic? Yes [] No []
2. If 1 above is yes how long have you been processing Gum Arabic?
 No. of Months [] No. of years []
3. What type of Grade(s) do you process?_____
4. How do you identify or recognize Grade(s)?_____

5. What volume or quantity (Kg/tones) of Gum Arabic do you process in a day/months/season/year? _____
6. How many days in a week do you process Gum Arabic? _____
7. How many month(s) in a year do you process Gum Arabic? _____
8. How do you get Gum Arabic for processing?
 - i. Buying []
 - ii From my farm []
 - iii Other ways. Please specify _____

9. How much do you buy one kg/tone of unprocessed Gum Arabic?

	1998	1999	2000	2001	2002	2003	2004
Grade I							
Grade II							
Grade III							

10. How much do you pay per one Kg/tone of Gum Arabic for the following activities
 - a. Transportation
 - b. Loading and off loading
 - c. Storage
 - d. commission agents
 - e. Market charges
 - f. others specify _____

11. How do you process your Gum Arabic?
 - a. Manual []
 - b. using machine []
 - c Manually & mechanically []

12. What are the Activities involved in processing Gum Arabic?

Activities			
Manual		Industrial	
Activity	Cost/Kg/Tonne	Activity	Cost/Kg/Tonne

13. List the machinery/equipments used in processing Gum Arabic.

Manual	Industrial

14. Are these machinery/equipments own or hire?

Equipment	Hired (charges/units)	Own (age)

15. How do you get fund for processing?

i. Personal saving [] ii. Loan [] iii others specify

16. Are you a member of co-operative Society or Association?

Yes [] No []

17. If above is yes, what is the name and the purpose of this co-operative or Association

Name: _____

Purpose: _____

18. How much do you sale one Kg/50kg bag/tonne of processed Gum Arabic in 2004

	Jan.	Feb.	March	April	May	June	July	Aug	Sept.	Oct.	Nov	Dec
Grade I												
Grade II												
Grade III												

19. Who do you sale your processed Gum Arabic to ?

i. Exporters [] ii. Industries [] iii. Others specify) []

20. Please list the name/addresses of your buyers_____

21. What are the major problems of processing of Gum Arabic from your experience?_____

22. What are the possible solutions to these problems from your experience

SECTION C. TRADERS OF GUM ARABIC

This section is to be completed by marketers or traders of Gum Arabic.

1. Do you sale or buy Gum Arabic? Yes [] No []

2. If yes, how long have you been into marketing of Gum Arabic?

No. of months [] No. of years []

3. What type of grade do sale or buy? Grade I [], Grade II []
Grade III []
4. How do you identify or recognized grades of Gum Arabic?_____
5. What type of activities do you carry out in the market?_____
6. Who do you buy gum Arabic from:
 - A. From my farm
 - B. From Farmers or collectors
 - C. From others sellers
 - D. Others. Please specify.
7. Who do you sell your Gum Arabic to?
 - a. To others marketers
 - b. To exporters
 - c. Others. Please specify.
8. What quantity of Gum Arabic do you sale or buy in a market day/season/year?

Mudu	Kg	Tonne

9. How many market days do you attend in a week/month? []
10. How many months do you attend market in a year? []
11. How much do you buy one Mudu/Kg/Tonne of Gum Arabic?

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct	Nov	Dec
Grade I												
Grade II												
Grade III												

12. How much do you pay for transporting 50 Kg bag/tonne of Gum Arabic to the market?

	50 Kg bag	Tonne
₦		

13. How much do you pay for loading and off loading of 50Kg bag/tonne of Gum Arabic?

	50 Kg bag	Tonne
₦		

14. How much do you pay as market revenue per 50 Kg bags/tonne? _____

15. Do you pay or receive commission? Yes [] No []

16. If 15 above is yes, how much do you pay or received as commission ₦/Bag/Tonne? _____

17. What other charges do you pay in the market again? Please specify, the charges and mount in ₦ / 50Kg Bag/Tonne?

18. Which month(s) do we have Gum Arabic available and which month(s) is Gum Arabic scarce?”

Months	Available	Scarce

19. What are the prices at these periods?

Available month(s)_____ Price(s)_____

Scarce months(s)_____ Price(s)_____

20. Do you store Gum Arabic before selling? Yes [] No []

21. If above is yes, for how long? _____ Days/Weeks , Months/Years

22. How much does it cost you to store 50Kg bag/tonne of Gum Arabic per a given period?

Quantity Kg/tonne	Duration Days/Weeks , Months/Years	Cost ₦

23. What is/are your source(s) of funds for trading of Gum Arabic

a. Personal saving []

b. Loans from friends []

c. Loans from Bank []

d. Loan from Religious body []

e. Others Please specify_____

24. How much do you sale one mudu / 50Kg bag/tonne of Gum Arabic?

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec
Grade I												
Grade II												
Grade III												

25. What are the average annual prices for 50Kg bag/tonne of Gum Arabic for the past years?

Years	1998	1999	2000	2001	2002	2003	2004
Price							

26. How many people do you know are in Gum Arabic marketing?
 a. None _____ b. Few (please specify no if possible)
 c. Many (please specify no if possible)
27. Are you a member of Cooperative Society or Association? Yes []
 No []
28. If yes, what is the name of the cooperative Society or Association?
 Name/Address _____
29. Do you have access to market information? Yes [] No []
30. If 29 is yes, where do you obtained your information? _____
31. What are the major problems of marketing Gum Arabic from your experience? _____
32. What do you think are the possible solution to these problems?____

APPENDIX 2

FARMERS/COLLECTORS OF GUM ARABIC QUESTIONNAIRE.**A. BACKGROUND**

This questionnaire is to be completed by farmers/collectors of Gum Arabic.

1. Name of respondent _____
2. Name of village/market _____
3. Name of Local Government Area _____
4. Age of Respondent _____
5. Sex of respondent Male [] Female []
6. Marital status a. Married [] b. Single []
7. Size of house hold a. Number of wives [] b. No. of Children []
8. Educational status
 - i. Primary Education [] ii. Secondary Education []
 - iii. Tertiary Education [] iv. Adult Education []
 - v. Islamic Education [] vi. Others specify []

B. PRODUCTION

9. How many years have you been producing Gum Arabic? _____
10. What is the size of your farm or plantation or forest reserve in hectares? _____
11. What quantity of Gum Arabic do you produced in a year Kg/tonne? _____
12. What are the activities do you carry out in your farm in years?

Activity	Months Jan. – Dec.	Duration (Week/day)	Cost (₦)

C. MARKETING

13. What type of Grade do you sale?

Grade I [] Grade II [] Grade III []

14. How do you identify different grades? _____
15. Where do you sale your gum Arabic.
At home [] Market [] others (Please specify) _____
16. How do you transport Gum Arabic to the market?
i. Head load [] ii. Animals [] iii. Bicycle []
iv. Motor cycle [] v. Motor Vehicle [] vi Others (Specify) _____
17. What is the distance from your house/farm to the market? _____ km
18. Please indicates where applicable, how much you pay for the following marketing services?

Marketing services	Cost (₦/Bag/tonne)
Transport	
Loading and off loading	
Market charges	
Bags and sowing	
commission agents	
Others (Please specify)	

19. Who do you sale your Gum Arabic to?
i. Commission Agents []
ii. Rural Assemblers []
iii. Urban Assemblers [] iv. Exporters []
20. What quantity (mudus/bags/tones) of Gum Arabic do you sale in a market day?

Mudu	50 Kg Bag	Tonne

21. Ho many market days do you attend in a week/month? _____
22. How many months do you attend market in a year? _____

23. Which month(s) do you have Gum Arabic available and which month is Gum Arabic scarce. What are the prices at these periods

	Month	Cost
Available		
Scarcity		

24. How much do you sale mudu/50 Kg bag/tonne of Gum Arabic?

Month	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov	Dec.
Grade	I											
	II											
	III											

25. What is the annual average price of 50Kg bag/tonne of Gum Arabic for the previous years?

Year	1998	1999	2000	2001	2002	2003	2004
Grade/Price							
I							
II							
III							

26. Are you a member of cooperative society or Association?

Yes [] No []

27. If 26 above is yes, what is the name and objectives of the cooperative or Association

Name; _____

Objectives: _____

28. What is/are your source(s) of income for producing and trading of Gum Arabic?

i Personal Saving [] ii. Loan from Bank []

iii. Loan from Cooperative society []

iv. Loan from family and friends []

v. Others (Please specify)

29. Do you have access to market information? Yes [] No []
30. If 29 above is yes, then where do you obtain your market information? _____
31. Do you store Gum Arabic before selling? Yes [] No []
32. If 31 above is yes, then for how long? _____
 _____ Days/weeks/months /years
33. How much does it cost you store 50Kg bag/tonne of Gum Arabic per a given period?

Quantity Kg/tonne	Duration Days/weeks/months/yars	Cost ₦

34. What are the major problems of marketing of Gum Arabic from your experience?

Problems	Rank		
	Very Severe (1)	Severe (2)	Average (3)

35. What do you think are the possible solutions to these problems _____
