# Profitability Analysis of the Sesame Value Chain in Gaderif State/ Sudan - 2019/2020 Season

**Salwa Ali Mohamed El Hassan** — General Department of planning and Agricultural Economics- Ministry of Agriculture and Natural resources- Sudan.

**Prof. Hag Hamed Abd Alaziz** — Head of Shandi University – River Nile State- Sudan

**Dr. Intisar Yousif Ahamed Elbashir** — Department of Agricultural Economics- Sudan University of Science and Technology - Sudan

**Abstract:**

Sesame is very important cash crop in Sudan, it contributed by 771.6 million dollars to Gross Domestic Products (GDP) in 2019. Semi-mechanized rain fed sector is the main contributor in sesame production especially in Gaderif State. Despite the importance of Sesame crop in the Sudanese economy, it suffers from some problems and obstacles that hinder its contributions. This study aimed to analyze the profitability of sesame value chain in Gaderif State during 2019/2020 season in order to identify the challenges and constraints throughout the value chain stages, determine gross marketing margin and producer share in consumer price. Primary and secondary data were used in the study, multistage random sampling technique and purposive sample procedure was used to collect the primary data from the actors by means of questionnaires. The total sample size was 230 participants (150 farmers, 30 wholesalers, 15 processors, 15 exporters and 20 retail traders). Secondary data included time series data (from 2000 to 2020) of

area cultivated, production, yield, export quantities and values and it collected from the Federal Ministry of Agriculture and natural resources and Bank of Sudan. Quantitative analysis of value chain was used to analyze the data, financial indicators and marketing margin coefficients were used to determine financial position of actors. The results of the study revealed that actors in the value chain received unequal marketing margins these difference are the evidence of market inefficiency. The results showed that most of the value added was due to high transportation cost and physical losses in the crop. The coefficient of private profitability (CPP) indicated the profitability of sesame in all value chain stages. Return of 1 SDG invested by farmer was found to be very low this implies low farmer profitability due to weak productivity. The results revealed that the farmers had the largest percentage share (59%) of the export price. The study identified some challenges in different value chain stages such as; high labor and mechanized operations costs at production stage, physical losses and transport cost at export stage, losses and processing cost in process stage, market fess and transport cost in market stage. The study recommended that; use of improved high yielding and disease resistant varieties of Sesame crop, improve the efficiency of market system and use effective pricing policies.

**Key words:** Oil seed, Marketing costs, value added

**المستخلص:**

يعتبر السمسم محصولاً نقدياً هاماً في السودان ، فقد ساهم بمبلغ 771.6 مليون دولار في الناتج المحلي الإجمالي لعام 2019. يعتبر القطاع المطري شبه الآلي المساهم الرئيسي في إنتاج السمسم خاصة في ولاية القضارف. بالرغم من أهمية محصول السمسم في الاقتصاد السوداني ،

إلا أنه يعاني من بعض المشاكل والعقبات التي تعيق مساهمته. هدفت هذه الدراسة إلى تحليل ربحية سلسلة قيمة السمسم بولاية القضارف خلال موسم 2020/2019 من أجل التعرف على التحديات والمعوقات في جميع مراحل سلسلة القيمة وتحديد هامش التسويق الإجمالي وحصة المنتج في سعر المستهلك. تم استخدام البيانات الأولية والثانوية في الدراسة حيث تم استخدام اسلوب أخذ العينات العشوائية متعددة المراحل وإجراء العينة القصدية لجمع البيانات الأولية من الجهات الفاعلة عن طريق الاستبيانات ، وبلغ الحجم الإجمالي للعينة 230 مشاركًا (150 مزارعًا ، و 30 تاجر جملة ، و 15 مصنعاً ، و 15 مصدرًا ، و 20 تاجر تجزئة). تضمنت البيانات الثانوية بيانات السلاسل الزمنية (من 2000 إلى 2020) للمساحة المزروعة والإنتاج والإنتاجيه وكميات الصادرات وقيمها وتم جمعها من وزارة الزراعة الاتحادية والموارد الطبيعية وبنك السودان. تم استخدام التحليل الكمي لسلسلة القيمة لتحليل البيانات ، واستخدمت المؤشرات المالية ومعاملات هامش التسويق لتحديد الوضع المالي للجهات الفاعلة. كشفت نتائج الدراسة أن الجهات الفاعلة في سلسلة القيمة حصلت على هوامش تسويقية غير متكافئة ، وهذه الاختلافات هي دليل على عدم كفاءة السوق. أظهرت النتائج أن معظم القيمة المضافة ترجع إلى ارتفاع تكلفة النقل والفاقد في المحصول. يشير معامل الربحية الخاصة (CPP) إلى ربحية السمسم في جميع مراحل سلسلة القيمة. وجد أن عائد SDG 1 الذي يستثمره المزارع منخفض للغاية ، مما يعني انخفاض ربحية المزارع بسبب ضعف الإنتاجية. وأظهرت النتائج أن المزارعين حصلوا على النسبة الأكبر (59٪) من سعر التصدير. حددت الدراسة بعض التحديات في مراحل سلسلة القيمة المختلفة مثل ؛ ارتفاع تكاليف العمالة والعمليات الآلية في مرحلة الإنتاج ، والفاقد وتكلفة النقل في مرحلة التصدير ، والفاقد وتكلفة التصنيع في مرحلة التصنيع ، ورسوم السوق وتكلفة النقل في مرحلة السوق. أوصت الدراسة بما يلي: استخدام أصناف محسنة عالية الانتاجيه ومقاومة للأمراض من محصول السمسم ، وتحسين كفاءة نظام السوق واستخدام سياسات تسعيرية فعالة.

## 1. Introduction

Agriculture is one of the most important productive sectors in Sudanese economy especially after secession of South Sudan and the reduction of oil contribution to the GDP. Its contribution is about 31% in 2017[1]. The Agricultural sector has an important role in achieving food Security by increasing food production and providing employment opportunities in the rural area. Crop production is practiced under three main systems; irrigated agriculture, semi-mechanized rain-fed agriculture and traditional rain-fed

agriculture. Semi-mechanized rain-fed agriculture is practiced in Gaderif, Kassala, Blue Nile, Sennar, White Nile and South Kordofan states, the crops produced in this sector are sorghum, Sesame, sunflower and millet. Oil crops are the main crops in Sudan and come in second place after cereals in terms of area. The crops of groundnuts, Sesame, cotton seed and sun flower are the most important oil crops. Sesame comes in the second place after groundnuts in terms of production and in first in terms of area these oil crops represent a major and important source of vegetable oils, and also play an important role in Sudan exports.

Sesame production in Sudan is produced into two types of farming: semi-mechanized rain-fed farming and traditional rain-fed farming. The traditional rain-fed farming produces an average of 44% of the total production in Sudan it occupies a considerable area of about 52% from total areas and is mostly practiced by smallholder farmers. On the other hand, semi-mechanized rain-fed farming produces an average of 56% of the country's Sesame seeds and occupies area of about 48% from total areas in Sudan. El Gaderif State is main state in the semi-mechanized rain fed in producing Sesame it contributes by an average of 33% of Sesame produced in semi-mechanized and 19% from total Sesame produced in Sudan[(2)]. About 61% of Sudan production of Sesame exported as Sesame seed only white Sesame was exported as grain while the red Sesame processed domestically. The main Sesame exporters worldwide include India, Ethiopia, Nigeria, Sudan, China, Paraguay, Myanmar, and Mexico. Sudan's markets for Sesa-

me are quite diversified; China, India and Malaysia are the main and biggest markets in Asia countries. Saudi Arabia, Lebanon and Syria are the major importers of Sesame in the Arab countries. In African countries Egypt, Tunisia and Algeria are the traditional markets. In industrial countries the main partners are Greece, Japan, Italy and Canada. In Europe the main market is Turkey. From fig (1) appeared that the values of Sesame export during the period 2010 to 2020 were increased in some markets especially in Asia markets it reached the maximum in year 2018 (272.2 million dollars), but these values decreased in 2019 in Asia countries and raised in other Arab countries like Jordan and Saudi Arabia also it appeared that there are high penetration in this year towards industrial markets compering with other previous years [3].

Despite the availability of marketing offers for Sesame, Sudanese Sesame suffers from some obstacles and challenges that weaken its role in the economy.

**2Previous Studies**

Imad Eldin Elfadil 2015

He analyzed the factors constraining the competitive of Sesame in Sudan by adjusting vector error correction model, he reported that the constraints of Sesame associated with rainfall variability, low yield, land tenure, harvesting and post-harvesting losses, quality of seeds and weak links in its value chain, in addition to ineffectiveness of agricultural extension, lack of agricultural rotation, low or no use of technology, frequent mono-cropping and used of non-certified seed. he found in his results that yield, area

variation and unstable fluctuating exchange rate are the main factors affecting Sesame export earnings in the long run, and area variation in the short run he finalized that the improvement of Sesame yield and stabilized exchange rate will have positive impact on Sesame export value in the long run, while expansion of area under Sesame production could have negative influence on Sesame export value due to Sudan large share of Sesame export in the world market(4).

**Shawgi Ali 2013:**

He used SWOT to analysis the Sesame value chain in the Kordofan region (Sudan) and the findings revealed that Sesame production is constrained by lack of extension services, civil war and conflicts between farmers and livestock keepers over natural resources and scarcity of farming equipment. Oil processors are constrained by high cost and insufficiency of inputs and oil imports. Sesame producers' opportunities in the region include production of good local varieties and favorable growing conditions. Oil processors have the potential to increase oil production and compete with other oils by improving quality (5).

**Hala Ahamed 2010**

She evaluated the effects of the main economic factors on Sesame production, marketing and exports of Gaderif and North Kordofan States, of Sudan. The study tested the positive hypothesis of socio-economic characteristics on producers and traders, high share of harvesting, crop physical losses and transportation costs, existence of market oligopoly, and co-integration of markets

in Sudan with the export market. The study depended on primary and secondary data. The study used descriptive statistic, marketing margins, budgeting, policy analysis matrix (PAM), and time series temporal and spatial co-integration methods for analysis. The results indicated that the share of farmers' price was about 75% on average of the FOB prices; the market-margin shares of the exporters exceeded those of the assemblers, the Sesame crop was profitable despite the high cost of harvest, physical losses and transportation in production and marketing activities. She reported in her result from temporal analysis that there was instability of prices of Sesame and there was existence of co-integration between export and domestic markets in the long run. The study put many recommendations some of it were reducing Sesame production and harvesting cost through breeding of non-shattering varieties; reducing marketing cost through introduction of sieving process in the production areas to reduce physical losses; improving infrastructure to reduce transportation cost of Sesame [(6)].

In addition to above mentioned constraints it recognized that production of Sesame in semi mechanized sector and Gaderif State was fluctuated up and down during the period 2000- 2020 the percentage share of semi mechanized sector decreased from 80% to 49% fig (2) as the result the quantities export fluctuated it reached the maximum in year 2015 representing 93% from production and then dropped to 48% in 2019, fig (3). Moreover change in macroeconomic policies especially remove of oil subsidy and devaluation of local currency leads to high inflation rate and increased

transaction costs [7] these added anew burden and challenges on Sesame which leads to raise the prices locally and globally. Challenges and constraints of Sesame in Gaderif State can be more detected by determining profits and gross margin at each level from production, marketing, exporting and processing. Therefore a value chain analysis was carried out in order to detect the role of all actors and their contribution in Sesame competitiveness and profitability in Gaderif State. In order to verify these objectives the study put some hypotheses to be tested;

- Sesame marketing was inefficient in the study area.
- Sesame crop was profitable in all stages.
- Long value chain will reduce farmer's share of the final price.

## 3 Literature review

Value chain concepts have been defined by different scholars, Kaplinsky and Morris defined a value chain as the full range of activities which are required to bring a product or service from conception, through the different phases of production, transformation and delivery to final consumers, and eventual disposal after use [8]. In Kaplinsky and Morris' approach, value chain analysis seeks to characterize how chain activities are performed and to understand how value is created and shared among chain participants. Fries, (2007) described value chain as the assessment of the actors and factors that influence the performance of an industry, relationship among the participants to identify the driving constraints to increase efficiency, productivity and competitiveness of an industry and on how these constraints can be overcome[9]. Different re-

searches were used value chain analysis to assess the profitability of the actors; Katanga Y. N.et al. 2018 they study the profitability of Sesame value chain along Jigawa-Kano Axis in Nigeria. Data were analyzed using gross margin and marketing margin. The results of the study showed that Sesame farmer produce an average of 576.21Kg/ha. The profitability measures have indicated that traders had highest gross margin in the value chain more than producers, processors and exporters. These values indicated profitable enterprises along the Sesame value chain. Challenges of the Sesame value chain include problem of improved seed, high cost of inputs, transportation, price uncertainty/low price, contract transaction, and policy issues. The study recommended that, increased profitability, production and productivity along the Sesame value chain could be achieved through the provision of improved varieties with desired characteristics, well managed contract transaction, provision of necessary infrastructures and a guarantee minimum price for all Sesame enterprises along the chain [10]. Magabe 2016 used value chain analysis in his study in Masasi District (Tanzania), he found that the farmers had a gross margin less than traders [11]. Also Linn T., 2013 studied Sesame value chain in Magway Township (Myanmar) he found that there were many actors in the value chain such as input providers, farmers, wholesalers, millers, processor and exporter his results showed that wholesalers received the highest percentage of profit than other actors [12].

## 2.Materials and Methods

Structured questionnaire were used to collect the primary data from farm households, traders, exporters and oil processors. Data on technical and economic aspects such as the socio economic characteristics of the respondents, costs, outputs, prices, quantities, taxes were collected. A multistage random sampling procedure was used to select sample from the farmers, a sample of about 150 respondents was chosen from seven localities from each locality one area was chosen using a systematic sample procedure according to area cultivated in season 2019/2020. Purposive sample procedure was used to select traders, exporters and oil processers. Participation in survey of respondents was traders 30, exporters 15, processers 15 and oil traders 20. Survey conducted on January 2020. Secondary data included time series data of area, production, yield, cost, quantities export and prices collected from federal Ministry of Agriculture, State Ministry of Agriculture and Central Bank. Also a review of published and unpublished materials on the internet was used. Quantitative analysis of value chain was used to determined costs, profit and margin at each level of value chain. Certain indicators were used to measured financial position of actors and market performance of Sesame.

**Financial indicators**

1/Net income or profit= Revenue – Total cost …… (1)

2/Net profit margin %= unit profit/unit price …….. (2)

3/Coefficient of private profitability (CPP) = Revenue/Total cost …. (3)

4/Return for 1 SDG invested= revenue/variables cost ……. (4)

**Marketing margin indicators**

1/ Total Gross Marketing Margin (TGMM)

TGMM% = (Pc-Pp)/ Pc×100 ……..……. (5)

Where: TGMM is the total gross marketing margin

Pc is the consumer price Pp is the producer price

2/ Producer's Gross Margin (GMp)

GMp= (Pc- TGMM)/Pc×100 ……

(6)

Where: GMp is the producer's share in consumer price

3/ Net Marketing Margin (NMM)

NMM= (TGMM- MC)/Pc×100 ……....

(7)

Where: NMM is the net marketing margin

MC is the marketing cost

4/Total gross profit margin TGPM:

TGPM= TGMM – Toe …….. (8)

Where: Toe= total operating expense

5/ Markup is the currency amount added to the cost of products to get the selling price.in other word markup means percentage of selling price that is added to the cost to get the selling price it calculated as:

Total Markup% = (Pc – Pp) /Pp×100 …… (9)

## 4 Results and Dissections

### a. Production Cost of Sesame

Different costs was incurred by farmers in producing of Sesame

seed it found that one feddan was cost the farmer about 4188 SDG and to produced one ton it cost 62881 SDG this high cost of ton due to low productivity per feddan which equals to 66.6 kg this season. Hired labor cost was highest cost in producing Sesame it was 23.3 thousand per ton, scarcity of labors and high wages per day leads to raise the cost of manual operations which are cleaning, weeding, harvesting, threshing and sacking. Second high cost was machinery costs and maintenance for mechanic operation like preparation, planting and spraying pesticide. Land rent also considered as high cost, to produce one ton needs to pay 7.8 thousand SDG for land rent. Seeds and chemicals have minor costs because farmers used their own seed from previous season, table (1).

**Table (1): Farm production cost of Sesame (SDG)**

| Items | Cost/fed | Cost/ton | Percent |
|---|---|---|---|
| **Variable cost** | | | |
| Seed | 115.8 | 1739 | 3 |
| Seed disperse | 1.4 | 21 | 0.03 |
| Herbicides | 169.8 | 2550 | 4 |
| Pesticides | 43.9 | 659 | 1 |
| Machinery and maintenance | 610 | 9159 | 15 |
| Packing material | 57 | 856 | 1 |
| Hired labor | 1556 | 23363 | 37 |
| Permanent labor | 253 | 3799 | 6 |
| Managerial cost | 172 | 2583 | 4 |
| land rent | 520 | 7808 | 12 |
| Zakat | 431 | 6471 | 10 |
| **Fixed cost** | 258 | 3874 | 6 |
| **Total cost** | 4188 | 62881 | 100 |
| (Yield (sack | 0.74 | | |
| (Yield (kg | 66.6 | | |

Source: Survey results, January 2020

### b. Production Cost of Sesame Oil and Cake

Processors processed Sesame seed to the edible oil and the cake result as by product from processing. It found that one ton of Sesame seed produced about 442.7 kg oil, 530 kg cake and the remaining 2.7% was losing from ton these loses due to packing of oil in the containers or sometimes the pressing is not very hard and left some oil in cake especially the traditional type of pressing. So losses cost represent the highest cost for processors which constituted about more than half from production cost. Processing cost comes as second high cost it reached to 1.4 thousand SDG for one ton.

**Table (2): Production cost of Sesame oil and cake (SDG)**

| Item | Cost/ton | Percent |
|---|---|---|
| Processing cost | 1403 | 31 |
| Maintenance | 250 | 6 |
| Labor wages | 555.5 | 12 |
| (Losses cost (2.7% | 2307.3 | 51 |
| Total production cost | 4515 | 100 |

Source: field survey January 2020

### c. Marketing Costs along Value Chain Actors

Marketing costs are incurred when commodities move from the farm to the final market, whether they are moved by farmers, intermediaries, cooperatives, marketing boards, wholesalers, processors, exporters or retailers. The components of marketing costs are simply includes handling costs, transport costs, storage cost, taxes and marketing fees, physical losses equivalent in value terms, cleaning [13]. Three options of value chain were analyzed in which Sesame delivered to the different logistics.

Option 1 Sesame seed: Input suppliers - farmers - wholesalers – exporters - consumers in other countries.

Option 2 Sesame oil: input suppliers – farmers – wholesalers - traditional processors - oil retailers - local consumers.

Option 3 Sesame cake: input suppliers – farmers – wholesalers – traditional processors - cake traders - animal breeding consumer.

From the table (3) appeared that transport cost was the highest cost faced the farmer when he sold his crop it was more than half of marketing cost, market fees was the highest cost for the wholesalers which represent 40% from adding cost, followed by transport cost 24%. For exporters 55% of the costs incurred due to physical losses from screening and re-sacking of Sesame they lost about 5% from ton, Port Sudan expense was the second cost faced the exporters it was 13% from the adding cost followed by transport 11%. Port Sudan expenses include (specifications and standards fees, port fees). Containers and sacks cost was the highest percentage cost for processors it represented about 68% followed by transport cost (22%). For oil retailers the highest percentage cost reported was losses cost 47% and this loss comes as result of packing the oil, followed by taxes 19%. In case of cake trader taxes was considered the greatest cost 36% from total cost followed by handling cost 24% and then transport cost 23%. Marketing cost across actors of value chain reveled that exporters had a highest marketing cost they expenses about 12.02 thousand SDG for one ton Sesame.

**Table (3): Marketing cost by actors (SDG/ton)**

| Items | Farmer | Whole-saler | Exporter | proces-sor | oil re-tailer | cake trader |
|---|---|---|---|---|---|---|
| Handling | 110 | 291.2 | 259.5 | 197.1 | 200.2 | 230.8 |
| Transport | 979.9 | 351.2 | 1377.2 | 702.5 | 188.3 | 217.0 |
| Market fees | 843.3 | 596.8 | 900.5 | 66.3 | 130.6 | 156.4 |
| Taxes | | 54.1 | 68.3 | 76.3 | 285.9 | 342.3 |
| Storage | | 188.7 | 73.0 | | | |
| sacks/contain-ers | | | 535.9 | 2204.0 | | |
| Screening/ sacking | | | 567.8 | | | |
| Port expenses | | | 1578.0 | | | |
| Losses cost | | | 6666.3 | | 717.2 | |
| Total cost ((TMC | 1933.1 | 1482.0 | 12026.6 | 3246.3 | 1522.2 | 946.5 |

Source: survey results, January 2020

### d.Revenues, Profit and Margin to Different actors

Table (4) revealed that the accumulated value added cost for exporting one ton of Sesame from production stage to the border point was equals to 78.3 thousand SDG while accumulated value added cost of transforming Sesame to oil and cake equals to 76.5 thousand SDG for one ton, this implies that exporting Sesame added more value than processing. Sesame oil had 85% share of value added from processing while cake constituted only 15% of value added. Total gross profit gained from exporting Sesame was equals to 55 thousand SDG for ton whereas processing oil gained about 61.4 thousand SDG. This indicates that transforming Sesame to oil has comparative advantage than export and this actually

due to high cost of export. But when looking to net profit to the exporter and processor it found that exporter gained 21.8 thousand SDG from ton whereas processor gained only 11.2 thousand SDG from both oil and cake.

**Table (4): Revenues profit and margins (SDG/ton)**

| Items | Farmer | Whole-saler | Exporter | Processor | | | Oil retailer | Cake trader |
|---|---|---|---|---|---|---|---|---|
| | | | | Total | oil | cake | | |
| Selling price | 78034.5 | 99440 | 133326.9 | | 228947.5 | 32176.4 | 264000 | 40000 |
| Quantity sold | 1 | 1 | 1 | 0.9727 | 0.4427 | 0.53 | 0.4427 | 0.53 |
| Revenue | 78034.5 | 99440 | 133326.9 | 118409 | 101355 | 17054 | 116872.8 | 21200 |
| Pro-duction cost | 62881 | | | 4515 | 3865 | 650 | | |
| Market-ing cost | 1933.1 | 1482.0 | 12026.6 | 3246.3 | 3792.5 | 467.5 | 1522.2 | 946.5 |
| Pur-chase price | 0 | 78034 | 99440 | 99440 | 85118 | 14322 | 101355.1 | 17053.5 |
| Total cost | 64814.5 | 79516.4 | 111466.6 | 107201.6 | 92775.9 | 15439.5 | 102877.2 | 18000.0 |
| Net profit | 13219.9 | 19923.6 | 21860.3 | 11207.0 | 8579.2 | 1614.1 | 13995.6 | 3200.0 |
| Mar-keting margin | 15153.1 | 21405.5 | 33886.9 | 18968.6 | 16236.7 | 2731.9 | 15517.7 | 4146.5 |

Source: survey results, January 2020

Distribution of value added, profit and gross margin between actors illustrated in the figure (4) it reflected that in option1 83% of value added of exporting Sesame incurred by the farmer while exporter added only 15%, the highest share of profit received by the exporter (40%) then wholesaler and lastly the farmer received only 24%. In processing Sesame to oil and cake (option 2 & op-

tion 3) also farmer added most of the values whereas processors added 12% for oil and 10% for cake, wholesaler gained highest percentage share of profit 33% in oil value chain while in cake value chain cake trader gained highest profit share followed by wholesaler, lowest percentage share of profit received by processor. Farmer received highest marketing margin in all value chain whereas wholesaler received 16%, exporter 25%, processor 14% for oil and 13% for cake, oil retailer 13% and cake trader 20% this indicates that the actors in Sesame value chains received unequal marketing margins and it was the evidence for the existence of market inefficiency [14] this result support the first hypothesis.

e.**Financial Indicators of Value Chain by stages**

Financial positions of value chain actors can be analyzed by calculating certain ratios included in table (5) it cleared that the coefficient of private profitability (CPP) was greater than one to the all actors this indicates that all stages of Sesame production, marketing, exporting and processing were efficiency and profitable and this agrees with second hypothesis. The highest CPP was found in marketing stage 1.3. Also ratio of return for 1SDG invested was found highest in oil retail stage and marketing stage they return 76.8 and 67.1 SDG respectively. Those results supported the previous finding that the wholesaler and trader are profit maximized. Returns to the farmer was found very weak compare to other actors for 1 SDG returns only 1.28 SDG that means the farmer gained small profit this actually due to low productivity of Sesame in addition to high cost and low price so utilization of improved

seed will lead to improve producer's profit. Also when comparing between exporter and processor it appeared that although exporter has high percentage of net profit margin and CPP they returns only 11.1 whereas the processor returns 15.3 SDG for each 1 SDG invested this may be due to effect of exchange rate on fob price.

**Table (5): financial indicators of value chain**

| items | Farmer | Wholesaler | Exporter | Processor | oil retailer | cake trader |
|---|---|---|---|---|---|---|
| % Net profit margin | 17 | 20 | 16 | 9 | 12 | 15 |
| Coefficient of private (profitability (CPP | 1.20 | 1.3 | 1.20 | 1.1 | 1.1 | 1.18 |
| return for 1 SDG (invested(SDG | 1.28 | 67.10 | 11.09 | 15.26 | 76.78 | 22.40 |

Source: survey results, January 2020

**f.Marketing Margin Indicators of Value Chain by Options**

Table (6) compared different coefficient of value chains in different options it cleared that the TGMM as currency was very high in seed value chain (option 1) it a counted of 55.3 thousand SDG for ton seed and in option 2 it accounted of 50.0 thousand SDG per ton Sesame oil, whereas in option3 it was 9.9 thousand SDG. When comparing total gross marketing margin as percentage of consumer price it found that option 3 had a highest TGMM 47% then option 2 (43%) and lastly option 1 (41%). This indicate that as long value chain between producer and consumer as the higher percent of TGMM which implied that the market margin becomes wide and price becomes high for consumers and low to producer.

The Net Marketing Margin (NMM) computed from the difference

between percentage shares of gross marketing margin and total marketing costs as the percentage of retail price in the chain. Accordingly, option 3 had the highest NMM which constituted for 38% of net income then option 2 had 36% and option 1 had 30%. Producer Gross margin (GMP) was the share of producer price in the consumer price. The producers had biggest percentage share in exporting price FOB price in option 1 which constituted for 59% then in oil Sesame price about 57% and cake price about 53%. This indicates that long value chain as in oil and cake reduced producer share in consumer price and this support third hypothesis.

Markup is the amount of currency added to the cost of products to get the selling price.in other word markup means percentage of selling price that is added to the cost to get the selling price. High markup was found in option 1 (71%) then option 2 (55%) and option 3(2%).

**Table (6): Marketing margin indicators in different options**

| Items | option 1 | option 2 | option 3 |
|---|---|---|---|
| Total gross marketing margin (TGMM) ((SDG | 55292.4 | 50077.1 | 9961.3 |
| Total gross profit margin (TGPM) ((SDG | 39850.7 | 41839.2 | 8055.4 |
| Total gross marketing margin %((TGMM | 41 | 43 | 47 |
| % (Net marketing margin (NMM | 30 | 36 | 38 |
| % (producer's gross margin (GMMp | 59 | 57 | 53 |
| % Total Markup | 71 | 55 | 2 |

Source: survey results, January 2020

## g.Challenges and Constraints in the Sesame Value Chain

Sesame crop in Gaderif State faces several constraints beginning with production and extended through wholesalers, exporters, processors and traders. Table (8) is a summarized of chain activities challenges and constraints identified from the survey. At the farm level, recurring constraints are pests and diseases which lead to big losses of the crop the farmers have limited pesticide knowledge and there is inappropriate use of pesticides. Also most of the farmers still use traditional seed varieties which bought from the market or reserved from previous seasons and this result in low productivity, improved varieties of Sesame seeds are mostly imported and are expensive for smallholder farmers to buy. Also lack and scarcity of labor in the harvesting time leads to raise their costs, providing the required inputs was also considered as constraints to the farmers due to high prices in addition to that low prices of Sesame at harvest time frustrated the farmers because most of them don't have facilities to store their crop. At the collection and wholesale level multiple brokers between farmers and wholesalers was the main constraints because they increase the transaction cost, high transportation costs, high fees and taxes and absence of marketing facilities especially good storage facilities resulting in high quality and quantity losses as well as price volatility. At exporting level multiple broker raise the prices and also high transportation cost, high port expense, high losses from screening are all constraints the exporters in addition to that the exporters complained from the exchange rate price specialized for

export because it was very low compare to the black market price. Processing activities affected by high losses from raw materials and oil which reached about 2.7% from ton, containers cost and transport cost. In the retailing level high taxes and fees and handling cost are the main constraints.

**Table (7): Summarized challenges and constrains of chain activities**

| Chain activities | Challenges and constraints |
|---|---|
| Production | Inappropriate use of pesticides, lack of improved seeds, lack of labor and high cost, high inputs costs and low prices at harvest time |
| Collection ((Wholesalers | Multiple brokers, high transportation cost, high fees and taxes and absence of marketing facilities |
| Exporting | Low exchange rate, multiple brokers, high transportation cost, high port expense high losses from screening and fluctuations of international prices |
| Processing | High losses, high transport cost, high processing cost |
| Retailing | High fees and taxes, high handling cost |

Source: survey results, January 2020

**Recommendations:**

1. promote of improved high yield and disease resistant varieties of Sesame.
2. improve post-harvest management system to reduce quantity and quality loss.
3. improve the efficiency of marketing system by decreasing transaction costs

4. improve market information system
5. effective pricing policies should be put in.
6. strengthen export promotion to increase export share in existing destination and new markets.
7. promote investments in oil refining, seed cleaning and hulling to add value and gain better market price.
8. appropriate processing technology should be promoted among the processors to improve their activities and minimized the loss.

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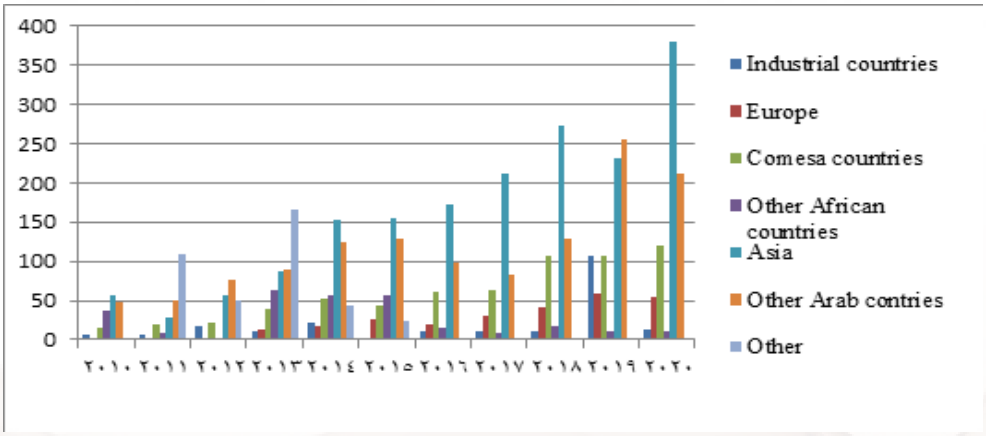
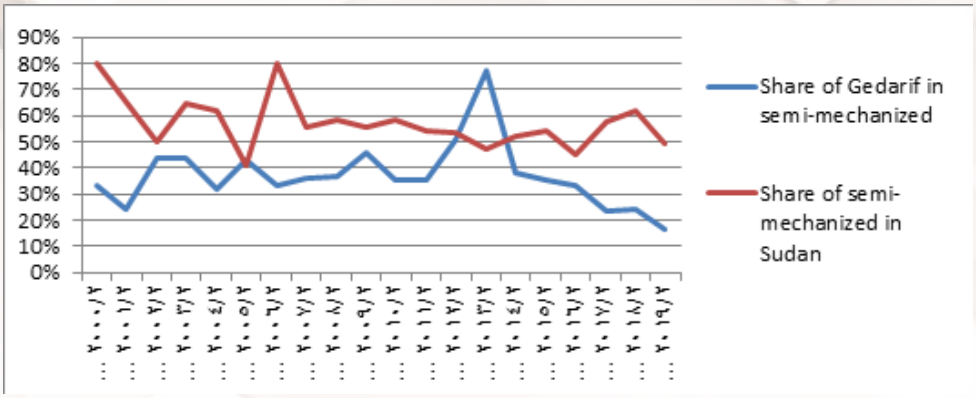



## 4.Figures

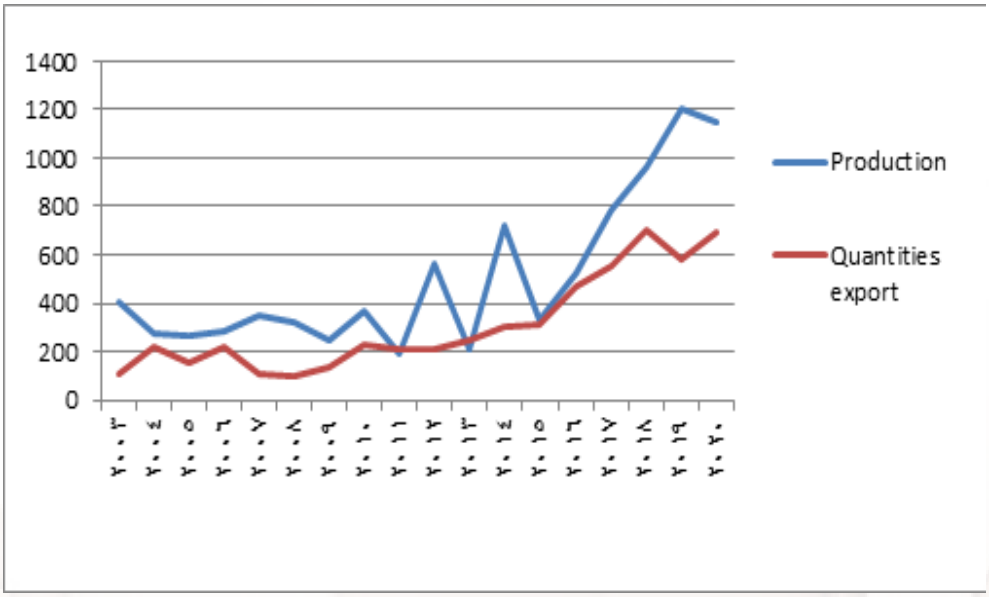
Source: Foreign Trade Statistical Digest (2010- 2020)- Central Bank of Sudan

**Figure 1: main markets for Sudanese Sesame seed in the world**
**(values in million dollars)**



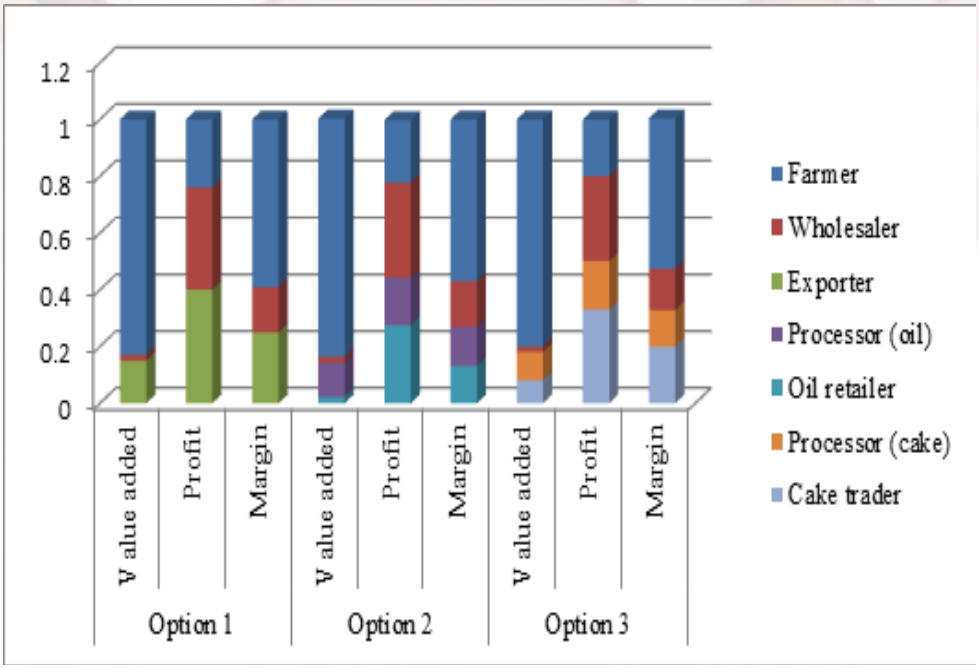

Source: Ministry of agriculture and natural resources

**Figure 2: Share of semi mechanized sector and Gaderif State in Sesame production**




(Source: Ministry of Agriculture and Bank of Sudan (2003-2020

**Figure 3: Sesame production and quantities export (000ton)**




Source: Survey results, January 2020

**Figure 4: Percentage share of value added cost, profits and margins for all actors of Sesame value chain in Gaderif State**