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Sudan University of Science and Technology

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Agricultural Economics

Estimation of Competitiveness of Sudanese Mango Fruits Exports to Kingdom of Saudi Arabia during the Period 2010- 2012

تقدير القدرة التنافسية لصادرات المانجو السوداني
المملكة العربية السعودية خلال الفترة ٢٠١٠ـ ٢٠١٢

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بِسْمِ اللهِ الرَّحْمَنِ الرَّحِيمِ

قال تعالى:

"وَتِلْكَ الْجَنَّةُ الَّتِي أُورِثْتُمُوهَا بِمَا كُنْتُمْ تَعْمَلُونَ ، لَكُمْ فِيهَا فَاكِهَةٌ

كَثِيرَةٌ مِنْهَا تَأْكُلُونَ "

"صدق الله العظيم"

الآيتان ٧٣،٧٢ من سورة الزخرف

Dedication

To my beloved father who gave me hope and care,,,

To the soul of my mother,,,

To my dear brothers and sisters who were there when I'm in need,,,

To my teachers, friends and colleagues,,,

With love

Suad

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ABSTRACT

This study was conducted to evaluate the competitiveness and to identify the comparative advantages of Sudanese mango exports and determination of the causes that lead to the fluctuations of mango exports during the period (2010- 2012) and suggesting recommendations and strategies to improve the performance of this sector which can play an important role in Sudan's economy.

The study used primary data collected from some exporters in this field beside the secondary data which were collected from the related sources such as ministries, government bodies and FAO annual reports.

The data were analyzed by descriptive statistics and Policy Matrix Analysis (PAM) method.

The main findings of the study were that; Kingdom of Saudi Arabia (K. S. A.) was the largest importing country. There was a competitive advantage for the Sudanese mango but, economic profitability was greater than financial profitability this was due to direct and indirect taxes imposed on mango exports.

The study found that the main causes of fluctuation of export are:

- Increase of the export costs, absence of extension and training programmes for mango growers especially in production, harvesting, grading, sorting and packaging phases. There is no process of preparation, cleaning, grading and waxing. This leads to variation in size and ripeness of fruits in one package.

- There are many departments related to horticultural export, the interaction between them with respect to information and other export promotion services is minimal leading to confusion among the exporters.

- Instability of policies had limited export expansion.

- Bad roads, unsuitable trucks from farms to export collection centers reduce marketing value and increase rate of crop waste.

- Export by air saves time but it is faced by many problems such as; export is mainly through passengers' aeroplanes permitting limited quantities.

- In addition to lack of coordination between Sudanese Airways Department of Cargo, Engineering and Reservation offices leading to change the flight number of export at any time or cancelling the trip, this

might expose fruits to damage and deterioration of their value even in domestic market.

To improve the export of Sudanese mango, efforts from the farmers, exporters and government at the same time are needed. There are many suggestions that will help to improve the performance of export and obtain high volume of foreign market sales.

To establish special farms to produce high quality mango, the owners must calculate the risks involved before and after cultivation by:

- Using improved varieties like those from South Africa.

- Using good fertilizers.

- Control seed infection by using suitable pesticides.

- Need to have trained farmers and crop collection that have a significant perception about cultivation and harvesting.

- The establishment of large companies or firms to deal only with mango export and carries on all the activities from production to delivery. These companies must:

- Introduce better cooling system for transportations.

- Use developed warehouses.

- Use new technology in post-harvesting operations.

The government has significant positive influence on the improvement process such as:

- Helps the export sector with financing and reduces the cost of fees and the commission of the export returns.

- Helps the farming sector by organizing education programs in harvesting, and training courses on how to improve the crop collection.

- Integrates market information and the trade system to provide information about markets and prices.

الملخص

أجريت هذه الدراسة بغرض تقييم القدرة التنافسية والتعرف على الميزة النسبية لصادر المانجو السوداني وتحديد الأسباب التي أدت إلى تذبذب صادر المانجو السوداني خلال فترة الدراسة (٢٠١٠- ٢٠١٢) وذلك للخروج بنتائج وتوصيات وإستراتيجيات تساعد على ترقية أداء هذا القطاع الذي يلعب دوراً مهماً في الإقتصاد السوداني.

إعتمد البحث على المعلومات الأولية والتي جمعت من المصدرين الذين يعملون في هذا المجال وعلى معلومات ثانوية جمعت من الجهات ذات الصلة مثل الوزارات والهيئات الحكومية والتقارير السنوية لمنظمة الزراعة والأغذية العالمية

إستخدم الإحصاء الوصفي في التحليل حيث استخدمت النسب المئوية والرسوم البيانية، أما لقياس القدرة التنافسية فقد استخدمت مصفوفة تحليل السياسات (PAM).

توصلت الدراسة إلى أن أهم الدول المستوردة للمانجوالسوداني هى المملكة العربية السعودية وتعتبر من أكبر الأسواق.

خلصت الدراسة أن المانجو السوداني لها قدرة تنافسية إلا أن الربحية الإقتصادية أكبر من الربحية المالية مما يدل على وجود ضرائب مباشرة وغير مباشرة مما يقلل حافز المصدرين.

كما توصلت الدراسة إلى أن أهم أسباب تذبذب الصادر هو:

- إرتفاع تكاليف الصادر وغياب البرامج الإرشادية لمنتجي المانجو خاصة في مراحل الإنتاج والحصاد والفرز والتعبئة حيث لا توجد عمليات إعداد مما قد يؤدي إلى إختلاف في الحجم ودرجة نضج في عبوة واحدة.

- هنالك أقسام ووزارات مختلفة ومتعددة ذات صلة بالصادرات البستانية وليس لها أي صلات أو ترابط مع بعضها البعض في تبادل المعلومات وخدمات التصدير متدنية مما يربك المصدرين.

- عدم إستقرار السياسات حد من التوسع في الصادر.

- سوء الطرق ووسائل الترحيل غير المناسبة من المزرعة لمراكز تجميع الصادر تقلل من القيمة التسويقية وتزيد من نسبة الفاقد.

- التصدير الجوي يوفر الوقت لكن تواجهه مشاكل عدة حيث أنه يتم عن طريق طائرات الركاب لذا نجد أن الكميات محدودة، كما أن مواعيد المغادرة غير منتظمة وإحتمال تغيير السفرية أو إلغائها وارد مما يؤدي إلى تلف الفاكهة وإنخفاض قيمتها في السوق المحلي.

تحسين صادر المانجو السوداني يحتاج لجهود المزارعين، المصدرين والحكومة. هناك بعض المقترحات لترقية أداء الصادر ورفع حجم المبيعات في السوق الخارجي.

إنشاء مزارع خاصة لإنتاج مانجو عالي الجودة وعلى المزارع الحد من المخاطر قبل وبعد الزراعة بواسطة:

- إستخدام أصناف محسنة مثل أصناف جنوب أفريقيا.

- إستخدام المخصبات الجيدة.

- مكافحة الأشجار المصابة بإستخدام المبيدات المناسبة.

- تشغيل المزارعين المدربين على عمليات جمع المحصول.

إنشاء شركات كبرى أومنشآت مخصصة لصادر المانجو تقوم بكل العمليات من الإنتاج وحتى التسويق الخارجي، هذه الشركات تختص بالآتي:

- جلب نظم تبريد جيدة لترحيل المحصول.

- إستخدام مخازن متطورة.

- إستخدام التقانات الحديثة لعمليا ت ما بعد الحصاد.

تلعب الحكومة تأثير إيجابي على تحسين الصادر بواسطة:

- مساعدة قطاع الصادر بتوفير التمويل اللازم وتقليل تكلفة الرسوم والعمولة على عائدات الصادر.

- مساعدة القطاع الزراعي بتنظيم البرامج التعليمية في الحصاد والكورسات التدريبية في كيفية جمع المحصول.

- العمل على تكامل معلومات السوق والنظام التجاري لتوفير المعلومات عن السوق والأسعار.

CHAPTER ONE

INTRODUCTION

1.1 Background:

Sudan was considered as one of large countries in Africa, occupying a territory of 1.882.000 million square kilometers. The geographical diversity of Sudan has had a direct impact upon economic, social, political, and cultural life with its multi various ethnic and cultural composition. The culture of Sudan is regarded as the oldest in Sub-Saharan Africa.

Sudan has had contacts with Middle East and Mediterranean civilizations since ancient times. The western parts have many contacts with West Africa, and the eastern parts have maintained close links with the countries of the Indian Ocean.

Sudan is very rich in natural resources, a fact that has inevitably made the country base its economy on agricultural and animal production. Consequently, agriculture is considered the backbone of the economy in the country. However, agricultural production varies from year to year because of intermittent droughts that cause widespread famine. The society is conditioned by anthropological and climatic factors, as well as the nature of the land, but agriculture is the foundation of the social structure (Eltoum, 2009).

Although there is great potential in the field of agriculture, development and reaping maximum benefit from this sector needs more effort to move the engine of production forward towards improvement and progress.

The leading export crops are cotton, sesame, and peanuts. Other agricultural products include sorghum, millet, wheat, dates, sugarcane,

fruits and vegetables. Sheep, cattle, goats, and camels are raised. A variety of forest products are produced, by far the most important being gum Arabic, with Sudan accounting for much of the total world production (Abusabib, 2004).

1.2 The Importance of Horticultural Crops (Fruits and Vegetables):

The horticultural acreage in the Sudan is estimated about 0.65 million feddans, representing about 3% of the total cropped area, but with high contribution (12%) to national agricultural production compared to 21% for food grains and 8% for oil seeds. The production of both vegetables and fruits is flourishing, providing cash for farmers, forming an important component of the human diet and holding good promise for export (ARC, 2012).

Sudan exports large amount of fruits and vegetables during the period (2000-2010), the most important of them: mango, lemon, melon and spices as shown in Table (1.1).

Table (1.1): Horticultural Exports Quantity in Tons (2000-2010)

Crop	٢٠٠٠	٢٠٠١	٢٠٠٢	٢٠٠٣	٢٠٠٤	٢٠٠٥	٢٠٠٦	٢٠٠٧	٢٠٠٨	٢٠٠٩	٢٠١٠
Mango	٦٠٩٥	7434.5	5682	3503.6	٢٨٣٦	٢٢٠٢	1091.7	1269.5	1409.531	2142	1417
Lemon	1715	1042.5	822.5	186.5	261.2	130	133.4	206.8	158	-	107
Grape	8	4	13.1	42.6	27	36	15	23.5	3.5	-	-
Dates	66	2415.5	475.5	886.2	227	241	652.8	35.2	-	7	-
Guava	١	-	-	-	١٩٥	-	-	-	-	-	-
Banana	٥٦	-	١١	٧	٤٧	١٤٨٧	٧٥٤	-	٧٢.٧	١٧٥٤	٣٣٣١
Melon	١٢٢٥	١٢٠٢	٦٣١.٥	٤٧١.٥	٤٢٩	٩	١٨٢.٢	٨٣٨	١٠٢.٥٩	١٨	٦
Watermelon	٥٦	-	٣٩٧	-	٣٨٩.٥	١٩٨	٩١.٥	٥٤٨.٤	١٥٩.٧٩٥	١١٠	١٨٤
Beans	453	14.778	1918.2	52.7	-	-	138.5	927.4	244	421	26
Okra	-	-	-	3.1	-	11	7	-	-	-	-
Onion	-	-	389	272	124	39.5	672.5	569.7	53	16.7	324
Spices	-	38.5	31.9	14080	213.2	458	610.7	968.5	1134.5	1004	-

Source: Ministry of Agricultural and Animal Resources Department of Horticulture, Annual Report, 2011

In Sudan, mango is an important horticultural crop. It has economic importance being produced almost all of the year in different parts of the country. It also has a regional and international demand in markets, being a beloved fruit with great nutritive value and delicious taste. There are new chances for whole markets abroad.

The mango cultivated area in Sudan was estimated to be about 2,814,000 ha in 2004. About 57 cultivars are reported to exist in Sudan. They are categorized into three groups: True Indian cultivars, Egyptian seedling cultivars of Indian origin such as Zibda, Alphons, Malgoba and Hindibesinara, and Sudanese seedling cultivars of Indian origin of high quality including Shendi, Taimoor, Nailm, Mabroka, Debsha and the famous sort Abu Samaka. And newly introduced varieties are Heden, Kent, Sensation, Sabrin (FAO, 1996).

The main area of mango production in Sudan extends along the main Nile banks in Northern and River Nile States. It is also grown on a small scale along the Blue Nile banks in central Sudan, and in some parts of South Kordofan and in Darfur States where the other cultivated species of mango is found (UNEP, 2005, pp 16-17).

The success of mangoes production in Sudan could be attributed to the possibility of extending its fruiting season eleven months a year from November to September (El-Mardi and El-Awad, 1984). The average areas and production of mango in Sudan from 1995 to 1997 was 39440 hectares and 928670 tons, respectively. West Darfur State produced about 53% from the total production, South Kordofan State about 27%, Northern States 3% and Khartoum State 2% (Abdel Kareem *et al*, 1996). Production of mango in the Sudan has recently expanded tremendously because of the recently opened channels to European and Arab markets. Moreover, farmers shifted toward fruit trees rather than vegetable production because of the energy crises (Mohamed, 1999).

Table (1.2): The production of mango in Sudan in all regions

State	Area (Feddan)	Production (Tons)	Production(%)
South Kordofan	23500	211500	50.08
Sinnar	7000	42000	9.94
Blue Nile	4125	36900	8.74
Northern	4921	30000	7.10
Gadarif	3000	16000	3.79
Gezira	2700	24300	5.75
South Darfur	2000	21000	4.97
West Darfur	1500	20000	4.74
Kassala	1000	200	0.05
River Nile	900	9300	2.13
Khartoum	880	7830	1.85
White Nile	400	3600	-
TOTAL	51926	422630	99.97

Source: Ministry of Agriculture and Forests, Dep. of Horticulture (2011). Khartoum. Sudan.

Table (1.3) below shows the countries which are exporting mango, their share in Saudi Arabia's market and its price (AOAD, 2006).

Table 1.3: Market size (%) of exported Sudanese mango in the Saudi's market and its price ($) compared to other countries

Country	Market size (%)	Price Ton (USD)
India	41.19	825
Pakistan	26.52	823
Sudan	11.16	460
Yemen	9.45	577
Brazil	3.62	725
Egypt	2.4	569
South Africa	2.29	700
Kenya	1.83	1039

Source: Arab Organization for Agricultural Development (2006)

1.3 Research problem:

The volume of Sudanese mango exported to the Saudi market decreased despite its favorable price compared to other countries.

Nadia (2005) stated that the shortage of post harvest infrastructures was considered as one of the main constraints in improving fruits and vegetables exports in Sudan.

Alawia (2004) reported that the reasons that facing fruits and vegetables exporters were financing, weak post harvest processes such as grading, packaging and transportation, high production costs and lack of information.

Um Salama (2005) stated that although there were horizontal increasing in fruits and vegetables cultivated areas, the production is fluctuating and weak and there is no special cultivation for export i. e. the exports come from the consumption surplus.

1.4 Research Objectives:

The main objective of the study is to identify and analyze the factors affected mango export during the period 2010, 2011 and 2012.

Specific objectives:

- To examine the economic and financial profitability of mango exports to Saudi Arabia.
- To determine the taxes and subsidies on mango exports to Saudi Arabia.
- To examine the efficiency of domestic resources used in mango produced and exported to Saudi Arabia.

- To determine the competitiveness of mango fruit exports during the years 2010, 2011 and 2012.
- To determine the causes of fluctuations of exports of mango fruits and the important exporting markets.

1.5 Research Methodology and analysis:

This research depended on primary and secondary data collected from Ministry of Foreign Trade, Central Bank of Sudan, Ministry of Agriculture, Police Customs (Khartoum Air port office), Arab Agricultural Statistics Year Book, Some of vegetable and fruit exporters, FAO annual reports, in addition to previous studies. The analysis of data based on descriptive statistics and the method of Policy Analysis Matrix (PAM).

1.6 Organization of the study:

The study involves five chapters, chapter one provides an introduction, problem statement, objectives of the study, the research methodology and the organization of the study.

Chapter two contains the theoretical framework including literature review and previous studies, the third chapter explains the research methodology, Chapter four illustrates results and discussion and Chapter five includes the summary and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction:

The scientific name of mango plant is (*Mangifera indica* L.). It belongs to Anacardiaceae family.

Mango originated from East Asia or India, and might be cultivated in India about four thousand years ago. From India mango spread to Burma, Malaya, China, and at a later date, it was cultivated in the various equatorial and semi-tropical regions. So, Mango is now grown in Indonesia, Florida, Hawaii, Mexico, South Africa, Brazil, Cuba the Philippines and tropical African countries. Mango trees are also grown in some Arab countries, such as Egypt, Sudan, Yemen and Palestine (Osman, 1999).

There are more than forty species of mango in South Asia, South and West New Ghenya Island and Philippines. Mango also exists in South Africa, Kenya, Tanzania, Nigeria, Sudan, Egypt, Palestine, Florida, Mexico, Brazil and Australia (Chaudhri, 1985; Anon, 1990).

2.2 Taxonomy:

The genus Mangifera belongs to the order Sapindales in the family Anacardiaceae, which is a family of mainly tropical species.

Division: Magnoliophyta

Class: Magnoliopsida

Sub Class: Rosidae

Order: Sapindales

Family: Anacardiaceae

Genus: Mangifera

Species: indica

Mango (*Mangifera indica* L.) fruit is the most important commercial fruit in the tropics and is a very popular fruit among million of people in the world. In the tropic areas, it is considered to be the best choice of all indigenous fruits.

Mango tree is spread in tropical countries in East and West Asia, Africa, United States of America and some tropical Islands. Mango trees are evergreen orchards, live long time and withstand dry condition and heavy rainfall, but severe frosts during winter endanger the trees. Mango fruit is drupe, 100-400 gram in weight and variable in forms and size. The skin is thick or thin, greenish yellow, yellow or orange coloured. The pulp is pale golden yellow or red yellow, while the texture is firming, soft or juicy and sometimes fibrous. The pulp has a sub acid taste and characteristic flavour. The nutritive composition, hence the nutritive value, in mango fruit is very high. Mango is good for consumers who are interested in diet, health, fitness and natural food because its nutritional value is considered high, it contains energy-giving fructose which is low on the glycaemic index, and high on dietary fibre, minerals and vitamins including vitamin A and C and traces of B-complex (Mango Resources, Botany and Taxonomy, 2007).

Common mango (*Mangifera indica* L.) is believed to have been cultivated for about 6,000 years; its native home is suggested to be Eastern Asia.

The world annual production of mango in 1986 was estimated at 14.73 million metric tons (mmt), and largest producer of which 65% is India's share (FA0, 1986). The annual production in India exceeds 9.6 million tons of mango fruit (Anon, 1990).

Most of mango fruits are consumed locally as fresh fruits in cities and producing areas. However, the total area of mangoes has increased because of the opened channels to Arabian markets.

Mango tree is an erect, branched, evergreen plant, reaching about forty meters in height and may live up to hundred years (Gibbon and Pain, 1985). Mango tree is characterized by alternate bearing. Mango fruit is an important crop of the tropical countries, which are the largest producers. In India about two million acres, out of 3.2 million acres of orchard were cultivated by mango (Singh, 1960a). Mango is a popular fruit in the tropical countries and has called "king of the fruits" (Jagirdar, 1968).

In Sudan, many varieties of mango were grown in almost all States. Fruits from best cultivars have normally yellow flesh, good flavour and a fine aroma (Samson, 1986).

2.3 Mango varieties:

There are more than thousands of mango varieties recognized throughout the world. Over thousands named varieties exist in India (Caygill *et al*. 1976).

2.4 Types of mango:

Mango has many types; for example, India, has more than 300 kinds described and registered. The majority of these types differ in shape and size of fruit. They are classified within two large groups:

(i) The Indian type distinguished by the seed of fruit made up as one part. An example of this is Alfonse, Mabroka, Dibsha, Shendi, White butter, Malyoba, Abu samaka.

(ii)The group of India - Chinese: These types are distinguished by the kernel of fruit contains a number of parts. An example of this is the Green butter, Tayrnor, Gale Alter and Kitchenar (Osman, 1999).

The most important types of export mango in Sudan are:
(I) Alfonse mango:

The fruit weighs 250 grams, and is nine centimeters long, and the width about 6.5 centimeters. The thickness of fruit is 61 centimeters. The shape of fruit is with small reed. The left shoulder is higher than the right. Its colour is yellow and orange. The flesh is butter like and of sweet taste. It is free of tissues. It has a nice scent, and the kernel is small with short tissues from one side. Alfonse mango becomes ripe in first July, but it has some defects e.g. lying flower which affect the mango. It endures transportation for long distances. They can stay for almost twenty days without any damage. This type is found in the north.

(2) Ragabt Alwiz or Totabary mango:

Weighs 170 grams, has a length 27 centimeters, a width of 8 centimeters. Thickness of fruit is 60 centimeters, and the shape of fruit is like a fish, thick at top and bottom, the colour of fruit is red orange and a red cheek sometimes. The inside is red orange, tough kernel and flesh middle sweetness, free of tissues and the seed is flat and thin. This type is considered a late type ripens in September, and has great power of being kept in the market.

(3) Dibsha mango:

Dibsha mango is one of the large size types. The fruit weighs 800 grams, and is 17 centimeters long and 10 centimeters wide. Toughness of fruit is 9 centimeters, the shape is oblong with a peak at the bottom, and it has a tough neck, and often has branches round the neck. The colour is bright green, and the flesh is orange with sweet taste, juicy. It has some soft tissues, the kernel is small in size with short tissues on the edge the season of ripeness is rather late in September and is considered a late type. The average crop of tree is 200 pieces.

(4) Zibda mango:

The fruit weighs 600 grams, 10 centimeters long, 17centimeters wide. Toughness of fruit is 9 centimeters, with an egg shape. It is abundant in Shendi, with an average bearing of 45 fruits per tree. The fruit ripens in late August. The colour of fruit is dark green and the surface is soft and thick. The inside is orange with soft tissues near surface. The inner is of sweet taste, the seed is small and the type is very good.

(5) Al malgoba mango:

The fruit weighs 500 grams, 12 centimeters long, 10 centimeters wide. And 9 centimeters thick, shape of fruit is compact, dark green to blue. This type is not abundant, except in the northern region and is found in little quantities in Khartoum state (Tuti Island). The fruit ripens in late September. The tree bears 200 pieces only and is suitable for transport. The colour of the fruit is dark green to blue. The skin is soft and thick and the inner is yellow whitish compact and very sweet. It is of medium size.

(6) Mahmoudi mango:

The fruit weighs 650 grams, 15centirneters long, 9 centimeters wide, and toughness of fruit 8 centimeters. It is egg shaped with a big size. It is found in Shendi area in the model orchard in Shendi. The average yield of the tree is 250 pieces. The fruits ripen during June and beginning of August. The colour of fruit is light green with a red line, which changes to purple when ripe. The skin is soft and of medium sweetness. It has a-light smell, which increases as it becomes riper, and is free of tissues. The seed is small.

(7) Golik mango:

The fruit weighs between 500-600 grams and is 8 centimeters long, 8 centimeters wide, and the toughness of 1 centimeter. Some of

these types were recently introduced in to Shendi and they are promising types. They are oblong in shape and the colour is yellow with green at bottom of fruit, which ends with the final ripeness of fruit. It is a good type for exportation and the tree yields 300-400 pieces.

(8) Langrbinesi mango:

The fruit weighs 400grams, 14 centimeters long, and 10 centimeters wide, the toughness is 8 centimeters. The tree gives between 500-600 fruit. This is one of the most important types in India, with which they invaded the markets of the world. They are well packed for exportation.

(9) Ormans mango:

The fruit weighs 350 grams, and 15 centimeters long and 9 centimeters wide. The toughness is 8 centimeters. It is a promising type and was introduced in Shendi area; it is egg shaped and has large size. The tree gives between 300 and 350 pieces. It is not well known in Sudan but it is one of the suitable types for exportation and is often packed in boxes and is of regular shape.

(10) Mabroka mango:

The fruit weighs 500 grams, 15 centimeters long, 9 centimeters wide. It was imported by Mr. Fisher before the First World War and was grown in Nuri and was given the name Mabroka in Sudan because of its beautiful and abundant crop. The shape is oblong and size is between middle and large. The colour is orange with red. It has an attractive appearance. The skin is soft for the tough. The colour is orange with red over it. It has an attractive appearance. The inside is dark yellow and free of tissues. The seed is small. The tree gives 500 fruits and they ripe during the first half of August.

(11) Nilem mango:

The fruit weighs 650 grams, 15 centimeters long, 10 centimeters

wide. Toughness is 10 centimeters and the shape of the fruit is very large with a strong edge. The yield is 300 pieces on average. The skin is very tough and the top is a rather circular. The colour or the skin is glittering green and the inside is orange with a sweet taste. It is free of tissue and is compact. The seed is small and originally has no tissue. It ripens very late, in the later half of September. It is promising for export.

(12) Taymour mango:

The fruit weighs 400 grams, 13 centimeters long, 7 centimeters wide. The toughness is 7 centimeters. The shape of the fruit is dark orange to blue. Some times has a light red line. This type is related to one of the Egyptian Bashas who had a picture of this type in his orchard for the first time in the Sudan. This type is abundant in the Blue Nile, brought by the orchard expert Hassan Mari who used to work as importer of orchards in the Sudan Government after spending time working in Tayba orchard in the Gazira Aba. The average crop or the tree is 600 pieces. It ripens in July, and can be kept for four weeks. The colour is dark green to blue, sometimes with a light red line. The skin is soft and thin, with good smell and the inside is orange. I t is very sweet and free of tissues. The seed is small.

(13) Galbour Kleemoki mango:

The shape is an oblong green with yellow patches. The colour is green with light yellow, and the skin is thin and soft to the touch. It is has ascent smell, the inside is yellow in colour sweet with light moderate acid. It is free of tissues. The average yield of the tree is 500pieces and is of the late types (Osman, 1999).

2.5 Botany of mango:

The tree is of permanent green dicotyledonous equatorial origin, with a large wooden and strong growth. The average length of the tree

is 10 to 30 meters. The branches of the tree are sometimes erect and are inclined to lean and the growth is clear from the end of winter and beginning of spring until autumn. This growth is not continuous, but is followed by one or two periods of stagnation. Therefore it is distinguished by two or three durations of growth.

Roots: They are deep and fast and spreading.

Leaves: The leaves are arrow shaped, glimmering and some have smell. The recent leaves are red or purple. After two weeks the colour changes to light dark green then to green. The size of leaf is completed within a month and then changes to light dark green. Before it falls its colour becomes yellow and the leaf remains on the tree for a year or two.

Flowers: The simple flowery buds are formed on the growth of the previous season and 90% of the buds are carried on the ends and the rest on the side. The bud is then transformed to a bunch of flowers with 250 and 750 flowers.

Fruit: The fruit is formed from skin and flesh and the cover surrounding the seed. The colour of the fruit when ripe is green or yellow. The inside of fruit is orange with a taste of light acidic to extremely sweet.

Kernel: The kernel is hard, round small or big. The tissues are on the kernel and extend penetrating the kernel. The amount of tissues differs from one kind to another.

The seed: Formed from dicotyledonous, white in colour round or oblong and pressed. It is distinguished by lack of vitality (AI Hassen, 1990)

2.6 The suitable climate and soil for mango:

The hot damp weather is suitable for mango, but the continuity of humidity does not help the crop to bloom although it helps it to continue growth. Mango grows on all soils with good drainage. The best land is the yellow and rich. It also produced in sandy soil, if irrigation and fertilization are good (Farage, 1980).

2.7 Ways of mango propagating:

Mango is propagated either by seed or seedling (AI Hassen, 1990).

I. Propagating by seeds:

(1) Propagating by one embryo seeded mango, which yields one growth and does not give similar trees or crops to the original. This type includes Alfonas and Dibsha.

(2) Propagating by numerous embryo seeds, which give several growths and similar plants to the original mother. Therefore it becomes possible to grow seeds directly in the orchard. This type includes Abosinara, Galbaltor, Mistikawi, Taymoor.

II. Propagating by inoculation:

This is the way to guarantee production of similar trees to the original from which it was taken. Inoculation is of two types

(1) By using branches with mother which is more spreading.

(2) By bud inoculation.

2.8 The nursing for or attending to mango trees:

(1) Protection:

Protection of small trees from heat during summer.

(2) Irrigation:

Mango trees should be watered regularly particularly when small. The number of watering increases or decreases 5-15 days according to weather conditions and the kind of soil. The tree should not be made thirsty during blooming periods.

(3) Trimming of trees and bushes:

Small trees are grown on three or four strong branches to form the skeleton of the original tree. So that these branches do not shoot all from one point while bearing in mind getting rid of cancer and the

branches coming out from underneath and also removal of the flowers which appear on the small tree and transform it to fruits which weaken the tree. To trim the fruit trees we remove the dry and affected, grown branches because the mango flowers exist usually at the edge of the branches. Therefore the removal of the first branch means removal of the location of flowers and fruits.

(4)Fertilization:

Mango needs one dose of fertilization during the first four years, to give green growth. Then fertilization stops until the tree goes towards flowering. We add 100-200 kilogram of nitrates to each tree which may be increased according to the need of the tree (Farage, 1980).

2.9 Important diseases of mango:

Important diseases of mango as explained by AItomy, 1990:

(1) The anthracnose:

The anthracnose is a disease, which affects the flowery parts and fruits. The disease appears in the form of small brown or black spots. Then it spreads and gradually becomes bigger and bigger. The disease is treated by collecting the flowery parts and the affected fruit and burns them by spraying with solution of yurdo.

(2) Skin insects:

These affect the leaves and branches, and the trees are treated with smoke of Idrosunic. They may be sprayed with the solution of flak.

(3) The fruit fly:

The Fruit Fly is the main and the dangerous insect which affect mango fruits. Its larvae will be inside the fruits after ripening. It can be treated by spraying with the solution flosilkat sodium.

2.10 Economic and social impact of mangoes:

Global production of mangoes is concentrated mainly in Asia and more precisely in India that produced in 12 Million Mt. Mangoes is grown in 85 countries and 63 countries produce more than 1000 Mt a year. Total world production was 24,420,116 Mt in 1999, where mangoes play an integral part in their lives not only by being rich nutrient source but also by serving as a common good that is shared in the culture, the life style and the religion. In 1960, mangoes were not commonly known among the consumers outside of the tropics and there was virtually no international trade of fresh fruit.

In recent years, mangoes have become well established as fresh fruit and processed products in the global market. India is still by far the major producer of mangoes in the world; although, its relative share in the world production has been gradually declining. In the United States of America, fruit consumers now regularly prefer mangoes to apricots, cherries and plums. World demand for mango is now increasing however, particularly from temperate countries, where mangoes are rapidly gaining in popularity. The increase in mango production in non-traditional mango-producing areas has been notable and includes parts of Asia, West Africa, Australia, South America and Mexico. International trade of mangoes is dominated by varieties like "Keitt" and "Tommy Atkins" (Emex, 2000).

2.11 Mango in the Sudan:

In the Sudan, mango is considered one of the most important fruit crop grown in different states. In Southern Sudan, it arrived from India via Congo, while in the North, the introduction was mainly from trees already established in Egypt, and a few were imported directly from India (Saeed, 1974).

Condition of Sudan offers an excellent potential for mango production, where there are suitable soil, climate and adequate water to sustain growth of the trees. The rain or irrigation water is sufficient. In the Sudan, mangoes are easily grown and their cultivation is calling for less skill than required for citrus fruits (Bacnon, 1952).

In Sudan, there are more than thirty varieties of mango, divided into two main groups namely, "Baladi" or fibrous group and the "Introduced" Indian group. The last group includes many varieties such as Alphonso, Abu Samaka, Dibsha, Shendi (1, 2 and 3), Gulb El-Tour, Taymour, Dr. Night, Millogoba, Tow C7ambo, Tow Berri, Bashieri, Zibda, Mahamodi, Mabruka, Gabalia, Nailam, Biari Musri, Pyro, Aida, Khartoumi, etc.

2.12 Properties of Sudanese mangoes:

Saeed and Khattab (1974) reported some physical and chemical properties of six varieties of mango as shown below:

Table (2.1):Physical properties

Variety	Colour	Weight (g)	Peel (%)	Stone (%)	Pulp (%)
Taymour	Green	397	19.2	9.8	70.7
Dibsha	Green-yellow	748	16.3	10.6	73.9
Shendi	Greenish-yellow	212	15.8	17.0	65.4
Alphonso	Green-yellow	283	16.6	11.4	71.7
Kitchener	Yellow	226	25.2	23.5	50.9
AbuSama	Yellow to orange	475	15.8	8.5	74.9

Source: Journal of Food Science and Technology

Table (2.2): Chemical properties

Variety	pH	Acidity %	T.S.S %	Vitamin C	Total sugar %	Reducing sugar %
Taymour	4.0	0.80	23.40	6.70	18.70	4.30
Dibsha	4.1	0.881	23.80	9.50	16.70	2.30
Shendi	4.5	0.189	19.60	21.00	14.10	4.70
Alphonso	4.0	0.799	19.30	98.60	15.80	4.10
Kitchener	4.1	0.481	17.70	22.20	12.30	3.70
Abusamaka	3.6	0.882	17.10	16.40	13.00	4.10

Source: Journal of Food Science and Technology

2.13 Theories of agricultural price policy:

The economic problem is often defined as the study of the problem of allocation of scarce resources among alternative ends through the use of prices signals.

2.14 The classical foreign trade:

According to the classical economic theory (Hussain, 2008), the classical school refers to economists who came after the famous economist Kenz between late eighteenth century (1776) and the beginning of the 20th century (1936) while the first classical economist who threw some light on trade between countries is Adam Smith in his famous book the wealth of nations published on (1776). He used absolute hypothesis in cost of production between countries. He assumed that every country can produce one commodity at least or many commodities with an actual cost less than the other countries i. e. every country will gain more if concentrates or specializes on the commodities where it can absolutely compete other countries and then can import other commodity which produce it with an actual production cost higher than other countries. And according to Smith that any two countries can coordinate their production in those commodities which they can produce it with more specialization with the trade efficiency

and therefore trade between countries can compete better from the point of availability of commodity for trade and finally will gain more revenues due to their specialization of production.

2.15 Classical economic theory:

According to classical economic theory under pure competition an equilibrium market price is achieved when the price at which the quantity demanded by consumers equals the quantity offered by suppliers. If an excess of supply exist prices will decline and marginal supplier will be forced to withdraw. If more goods demanded than are available prices will rise and new firms will be attracted to the industry. In actual economy the current levels of supply, demand and prices reflect the impact of both economic structure (production technique, infrastructure, market system, and income distribution….etc.) and policy of interventions such as taxes and subsidies. Price structure refers to the array of prices for a commodity measured at one time at different points of a market system.

Basically, the role of the price structure lies in bringing about necessary adjustment between demand and supply plan influence the suitability of the allocation or flow of resources between production channels.

Price structure differs from intervention. Most developing countries however, have decided to continue to peg their currencies to those of developed countries. Although the following exchange rates system may be single or multiple systems, it is commonly used as unified system (Hussain, 2008).

2.16 The modern classical theory for foreign trade:

It depends on the difference between countries in the major condition for units of production (land, labor capital).

A country is said to have a comparative advantage in the production of a good (say cloth) if it can produce cloth at a lower opportunity cost than the other country. Assume that England would have a comparative advantage in cloth production relative to Portugal if it must give up less food to produce another unit of cloth than the amount of food that Portugal would have to give up to produce another unit of cloth (Bushara, 2004).

2.17 Sudan foreign trade improvement:

In the very early of the 20th century, Sudan started to export livestock to Egypt and Saudi Arabia of that it was improved and increased its quantities exported. The period from 1978 to 1989 prevailing a severe period in the Sudanese economy history due to the foreign debt and its costs reaches 80 million $ and with internal budget deficit 05% of the domestic national product. In the nineties of the previous century, the situation prevailed although the production is increasing but the cost of production is subjected to substantial increase (Tomsah, 2006).

2.18 Comparativeness and competitiveness:

Hassan (2002) stated that the comparative advantage is a relative export advantage for specific production sector compares to other production sectors in the same countries before establishment of the trade. While the competitiveness advantage can be defined as a relative export advantage of a production sector or sectors in a country compared to the some sectors in the other countries in the international market. And as stated by Hassan (2002), the comparative advantage can be established or induced in the country by its own economic policies and location of the country and its nature can give it to the country. But, the competitive advantage will only be gained through production and

policies and not via inheritance. The human factor plays in it a vital role.

The comparative advantage differs from the competitive advantage in the fact that the comparative advantage depends on the differences and variations in the cost of production of a commodity from country to another i. e. it depends on the availability of production inputs, experience and the level of the technology used in producing the commodity while in the competitive advantage depends on the human factor role achievement through developing new techniques and continuously searching for new managerial ways to raise the output of the product and at the same managing ways to minimize the cost of production and so forth. Also, means the production of local environment for specific region interact with different factors (economical, technical, educational, cultural and historical) to create the competitive advantage (Hassan, 2002).

It should be a link stage between the comparative and competitive advantage and trying to make a joint in the district of production to interact between all economical, technical, educational, cultural and historical factors to maximize the competitive advantage. The government can build her own comparative advantage through her production sectors and companies while it can build up her own competitive advantage through short and long policies.

It has been discussed by (AOAD, 1999) in its reports that comparative advantage means the advantage reflected by the natural resource quantity and quality wise and the technology level used to produce the commodity and products from these resources while competitive advantage have an advantage through the availability of marketing and trading opportunities, proper economic and political social which make sustainability of marketing of production.

Hassan (2002) broadly said that the competitive advantage is a power of export and the right usage of natural resources where up and down in exported quantities or deviation in quantity exported, also he reported that the American Committee for industrial competitiveness is possibility for the country to produce commodities and services to cover the needs and the selection of the international market so as to sustain the increase of the actual gross national product of the country.

2.19 New development in comparative advantage (new classical school):

The new classical economist (Hecker, Owlin) entered very important change on (Ricahrdo) theory and they withdrawn his theory of value which discipline commodities prices in local market after he takes off its application in international market, while Richardo impose there is deviation in technique and in production between countries. They impose that the differential is available between commodities where ever the countries produced and there is also international differentiation in natural production inputs. Where for every country at any time have different stock from work and capital which is called production function. They established different combinations of concentration of work and capital. Developed countries have available capital and shortage of work which will specialize in commodities need more capital, while developing countries specialized in commodities need more work and short of capital. Application of comparative advantage for any country through taking wages levels, prices and exchange rates.

As mentioned by Richardo by changing in price levels for attracting competitiveness without changing productivity level.

2.20 Taxation:

Taxing agriculture is likely to be an essential component of government policy for different aspects. First, it is a source of income, since agriculture has a wide base in many developing countries. Secondly, it is argued that agriculture needs to be taxed since it is inherently unprofitable in the long run to provide an industrial base for sustaining development. Thirdly, it is often thought that taxation contributes to welfare by securing cheap food for both urban and rural consumers.

Indirect taxation (taxes levied on expenditure, goods and services) is widely used rather than direct taxation (taxes on earnings of labour, rent and interest) in many developing countries. Taxation of agricultural products mostly occurs at exporting stages. The aim of export tax is to stimulate exports by switching foreign spending towards domestic output i. e. help to establish new external markets. Since producers for export in Sudan are price takers, the export incidence is shifted entirely to the producer and thus to the producer's price which will be negatively affected (Zaki, 1983).

2.21 Subsidy policy:

Consumer and producer subsidies are means of income transfers. Usually governments fix prices at lower or higher than they would other wise be.

Subsidies are generally believed to encourage the adoption of more productive techniques using the subsidized resources, providing low food price and hence help low income farmers. Subsidies place burdens on producers but often invisible while consumers benefit quite visibly through the budget subsidy need to implement the lower domestic price (Timmer, 1989).

2.22 Exchange rate:

The exchange rate reflects the true supply and demand for foreign exchange currency when properly valued. It is defined as the rate at which one native currency unit exchanges for one unit currency of an internationally traded currency. In many countries, exchange rates are typically set by governments rather than established in the markets. Under the floating exchange rates regime market force determines the exchange rates i. e. without any government intervention. The equilibrium exchange rate will be determined by supply and demand. This system protects the domestic economy from changes in external world and ensures the equilibrium of balance of payment. Also, an inelastic demand for primary exports means that some of its advantages are lost (Zaki, 1983).

The shadow exchange rate through which the foreign component of each item is directly transformed into its border price can be computed by the following formula:

$SER = OER_{(X)} + MER_{(1-X)}$

Where as:

SER = Shadow Exchange Rate

OER = Official Exchange Rate

MER = Free Market (black market) Exchange Rate

X = Percentage of foreign transaction priced by the official exchange rate.

2.23 Export:

This term export derives from the conceptual meaning as to ship the goods and services out of the port of a country. The seller of such goods and services is referred to as an "exporter" who is based in the country of export whereas the overseas based buyer is referred to as an

"importer". In International Trade, "exports" refers to selling goods and services produced in the home country to other markets. (Joshi, Rakesh Mohan, 2005). Export of commercial quantities of goods normally requires involvement of the customs authorities in both the country of export and the country of import.

Making the export decision:

Once a company determines that it has exportable products, it must still consider other factors, such as the following:

- What does the company want to gain from exporting?
- Is exporting consistent with other company goals?
- What demands will export place on the company's key resources-management and personnel, production capacity, and finance and how will these demands be met?
- Are the expected benefits worth the costs, or would company resources be better used for developing new domestic business?

Trade increases the variety of goods:

A different reason why trade is beneficial is because it makes accessible to national consumers and producers an array of goods and services that would not be available otherwise. Since these include consumer goods as well as capital goods and inputs, trade favours both domestic consumers and the development of the domestic production capacity.

Trade may also serve to smooth out transitory excess demand or excess supply situations in domestic markets, thus avoiding or reducing price fluctuations and eventual supply shortages. Agricultural products may benefit especially in this respect from foreign trade, since agricultural markets tend to be particularly unstable as a consequence of supply rigidities (it takes time for agricultural production to respond to market signals), exogenous factors affecting production (such as

weather and pest conditions) and the fact that the demand for food tends to vary little when prices go up or down (it is inelastic). A country largely self-sufficient in food and agricultural products may have agricultural surpluses in good years, which will place strong downward pressure on farm prices. The international market may serve to dispose of these surpluses with minimum disruption of domestic prices and incomes. The opposite will happen in poor agricultural years.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction:

Interest in the analysis of agricultural policy is relatively recent phenomenon. Before the mid of 1960s, industrialization was seen as the key to economic development in most developing countries. Accordingly, government resources and policies were focused on the promotion of industry and the agricultural sector was thought of primarily as a pool resource of the non- agricultural sector.

This chapter contains the methods used in the analysis; it is divided into the following parts:

1. Sources of data collection.
2. Descriptive statistics.
3. Policy Analysis Matrix (PAM).
4. Financial analysis formulae.
5. Economical analysis formulae.

3.2 Sources of data collection:

Data were collected from different sources that are relevant to the study like Ministry of Foreign Trade, Central Bank of Sudan, Ministry of Agriculture, Police Customs- KRT Air Port office, Arab Agricultural Statistics Year Book, Some of vegetable and fruit exporters, FAO annual reports, in addition to previous studies.

This data include the quantities of mango exported to Saudi Arabia's markets during the period (2010- 2012), the variable costs, the exchange

rates of SDG in terms of Dollars and the international prices of mango and other costs.

3.3 Methods of analysis:

3.3.1 Descriptive statistics:

Descriptive statistics concerning summarizing and describing data, to simplify events and phenomenon and find the relationship that determine the objectives of research. Descriptive statistics introduce data and show them in different ways to increase understanding and to facilitate understanding the relation to give a quick idea. Using percentages, mediums, charts and drawing necessary to compare quantities of mango exported to some other vegetables and fruits that were exported during the same period (2010- 2012).

3.3.2 Policy Analysis Matrix method (PAM):

Uses of Policy Analysis Matrix (PAM):

Analysts using PAM have to provide complete and consistent coverage to all policy influences on returns and costs of agricultural production. With this method, applied economists need to be equally capable of analyzing, for example, fertilizer response functions, quantitative restrictions on trade, and real effective exchange rates. In PAM studies, the focus is on a commodity by commodity basis. Each commodity can be described by the chain of production, processing and marketing activities that bring the commodity to the final consumers. The main empirical task is to construct accounting matrices of revenues, costs, and profits. A PAM is constructed for the study of each selected agricultural system-using data on farming, farm-to-processor marketing, processing, and processor- to-wholesaler marketing. The impact of commodity and macroeconomic policies can then be gauged by

comparison with the absence of policy. The performance of the whole system can be measured by the result it achieves in terms of profits, that is the difference between revenues and costs. Revenues are simply the product of quantity and price of the consumption good, as registered on the final market. Costs are the sum of the products of the quantity and price of all inputs utilized along the commodity chain, from the farm, to the processing industry, to the marketing activity. The key intuition in the use of the PAM for policy analysis is that the overall effect of policies and other market distortions that affect a given commodity system, can be captured by the induced difference in prices.

In this study, price policy analysis was used to estimate the competitiveness of Sudanese mango by using protection coefficients which are used to know subsidies and direct and indirect taxes on the product.

PAM is designed to measure the divergence between actual market prices and efficiency prices. Efficiency prices are those prices that would have existed if all markets were perfectly competitive and the economy was in a state of general equilibrium (Pearson and Monke, 1987).

The PAM is a product of two accounting identities; one defining profitability and the difference between revenues and cost and PAM is based on the following simple equation:

Profits = Revenues – Costs

The other identity measures the effects of divergences (distortion policies and market failures) as the difference between observed parameters and the parameters that would exist if the divergence were removed.

In PAM, cost was broken down into tradable and non-tradable inputs. Non- tradable inputs are called domestic resources or factors. Profit, revenue and costs were then calculated using both the actual prices

(private prices since they are the prices usually faced by the private agents) and efficiency prices (social prices that would exist if all the markets are perfectly competitive and the economy is in a state of general equilibrium). The differences between the private and social prices are referred to as transfers.

The size of divergences reflects the extent to which actual distorted prices diverge from the efficiency prices. Table (3-1) illustrates the general matrix structure.

Table (3.1): The general structure of PAM

Prices	Revenue	Costs		Profit
		Tradable input	**Non-tradable Factor**	
Private prices	A	B	C	D
Social Prices	E	F	G	H
Divergences	I	J	K	L

Source: Pearson and Monke (1987).

From the above table (3-1), PAM can by calculated as follows:

Absolute international competitiveness indicators:

- Financial Profitability (FP) $D = A - B - C$
- Economical Profitability (EP) $H = E - F - G$
- International Value Added (IVA) $IVA = E - F$

Relative competitiveness indicators:

- Domestic Resource Cost (DRC) $DRC = {G}/{E - F}$

- Coefficient of International Competitiveness (CIC)

- $CIC = {B}/{(B + C)}$

- Coefficients of Foreign Exchange $= {B}/{(B + C)}$

a) Nominal Protection Coefficient (NPC) $\quad NPC = A/E$

b) Effective protection coefficient (EPC) $\quad EPC = \dfrac{(A - B)}{(E - F)}$

Profits are defined as the difference between total (or per unit) sale revenues and costs of production. This definition generates the first identity of accounting matrix.

In the PAM, the profitability is measured horizontally, across the columns of the matrix as demonstrated in table (3-1), profit shown in the right hand column, is found by subtraction of cost, given the two middle columns from revenue indicated in the left hand column. Each of the columns entire is thus a component of the profits identify revenues less costs equal profits. Some indications that can be computed through the PAM from table (3-1).

3.3.2.1 Private profitability:

It can be defined as the difference between the revenues and the economic activity (A) and the production cost of the associated tradable input (B) and the domestic factors (C).

It is a measure of competitiveness at actual market prices and it is defined in the PAM as:

D= A- B- C

3.3.2.2 Social profitability:

It is calculated by the profit of the production system when all the matrix elements (revenues, tradable inputs, and domestic factors) are measured at their opportunity cost, it is defined at the PAM as:

H= E- F- G

It is an indicator of the efficiency or comparative advantage of an agricultural system. If the social profitability is positive the production

system is efficiently using its resources and shows a positive contribution in the national income.

Transfers are the difference between the elements in the private analysis and the social analysis and they can be explained or accounted for by the government policy and market failure.

These valuations measure comparative advantage or efficiency in the agricultural commodity system. Social profits (H) are an efficiency measure because outputs (E) and inputs (F+ G) are valued in prices that reflect security values or social opportunity costs.

3.3.2.3 The measurement of the social prices in the PAM:

The differentiation between the private prices and the social prices reflect clearly the usefulness of the PAM, in which we shall measure it using the shadow prices based on price in the international markets. For tradable outputs and inputs which have no border prices we shall have to identify equivalent goods for factors which border prices do exist.

3.3.2. 4 Tradable goods:

Tradable goods can be defined as those goods that are either directly imported or exported or whose domestic sale (purchase) results in the goods being exported (imported) by some persons or firms.

3.3.2.5 Non- tradable goods:

These are goods which have no readily available border price by which to measure the social value, but non- tradable goods have opportunity costs just the way that tradable goods do. That means the resources currently used to produce or a non- tradable goods could have been used to produce a tradable goods. Therefore they had been disaggregated into their traded and primary non- traded components. The traded components valued at their border prices and the primary non-

traded valued at their opportunity cost and converted into border price equivalent values using the appropriate conversion.

The Policy Analysis Matrix has measure for:

- Absolute international competitiveness indicators:

    1- Financial profit (D).

    2- Social profit (H).

    3- International Value Added (IVA).

- Relative competitiveness indicators:

    1- Coefficient of International Competitiveness (CIC).

    2- Domestic Resource Cost Coefficient (DRC).

    3- Protection Coefficients:

    a) Nominal Protection Coefficient (NPC).

    b) Effective Protection Coefficient (EPC).

3.3.2. 6 Absolute international competitiveness indicators:

1- Financial profitability:

It is the output of production. It reflects the producer prices which include taxes, subsidies of inputs. It shows clearly the actual profits in the agricultural system and the technology used in it, output values, input costs and the government interference. It is from the producer (farmer) view equal term gate price minus cost inputs. For the government view subtraction of cost of production and marketing from international prices in case calculated in local market prices.

D = A- B – C from table (3-1). The private or actual market prices thus incorporate the underline economic costs and valuation plus the effects of all policies and market failures. The private profitability calculations show the competitiveness of the agricultural system, given the current technology output values, input costs and policy transfer. If the financial profitability is a positive value there is a profit.

2- Economic profitability:

It measures the comparative advantage or efficiency in agricultural commodity system. Economic (social) profits (H) are like the financial analogue are the difference between total revenues and total costs all are measured in economic prices.

$H = E - F - G$ table (3-1) for the output (E) and the input (F) are traded internationally, the appropriate social valuations are given by the world prices at their (CIF) import prices for goods and services that are imported, or (FOB) export prices for exportable. World prices represent the government's choice to permit consumers and producers to import export, or produce goods and services domestically, the social value of additional domestic thus foreign exchange saved by reducing imports or earned by expanding exports.

Cost Insurance Freight (CIF) is a term used to describe pricing or valuation of imported goods to include all of the transfer costs, of delivering the goods to the point of consumption.

Free On Board (FOB) is a method where the transfer costs are excluded. It refers to export.

3.3.2.7 Financial analysis equations:

Financial and economic analysis:

Market conditions which diverge are called distorted or imperfect market. The market distortion is generally divided into two types:

a) Endogenous distortion which are existed within the market structure.

b) Exogenous distortion which are not inherited to the market structure.

The divergence due to the market structure stems from the number and size of distribution of sellers and buyers, the degree of the product differentiation and the ease of entry of new firms into the industry.

This study is an attempt to throw some lights on divergence on mango exports for the seasons 2010, 2011 and 2012 through testing its international competitiveness and profitability.

The PAM is based on the detailed data for the crop seasons 2010, 2011and 2012 using the financial and economic analysis. Regarding the valuation procedure, the private profitability is calculated by market prices and actual remuneration of the factors of production while for the estimation of economic profitability market prices are replaced by shadow prices. For imports (exports) the accounting prices are estimated directly by CIF (FOB) value converted into local currency and adjusted into international cost items. The international cost items are added to CIF value in case of imports and import substitutes and deducted from the FOB value in case of exports.

The shadow prices are done via the following steps:

The data on costs and revenue items at market prices are divided into sub- items and each sub- item is decomposed into foreign and domestic components. This has been done by estimating the foreign exchange component (FOREX) of each item used in the analysis (Table 3.2).

1. CIF: "Cost Insurance and Freight" a term used to describe pricing or valuation of an imported goods to include all the transfer costs of delivering the goods to the point of consumption.

2. FOB "Free On Board" a method where the transfer costs are excluded. It refers to exports.

3. FOREX component refer to the percentage of the total price that must be directly or indirectly paid by using a foreign currency.

- International Value Added (IVA):

It is the value of output in foreign currency at any point in the production process less the value of the purchased inputs in foreign currency in the same period or can be defined as the revenue due to production or export of a commodity in foreign currency.

IVA = E- F Table (3-1).

If IVA is positive that means the commodity have positive revenue and it is one of the international competitiveness indicators.

The indicators which can be computed through the PAM from table (3-1) are of two measures:

3.3.2. 8 Relative international competitiveness indicators:

a) Coefficient of International Competitiveness (CIC):

It reflects the ratio of the cost of local resources needed to gain one unit of foreign currency. It can be defined as the ratio of domestic resources cost measured in economic prices to International Value Added (IVA) expressed in foreign currency. It is an indicator measured and compared with the shadow price exchange. It is the rate at which we can exchange local resources into foreign currency. If the CIC value is less than the exchange rate, the crop is economically profitable and that means few local resources are used to gain foreign currency. If CIC is greater than shadow exchange rate, that means there is no relative competitiveness (Bushra (2004), Elhabob (1994)).

b) Domestic Resource Cost (DRC):

It is a measure and an indicator for efficiency of local resource usage and can be computed as follows:

$$DRC = \frac{G}{(E-F)}$$

Where:

G = domestic factor cost

(E-F) = IVA

It is practically a very important indicator. It is used to measure the economic efficiency at each stage of the commodity.

If DRC is less than one this means that the product used resources with efficiency according to the international prices and if DRC is greater than one then the opportunity cost of using domestic resources exceed the value added which means don not use the resources with optimum efficiency and if the indicator value equal to one that means the resources are enough to gain the product.

3.3.2. 9 Relative protection:

a) Nominal Protection Coefficient (NPC):

It reflects the impact of policies on both output prices and inputs prices and distortion. It shows the diversity in local prices compared to international prices due to act of explicit and implicit taxes on the product or the subsidy for the crop. It can be calculated as follows:

$$\text{NPC} = {}^{A}\!/_{E}$$

It can be defined as the ratio of the revenues from the product at market price to its values in international prices (at social prices).

If the ratio is less than one this means that the resources used in the system is gaining less than earns if the commodity is freely traded i. e. the product is suffering from government taxes. If the ratio is greater than one this means that the product is subsidized by the government. If the ratio equals to one this means that price that used by the producer is equal to the international price.

b) Effective Protection Coefficient (EPC):

It measures the effect of protection and bonus on production or taxes induced and it is the value added to product or against the resources used to produce the product. It can be calculated as follows:

$$EPC = \frac{A-B}{(E-F)}$$

If it is greater than one that means there is a protection and bonus on the product. If it is less than one that means there is a tax against the product.

When using PAM through measuring shadow exchange rates, commercial commodity and non- commercial commodities bearing in mind the following factors:

- Shadow prices:

They are prices which replace the market price after it had been distorted by monopolist act or imposition of taxes or lack of economic information therefore the prices are calculated at international prices.

- Commercial commodities:

Are those commodities which have border prices and international prices and can be expressed as border prices. If the prices can be expressed in three levels of prices as farm gate price, cost of transport price and marketing price and so forth and can be transferred into shadow prices through transfer factors. Transfer factor is the ratio revenue of opportunity product with the border prices to the actual product revenue expressed in market price.

- Non- commercial commodities:

These are commodities which have unknown border prices and are expressed in social prices like commercial commodities and inputs of production e. g. land and labor.

- Labor:

Computed by multiplying number of working hours for one labor in average wages after differentiation of labor according to type, age, skill level of labors with economic wage rate by this equation:

AWR = M × ARM

Where as:

M = Opportunity product with local price.

ARM = M value after transferred into similarly equal foreign exchange.

WR = Economic wage rate.

The opportunity product can be calculated by ratio value of agricultural product in economic price to the summation of the total labor in agricultural sector or number of working hours times the daily opportunity product. But the rate of shadow wages can be computed by multiplying market wages times the appropriate transfer rate for each type of labor. For skilled labors its transfer rate equal one. For unskilled labor it is calculated as 0.6 due to lack of full appointment and seasonality and differentiation in labor wage locally.

The Accounting Wage Rate (AWR) measure the opportunity cost of labor (Gittinger, 1982) stated that the AWR is computed as follows:

$$AWR = MWR \times AR$$

Where as:

MWR = Market Wage Rate of a particular category.

AR = Accounting Ratio of that category.

Usually the skilled labor assumes to have an accounting ratio which equal to one since it is scarce in its supply. Therefore in this case:

$$AWR = MWR$$

For labor it depends on differentiation between them according to the type, age and level of professionalism and economical wage rate is calculated with the following equation:

$$EWR = M \times ARM$$

Where:

EWR = Economic Wage Rate.

M = Opportunity product with local currency

ARM = Equal to M value after transferring it into foreign currency.

Opportunity product can be calculated by dividing the value of agricultural products value in economic prices by the summation of labor man power in the agricultural sector or multiplying number of working days times the daily opportunity product.

For the unskilled labor accounting ratio is assumed to be 0.6 because it is more complicated due to the lack of complete jobs and its seasonality and the differentiation in prices of local labors wage (Elmak, 1990).

Land:

Shadow prices of land are calculated by its cost of its opportunity cost by products produced in it. Land is abundant in supply varies largely in its quantity and uses.

Most studies in Sudan used to ignore its opportunity cost normally the land rents rates imposed by the government are normal or almost negligible.

Although land is abundant in its supply, but it usually varies in its quantities and uses. In Sudan, usually we ignore the land opportunity cost because of unavailability of its shadow price rate.

The shadow price of land is calculated by the opportunity cost of the products.

3.3.2. 10 The shadow exchange rate:

The shadow exchange rate can be estimated through the following formula:

SER = OER + MER (1-X)

Where as:

SER = Shadow Exchange Rate

OER = Official Exchange Rate

MER = Free Market (black market) Exchange Rate

X = The percentage of foreign transaction priced by the official exchange rate.

In general, the economic prices can be found directly as international prices. In case it can be found directly by evaluating through using of shadow exchange rate and local prices for:

1- Calculate the financial prices.

2- Calculate shadow prices and local currency exchange rate.

3.3.2. 11 Financial analysis equations:

For local commercial inputs (which are having no international prices) can be calculated by transferring into local currency by using official exchange rate through the following equation:

FPTi = FXi (Total cost)(Pounds)/Tons × AOER

Where as:

FPTi = The financial price of input.

FXi = Foreign Exchange Coefficient

AOER = Average Official Exchange Rate

For non- commercial inputs using the following equation:

FPni = 1- FXiX Total cost (SDG/Ton)× AOER

Where as:

FPni = Financial Price of input.

3.3.2. 12 Economic analysis equations:

For transferring the financial prices into economic prices we use the following equation:

EPti = FPti $\times \frac{SER}{AOER}$

Where as:

EPti = Economic Price of commercial input

FPti = Financial Price of the same input.

For non- commercial inputs we use the following equation:

FPni = Xp × Oi

Where as:

FPni = Economic Price of non- commercial input

X = Foreign trade percentage through official exchange rate

Oi = Transfer rate for the same input by the following equation which had been adopted by Ulrich (1990)

EPi = FPi + AERP × FX× FPi

Where as:

EPi = Economic Price of input

FPi = Financial Price of input

FX = Foreign exchange coefficient

AERP = Accounting Exchange Rate Premium

Which equals?

$$\frac{SER - OER}{OER}$$

Where as:

SER = Shadow Exchange Rate

OER = Official Exchange Rate

Accordingly:

EPi = FPi + (SER- OER) × Fx ×FPi

$= FPi + \frac{SER}{OER} \times FX\times FPi - \frac{SER}{OER} \times FX\times FPi$

$= \frac{SER \times FX \times FPi}{OER} + FPi - FX \times FPi$

$= \frac{FX \times FPi \times SER + FPi\,(1 - FX)}{OER}$

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction:

This chapter displays analysis and results of the study that aims to describe Sudanese mango exports mainly to the Kingdom of Saudi Arabia (K. S. A) for the seasons under study (2010, 2011 and 2012).

Data collected were variable costs of mango exports for the three years, exchange rates of dollars and sale prices in (K. S. A) during the period of the study (Table 4.1).

Table (4.1): Wholesaler variable costs of Sudanese mango exports during the years 2010, 2011 and 2012(SDG/Ton)

Items	Years		
	2010	2011	2012
Purchasing price from fruits refrigerators	800	870	960
Physical loss (4%)	32	32	32
Export Taxes	90	90	89.96
Exporting form	60	60	59.97
Port entry tariff	10	12	11.99
Packaging	200	220	229.90
Labeling	2	2	3
Skilled labour	14.45	14.45	14.44
Unskilled labour	2.55	2.55	2.55
Cargo labour	10	11	11.99
Cool Transport	37	38	37.98
Loading Bill	10	12	11.99
Quarantine Certificate	5	6	6

Source: Police Customs- KRT Air Port office (2013)

Table (4.2): Prices of mango exports during the years 2010, 2011 and 2012

Items	Years		
	2010	**2011**	**2012**
Total sale price (Dollar/ Ton)	٦٤٥٠٠٠	١١٧٦٤٣٠	٢٦١٤٣٤٠
Amount exported (Ton)	١٤١٧	١٨٥٥.24	٣٣٣٤.48
Price of ton sold(Dollar/ Ton)	455.1870148	634.1120286	784.03
Price of ton sold (SDG/ Ton)	1137.967537	1693.079116	3448.17
FOB price(Dollar/ Ton)	1600	1600	1600
Official Exchange Rate (OER) (Dollar/ SDG)	2.50	2.67	4.40
Nominal Exchange Rate (NER) (Dollar/ SDG)	2.95	3.881	6.60
Shadow price(Dollar/ SDG)	2.815	3.5177	5.24

Source: Police Customs- KRT Air Port office (2013)

Table (4.3) shows the amounts of vegetables and fruits exported through Khartoum Airport during the period (2010- 2012).

According to the amounts exported in table (4.3), it is clear that the amounts of mango is the highest one of all vegetables and fruits exported through Khartoum Airport during the period under study (2010, 2011 and 2012) which are (64.40%, 73.30% and74.95%), respectively.

Table (4.3): Amounts of fruits and vegetables in tons exported through Khartoum Air Port during the years 2010, 2011 and 2012

Type	2010	2011	2012
Melon	399	272.11	745.25
Beans	148	17.30	83.050
Lemon	14	20	13.31
Grape fruit	2.50	200	6.500
Watermelon	55	25.50	182.04
Mango	1417	1855.24	3334.48
Other*	129.655	141.054	84.375

Source: Sudanese Standards and Metrology Organization (SSMO), KRT Airport office (2013).
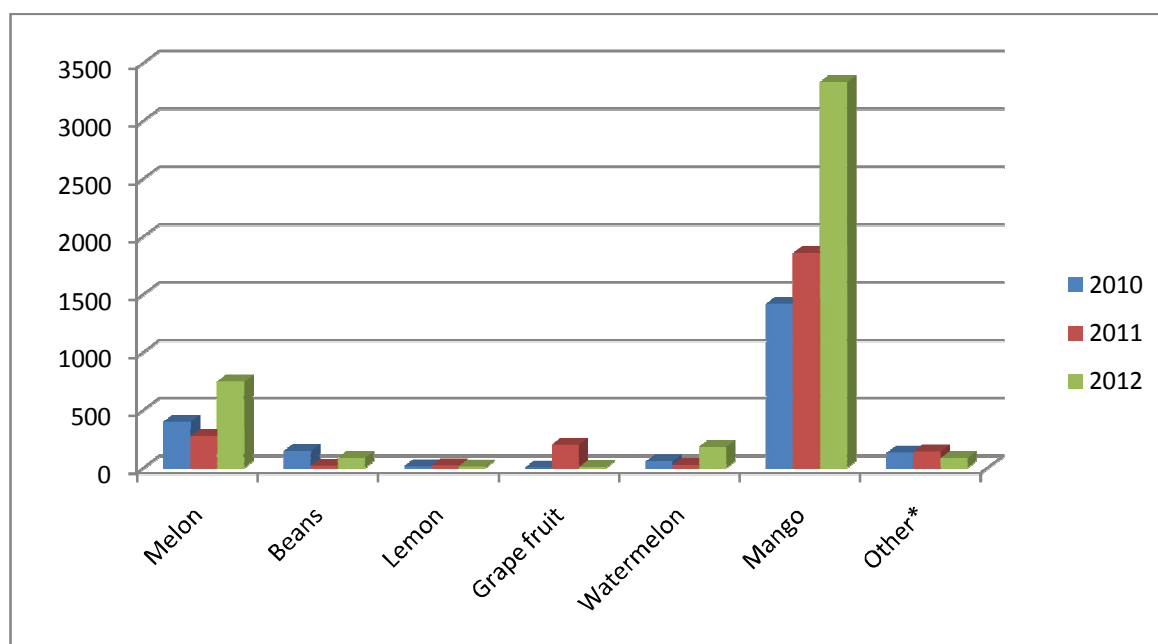
*Others = Cucumber, Okra, Dates, Potatoes

Figure (1): Amounts of fruits and vegetables in tons exported through Khartoum Air Port during the years 2010, 2011 and 2012

4.2 Competitiveness of mango exports to K. S. A:

PAM was used to estimate the financial and economic profitability of mango exports to measure the competitiveness of mango for the period (2010, 2011, and 2012).

4.2.1 Financial and economic profitability:

Table (4.4) shows that the financial costs of mango exports in year 2010 were 1273SDG. The share of tradable inputs was 245SDG which is approximately 19% of the total cost whereas the share of domestic factors cost was 1028 SDG which is approximately 81% of the total cost.

Economic costs in the same year were 1140 SDG. The share of tradable inputs was 276 SDG which represents 24% of total costs and the share of domestic factors in the economic costs was 864 SDG which is 76% of total economic costs.

Table (4.4): Revenues, costs and profits of mango exports for the year 2010

Prices	Revenue	Costs		Profit
		Tradable inputs	**Non tradable factor**	
Financial Price	4000	245	1028	2727
Economic Price	4504	276	864	3364
Divergence	-504	-31	164	-637

Source: Police Customs- KRT Air Port office (2013)

Financial costs in year 2011 (Table 4.5) were 1370 where the share of tradable inputs was 264 SDG which was 19% of the total costs whereas the share of domestic factors was 1106 SDG which represents 81% of the total costs. Economic costs in the same year were 1288. Share of tradable inputs was 348 SDG which represents approximately 27% of the total cost and the share of domestic factors was 940 SDG which was approximately 73%.

Table (4.5): Revenues, costs and profits of mango exports for the year 2011

Prices	Revenue	Costs		Profit
		Tradable inputs	**Non tradable factor**	
Financial Price	4272	264	1106	2902
Economic Price	5628	348	940	4341
Divergence	-1356	-84	166	-1439

Source: Police Customs- KRT Air Port office (2013)

Financial cost in 2012 was 1471SDG where the share of tradable inputs was 274 SDG which was approximately 19% of the total cost whereas the share of domestic factors was 1197 SDG which is approximately 81% of the total cost.

Economic costs in the same year were 1357SDG. Share of tradable inputs was 326 SDG which represents 24% of total cost whereas the share of domestic factors was 1031 SDG which represents 76% of total cost.

Table (4.6): Revenues, costs and profits of Sudanese mango export for the year 2012

Prices	Revenue	Costs		Profit
		Tradable inputs	**Non tradable factor**	
Financial Price	7037	274	1197	5565
Economic Price	8383	326	1031	7026
Divergence	-1346	-52	167	-1461

Source: Police Customs- KRT Air Port office (2013)

Table (4.7) shows Private profitability which is positive during the three years 2010, 2011 and 2012 meaning that mango exports have competitiveness at actual market prices, this competitiveness encourage future expanding and improving of mango exports.

Table (4.7): Financial profitability indicators

Indicator	2010	2011	2012
PP	2727	2902	5565
PRC	0.27	0.28	0.18
PCB	0.32	0.32	0.21

Table (4.8) shows a positive Economic Profitability during all years under study, so Sudanese mango exports have a comparative advantage and a positive contribution in the national income.

Table (4.8) Economic profitability indicators

Indicator	2010	2011	2012
EP	3364	4341	7026
DRC	0.20	0.18	0.13
SCB	0.25	0.23	0.16

Source: Analysis results

Figure (2) below shows that economic profits exceed the private profits in all studied years meaning that there were government taxes levied on mango exports.
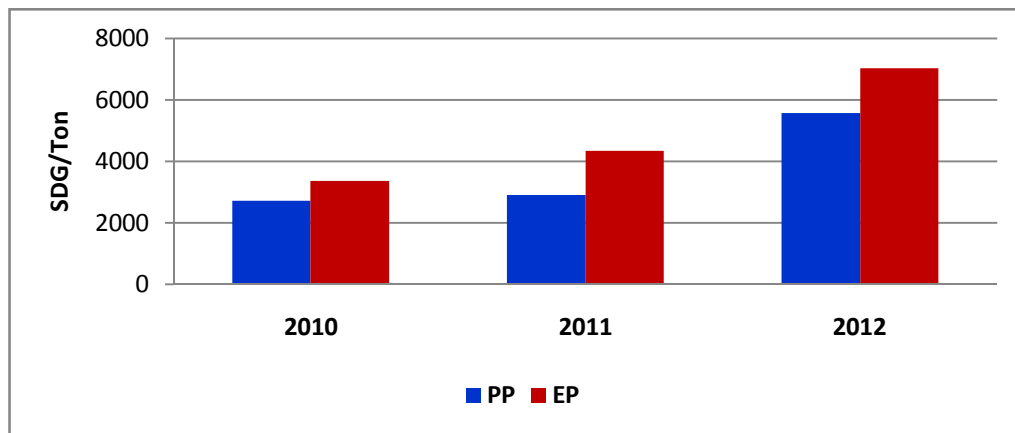

Figure (2): Private and Economic Profits of Sudanese mango export during the years 2010, 2011 and 2012

4.2.2 Relative competitiveness indicator of Sudanese mango exports during the years 2010, 2011 and 2012:

Since the Domestic Resource Cost (DRC) is less than one in all three years under study which indicates that a dollar worth domestic resource produce more than dollar of foreign exchange so resources are used efficiently according to international world price. In other words decreasing opportunity cost for domestic resources that used will earn one unit of foreign currency which indicates that increasing of

competitiveness. This means Sudan has a comparative advantage in exporting mango.

Since Private Resource Cost (PRC) was less than one in all three years 2010, 2011 and 2012, the private factors cost is less than their value added showing that Sudanese mango can afford to pay domestic factors and still remain competitive.
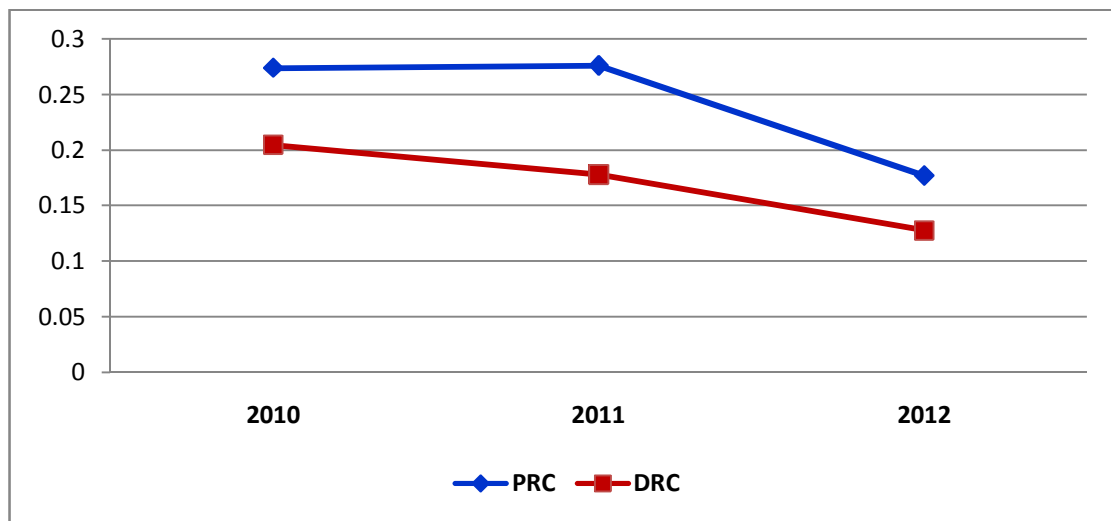

Figure (3): Relative competitiveness indicator of Sudanese mango exports during the years 2010, 2011 and 2012

Where:

PRC = Private Resource Cost

DRC = Domestic Resource Cost
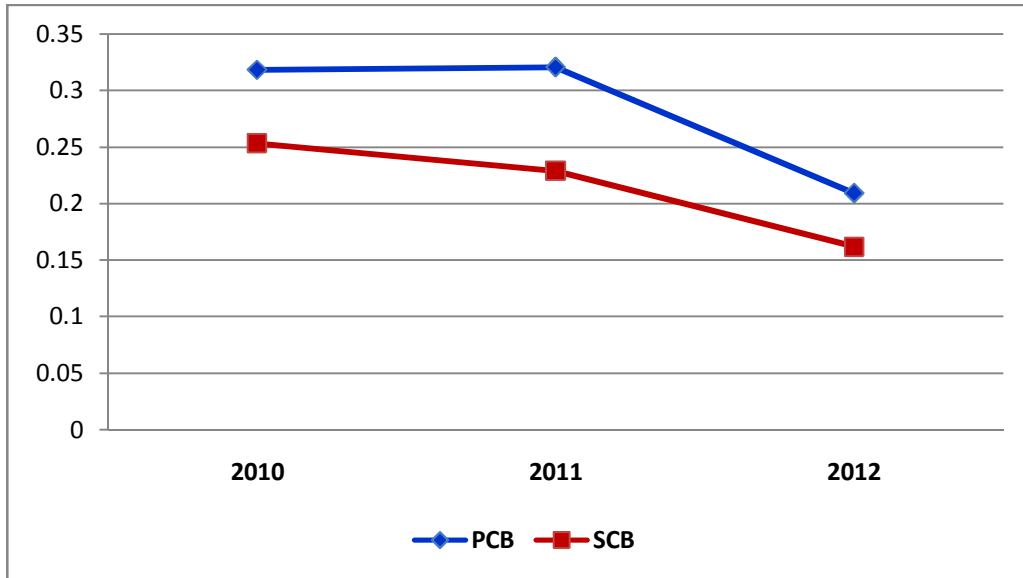
Figure (4): Private Cost Benefit ratio and Social Cost Benefit ratio

4.2.3 Profitability Coefficient (PC):

Profitability Coefficient measures the impact of transfers on private profits and the incentive of the effect of policies. It equals to the ratio of private profits to the social profits.

Table (4.9) shows that Profitability Coefficient during the three years of the study is less than one which indicates that the economy will benefit from divergences of mango exports during the periods 2010, 2011 and 2012.

Table (4.9): Profitability Coefficient (PC)

Season	PC
2010	0.81
2011	0.67
2012	0.79
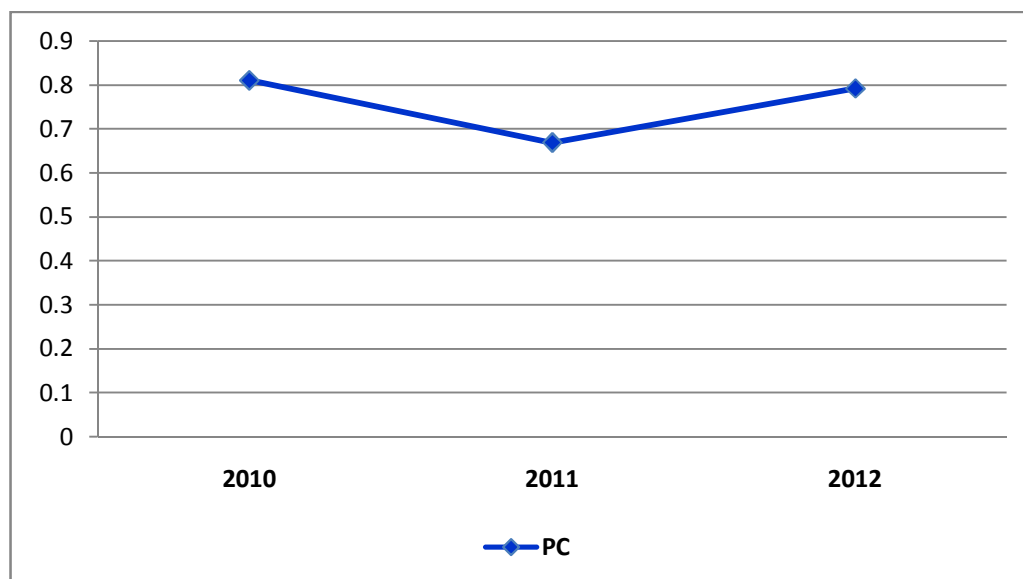
Figure (5): Profitability Coefficient (PC)

4.2.4 Nominal Protection Coefficient (NPC):

Mango exports price incentive was assessed by calculating the Nominal Protection Coefficient (NPC) considering the effects of implicit taxes and subsidies on Sudanese mango exports.

Table (4.10) shows that Nominal Protection Coefficient on output (NPC) was less than one in all three years 0.89, 0.76, 0.84, respectively, which indicates that there were taxes levied on outputs by the government at rates of 11, 24, 16%, respectively and there were no protection for mango exports.

Table (4.10): Nominal Protection Coefficient (NPC) during the years 2010, 2011 and 2012

Season	NPC
2010	0.89
2011	0.76
2012	0.84

Source: Police Customs- KRT Air Port office (2013)
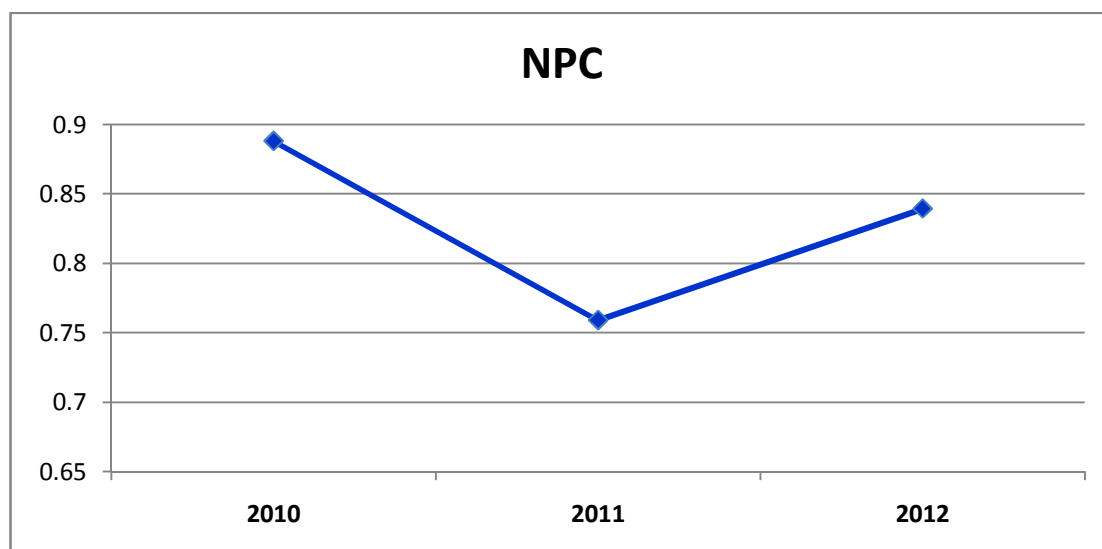
Figure (6): Nominal Protection Coefficient (NPC) during the years 2010, 2011 and 2012

4.2.٥ International competitiveness of Sudanese mango exports:

Coefficient of International Competitiveness (CIC) reflects the ratio of the cost of domestic resources needed to gain one unit of foreign currency.

Table (4.11) shows that CIC in all three years 2010, 2011 and 2012 gives values less than the shadow prices for the same years, so Sudanese mango exports have competitiveness.

Table (4.11): Coefficient of International Competitiveness (CIC) and Official Exchange Rate of Sudanese mango exports during the years 2010, 2011 and 2012

Item	2010	2011	2012
CIC	0.51	0.48	0.56
Official Exchange Price	2.50	2.67	4.40
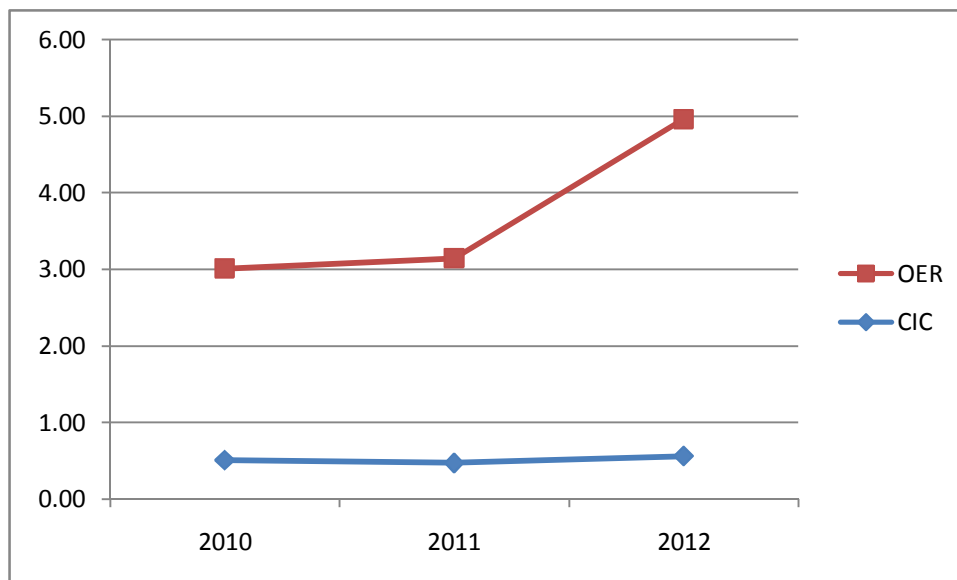
Figure (7): Coefficient of International Competitiveness (CIC) and Official Exchange Rate of Sudanese mango exports during the years 2010, 2011 and 2012

4.2.٦ Absolute competitiveness indicator:

International competitiveness indicators for mango exports

It is clear from table (4.12) that Sudanese mango exports were found to be competitive because all values of International Value Added (IVA) are positive with regard to absolute competitiveness. It is obvious

that season 2012 is the highest among the other two seasons which indicates that the revenue in foreign currency is high during this season.

Table (4.12): Absolute competitiveness indicator (IVA)

Indicator	2010	2011	2012
IVA US$	1691	1978	1832
CIC	0.51	0.48	0.56

From the above results, it is obvious that Sudanese mango exports are internationally competitive in all three years under study and profitable at the official exchange rate prevailing at the same period.

CHAPTER FIVE
SUMMARY AND RECOMMENDATIONS

5.1Summary:

This study deals with Sudanese mango exports competitiveness and the obstacles facing its marketing abroad. Data were collected from different sources such as personal interviews with exporters and documentations from related ministries. Analysis is based on descriptive statistics Policy Analysis Matrix (PAM).

As a conclusion, the study showed that:

- Mango Exports represents approximately 70.9% of all fruits and vegetables exports in Sudan. It is the highest in terms of quantities in relative to other fruits and vegetables.

- Saudi Arabian market accounts for more than 90% of the total Sudanese mango exports.

- The study reveal that Sudanese mango had a high competitiveness and it was financially and economically profitable, but economic profit was higher than financial one in years 2010, 2011 and 2012 of study due to direct and indirect taxes which will be against the motivation of exporters.

- There is a rising demand locally and internationally for mango in general and for superior qualities in particular.

5.2 Recommendations:

- Reduction of exports costs such as transportation, bills, taxes…..etc.

- Maintain and expand the Saudi Arabian market and search for new channels such as United Arab of Emirates (UAE), Qatar and European markets.

- Considering of consumer taste for type and quality of mango and the required capital for investment in improving grading and packaging services by justifying the assessment of a proposed project for standardizing Sudanese mango exports.

- Mango fruit is delicate and many cultivars cannot withstand long distance transportation and may reach the market in a mushy overripe, so it needs an improved production and market structure through building of roads and exporting ports hence we can keep its quality.

- Mango fruits are widely subjected to fruit fly so; it needs to be better controlled to keep good quality of the fruit.

- Mango or fruits in general facing many problems like cleaning, grading, sorting, packaging, waxing ….etc, there are no processes of standardization, this leads to variation in size and ripeness of fruits in one package and hence lowering their competition in the international market.

- Trade transaction relationship between exporters is weak, method of obtaining information on market depends on contacts with importers to inform about the market situation on supply and demand and determination of quantities and varieties required, exporters do not well equipped with the needed information about foreign market and quality of the crop so they lack bargaining power in relation to export price.

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APPENDEX

Appendix (1): Prices of Mango Exports

Item	Year		
	2010	**2011**	**2012**
FOB price (Dollar/ Ton)	1600	1600	1600
Amount exported (Ton)	1417	1855.24	3334.48
Purchasing price from central local market (SDG/Ton)	455.19	634.11	784.03
Official Exchange Rate (OER) (SDG/ Dollar)	2.5000	2.670	4.398
Nominal Exchange Rate (NER) (SDG/ Dollar)	2.950	3.880	5.600
Shadow price(SDG/ Dollar)	2.82	3.52	5.24

Appendix (2): Export variable costs (SDG/ Ton) during 2010, 2011 and 2012

Item	Year		
	2010	**2011**	**2012**
Loss 4%	32.00	32.00	31.99
Export Taxes	90.00	90.00	89.96
Cool Transport	37.00	38.00	37.98
Cargo labour	10.00	11.00	11.99
Exporting form	60.00	60.00	59.97
Air port entry tariff	10.00	12.00	11.99
Loading Bill	10.00	12.00	11.99
Quarantine Certificate	5.00	6.00	6.00
Packaging	200.00	220.00	229.90
Labelling	2.00	2.00	3.00
Skilled labour	14.45	14.45	14.44
Unskilled labour	2.55	2.55	2.55

Appendix (3): Export cost 2010 (SDG/Ton)

Item	Financial prices		Economic prices	
	Commercial cost	Local cost	Commercial cost	Local cost
Loss 4%	32.00	0.00	36.03	0.00
Export Taxes	0.60	90.0	0.0	0.0
Packaging	180.00	20.00	202.68	20.00
Labeling	1.90	0.10	2.14	0.10
Cool Transport	29.60	7.40	33.33	7.40
Skilled labour	0.00	14.45	0.00	14.45
Unskilled labour	0.00	2.55	0.00	2.55
Cargo labour	0.00	10.00	0.00	6.00
Exporting form	0.00	60.00	0.00	0.00
Air port entry tariff	0.00	10.60	0.00	0.00
Loading Bill	1.00	9.00	1.13	9.00
Quarantine Certificate	0.50	4.50	0.56	4.50

Appendix (4): Export cost 2011 (SDG/Ton)

Item	Financial prices		Economic prices	
	Commercial cost	Local cost	Commercial cost	Local cost
Loss 4%	32.00	0.00	42.16	0.00
Export Taxes	0.00	90.00	0.00	0.00
Packaging	198.00	22.00	260.86	22.00
Labeling	1.90	0.10	2.50	0.10
Cool Transport	30.40	7.60	40.05	7.60
Skilled labour	0.00	14.45	0.00	14.45
Unskilled labour	0.00	2.55	0.00	2.55
Cargo labour	0.00	11.00	0.00	6.60
Exporting form	0.00	60.00	0.00	0.00
Air port entry tariff	0.00	12.00	0.00	0.00
Loading Bill	1.20	10.80	1.58	10.80
Quarantine Certificate	0.60	5.40	0.79	5.40

Appendix (5): Export cost 2012 (SDG/Ton)

Export cost 2012 (SDG/Ton)				
Item	**Financial prices**		**Economic prices**	
	Commercial cost	**Local cost**	**Commercial cost**	**Local cost**
Loss 4%	31.99	0.00	38.10	0.00
Export Taxes	0.00	89.69	0.00	0.00
Packaging	206.91	22.99	246.49	22.99
Labeling	2.85	0.15	3.39	0.15
Cool Transport	30.39	7.60	36.20	7.60
Skilled labour	0.00	14.44	0.00	14.44
Unskilled labour	0.00	2.55	0.00	2.55
Cargo labour	0.00	11.99	0.00	7.20
Exporting form	0.00	60.00	0.00	0.00
Air port entry tariff	0.00	11.99	0.00	0.00
Loading Bill	1.20	10.80	1.43	10.80
Quarantine Certificate	0.60	5.40	0.71	5.40