

Back to the Agriculture - the Development of the Comparative Advantage of Sudan's Commodities

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Abstract In recent years, the Dutch disease created by losing the oil revenues has encouraged countries to diversify the comparative advantage in other products and services, and for many countries including Sudan agricultural products are at the top of the exports. Hence, this paper analyzed the comparative advantages of Sudan's agricultural products and to show the extent to which products that Sudan should specialize in to regain some of missed comparative advantages. In order to figure out this, data were extracted from the International Trade Centre (ITC)'s Trade map, the UNCTAD COMTRADE database and Central Bank of Sudan. In this study, we used the Revealed Comparative Advantage (RCA) method to analyze the direction of changes of Sudanese comparative advantages for the recent period from 2000 to 2013. The study found that Sudan has opportunity to regain it is missed comparative advantages for products that have recently specialized and experienced in. The Cotton, animal resources and Gum Arabic products are found most products that Sudan has a comparative advantage in.

Keywords: comparative advantage, cotton, gum arabic, RCA

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1. Introduction

Specialized in specific agricultural products and explore the comparative advantages in the market place are the key for economic growth in developing countries, which allows these countries to concentrate resources and increase productivity on specialized products. Thus, most of developing countries including Sudan; however the agriculture is main contribution of the Gross Development Product (GDP).

In Sudan, the agricultural sector is considered to be the backbone of industrial development and it continues to contribute in the growth domestic product (GDP). In 2010, it accounts of 31.1% of the country's total GDP [1]. Therefore, it was widely regarded as the future "breadbasket" of the Arab nation, a vast, fertile land with abundant water from the Nile watershed [2].

Despite it has huge comparative advantages in many products, Sudan has lost most of competitiveness advantage for agriculture products. The reason for lost the comparative advantages is that the agricultural sector has affected by the lack government policies, which puts the agriculture in the bottom priorities. However, and since 2000, the agricultural sector which includes livestock, corns, forestry and fisheries have negatively caused by the boom of the oil industry and secession of South Sudan, which creates a new dimension to the current economic development in Sudan [3]

While the opportunity of Sudan's economy continues to recover, there is a need to develop products that have a priority in comparative advantages to sustain the economic growth. Therefore, Sudan has been losing absolutely advantages of many products, for instance, Cotton, Animal Resources Products and Gum Arabic, which have recently considered by Sudan's Central Bank of as main exports for the Three Year Programme (2012-2014).

This study aims to analysis the agricultural policies in various stages of Sudan economic development. The government's agricultural policy includes encouraging investment in agricultural products in which it believes Sudan has a comparative advantage. This work will help how different agricultural products which are supposed to produce for export purpose are connected with the comparative advantages and how the lack of government policies affects the cost of production.

To achieve this, this study argues that political, economic, social and other factors affect investors' decision-making in the previously conflict affected region, and acknowledges that private sector investment can make a significant contribution to economic reconciliation in the country through employment generation. It also believed that the land productivity is continued to decrease due to lack of government policy. However, we argue that more than 60% of the cultivable agricultural land has not been used for agricultural purpose, it also argue that the services and oil sectors have improved and it has a high returns for labour, which caused the mobility to these sectors.

In this study, the comparative advantage of three agricultural products in Sudan was analyzed by using Revealed Comparative Advantage (RCA) method for the years 2000 to 2013. The RCA method has developed by [4] has been extensively used in the comparative advantage theory (such as [5,6,7]).

Based on the RCA model, our key findings can be summarized as follows. First, Sudan has lost its comparative advantage for many agricultural products, when Sudan concentrates on the oil production, the contribution of the agricultural sector has declined from 43%/GDP to 29%/GDP in 2000 and 2007 respectively. Second, It demonstrates that Sudan has an absolutely advantage in the Gum Arabic, it produces around 80% of the global production. Finally, the comparative advantage in Cotton and animal products depends on how much government interest occurs in agricultural sector and providing the required funding.

The study is structured in six sections. After this introduction, Section 2 reviews the theoretical foundations on comparative advantage and develops the used model. The data and methodology is presented in section 3. Section 4 illustrates the agricultural policies and the importance of agricultural sector to Sudan. Section 5 is devoted to discuss the results and the main findings. We conclude in Sections 6.

2. Literature Review

The comparative advantage theory of the international trade has long been employed to emphasize firm behavior when policy makers operate under the multiple competing goals and conditions of bounded rationality [8].

However, the concept of comparative advantage is important in the international trade theories; it identifies the overall trends of trade and investment that countries should exploit the differences in products in the international level [5].

On the one hand, the extensive literature on comparative advantage has shifted from autarky to international trade. On the other hand, the empirical works have developed to measure the comparative advantage of products among the countries. The theories of trade on comparative advantage have divided on two parts, firstly, the Heckscher-Ohlin (H-O) theory and the Ricardian theory [9]. In this context, Ricardo argues that it is necessary for countries to specialize in the products that produced better than other countries, even if it has opportunity to produce everything efficiently. Therefore, the core of the Ricardian theory is that the comparative advantage arises from differences in technology across countries. By contrast, the Heckscher-Ohlin (H-O) theory supposes countries have the same technologies, and country's comparative advantage determines by the factor scarcity (factor endowment ratios) compared to the world or analysis a set of countries.

In his paper, [10] has developed the standard Heckscher-Ohlin theory to investigate the duration of exports of the least developed countries (LDCs) affected by comparative advantage affects. Therefore, the authors calculate the entire exported product's to estimate the export survival rates. They found that a product's that have a comparative advantage influenced the LDC export.

In Sudan context, [11] applied a multimarket model to estimate the impacts of the Sudan-EU economic partnership agreement on Sudan's agricultural commodities for the period 2007-2008. They found that the removal of tariff between the EU and Sudan, which gives Sudan the opportunity to increase the agricultural products to the EU.

Further studies related to agricultural trade have found that Sudan has lost its market shares of most of agricultural products, for instance, the production cotton and Gum Arabic has decreased by 30% and 60% in 1999 and 2007 respectively. [12] Studied the performance of Sudan exports over the period from 1970-93. The author found that the impact of price incentives on export earning was a minimal and the programs adopted by the policy makers have not created improvement in the price incentives.

In their research, [8] measured the competitiveness of Gum Arabic at Sudan crops market; they employed participatory learning and action (PLA). The authors conclude that the Gum Arabic showed varying comparative advantages and despite adopting the liberalization measures the market is predominating.

Using the Policy Analysis Matrix (PAM), [13] evaluated the Sheep production market in Sudan. The study found that the high taxes on sheep's production have affected negatively on the export and the value added has a positive relation with foreign exchange.

[14] Used Revealed Comparative Advantage (RCA) to investigate the Sudan's comparative advantage. 60 product lines have comparative advantages and Sudan has capabilities to produce and export other agricultural products that may compete in the international market.

On the building strategy for Gum Arabic, [15] studied the impacts of market strategy on export performance. They used data from surveys and from the policy makers; the study has found that the ineffective marketing strategy in Sudan is caused in the decline of the Gum Arabic exports revenues and eventually lowered it is global market share

There is a widely spread belief that Sudan has opportunity to recover from the current economic crisis by implementing agricultural policy to produce products that have comparative advantage. Given these arguments it might be anticipated that the huge amount of money needed to produce this products.

Based on previous studies dealing with analysis of the comparative advantage of agricultural products, the paper intends to test the following hypotheses:

H1: Changes in the productivity of the comparative advantages products influence the GDP

H2: There is a direct relationship between the mobility labour and productivity of agricultural products.

H3: The government policies have negatively affected the productivity of agricultural products.

Many authors have found evidence suggesting that Sudan has lost comparative advantages [12,14,16] due to fact that the production cost of most agricultural products, which continues increased during the last twenty years.

However, this study contributes to the gain from trade literature by examining the comparative of Sudanese goods in the recent period (2000-2013). This research explores the potential role of agricultural sector in Sudan, which endeavors to demonstrate that the comparative

advantage of Sudan commodities. The key question the paper seeks to address is whether Sudan able to regain the comparative advantages of agricultural products? Are Sudan's agricultural products having comparative advantages? What are the main sources of comparative advantages of agricultural products? The findings of this study will provide some important insights to policy makers.

3. Agricultural Sector in Sudan

Sudan is considered an agricultural country, where enjoys different such as irrigated, semi-mechanized rain fed and traditional rain agriculture. For instance, the irrigated agricultural system is devoted to produce Cotton, Wheat and Sugar cane. In 2008, the irrigated areas are estimated of 10.5 million hectares, it decreased to reach 7.3 million hectares in 2012, the agricultural production of these areas contributed declined from 28% to 14% of the value added in 2008 and 2011 respectively [1]. According to the report provided by Sudan National Bureau in 2010, the semi-mechanized rain fed is decreased to contribute 1.5% in 2012 instead of 3.5% in 1999. However, this irrigation system is added value of 95% of the sorghum production; the traditional rain agriculture is contributed 15% of the value added.

The process of Structural Adjustment Programs SAPs was aggressive which aims at managing the government budget deficit through curbing expanding government expenditures and increasing amounts of government revenues through broadening of revenue sources, especially taxes [17].

In this section, we discuss the contribution of agricultural products on GDP, which are considered by Sudan's Central Bank as main exports for the Three Year Programme (2012-2014) namely, Cotton, Animal Resources Products and Gum Arabic.

Since starting produced, the government has imposed a Cotton export monopoly and continues enhancing the government revenues, stabilizing the domestic prices and eventually stimulated the economic growth. However, Sudan has experienced in Cotton production for long time, for instance during 1970-93, Sudan accounts 25% of the world exports. In 1994, the government has liberalized the economy and implemented the Structural Adjustment Programs SAPs to resolve the fiscal deficits. These policies have ignored the agricultural sector, and concentrated on the oil and services sector, which shows higher and rapid growth during the 2005 until 2009.

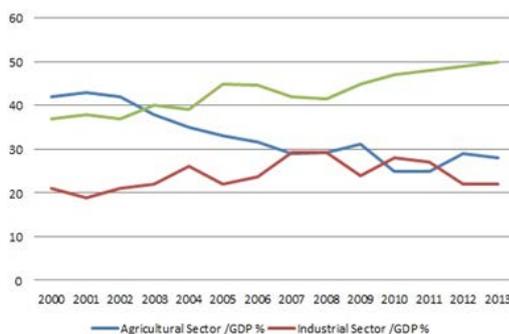


Figure 1. Contribution the production sector in the GPD (Source: World Bank, 2014.)

Figure 1 highlights the contribution the production sector in the GPD during 2000-2013. The fig. also shows the decline of the agricultural sector since 2000 and the contribution of industrial sector has increased due to fact that the government concentrated on the oil sector, while the services sector rises higher among production sector, for instance, in 2013, the services sector has contributed about 50% of the GDP. Volatility of productivity and the lack policies of the agricultural sector make the contribution difficult.

Sudanese government has intervened in Gum Arabic production to maintain Sudan and then become a largest market. Therefore, Sudan has experienced in producing and has a comparative advantage in Gum Arabic product, for instance during 1970-93, the Gum Arabic accounts 75% of the world exports, it declined to 36% and 46 in 2003 and 2013 respectively, this due to fact that the regional conflicts in field production.

The livestock also affected by the lack policies, it estimated that Sudan has 120 million cattle, goats, sheep and camels, which supports around 15% of population most of them in the rural areas [1]. However, livestock contributed by 0.9% (1994) and it increased to 21% (2002), while the in 2008 declined to 16.7 and in 2013 the total share of agriculture estimated by 21% to Sudan's GDP (Bank of Sudan, 2014).

4. Research Methodology

In this study, the exploratory and descriptive analysis has used. We used Revealed Comparative Advantage (RCA) developed by [4] has been used widely among the scholars, such as [6] and [7].

We extracted data from the International Trade Centre (ITC)'s Trade map, UNCTAD COMTRADE database and the Central Bank of Sudan for the recent period from 2000 until 2013.

$$CA = \left(\frac{X_{i,j}}{X_{w,i}} \right) / \left(\frac{X_{i,tot}}{X_{W,tot}} \right) \quad (1)$$

Where:

$X_{i,j}$ = Country i's exports of product j;

$X_{i,tot}$ = Country i's total exports;

$X_{w,j}$ = the world's (all countries) export of product j; and

$X_{w,tot}$ = Total exports in the world.

According to the model $RCA \geq 1$ means that this product has comparative advantage, by contrast when $RCA < 1$ that means that this product has no comparative advantage.

There are large scale emigrants from rural area to the main city between 2000 and 2010. However, after the secession of South Sudan, the economic situation become worse, there are many people emigrate to other countries and most of them from the rural areas, this creates a labour shortage in the agricultural operation.

A recent report shows there are many farmers complain that the wage has increased by 50% in 2013 compared to the previous wages before 5 years, while the productivity has sharply decreased because lack policy.

We collected the data from the international Trade Centre (ITC)'s Trade map in Switzerland, the UNCTAD COMTRADE database and the Central Bank of Sudan to measure the comparative advantage of three agricultural products have been considered by bank of Sudan in the

three Years Program (2012-2014) after the Sudan lost the oil revenues.

Table 1. RCA Results

Year Variable	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Gum Arabic	321.403	322.027	212.468	153.592	102.639	348.749	204.233	243.435	115.285	174.568	213.047
Cotton											
Cotton, not carded	3.272	3.021	1.078	1.349	1.823	3.314	6.663	4.797	7.351	12.347	13.415
Cotton seed oil-cake	1.032	2.401	1.039	1.581	1.951	1.836	1.742	6.371	7.672	16.826	15.603
Animals											
Camels	32.902	31.739	16.738	21.842	17.1756	22.627	1.659	1.702	0.782	4.631	5.673
Sheep	21.935	23.673	19.602	26.792	15.628	30.232	111.632	122.818	101.962	136.694	142.73
Goats	53.573	51.362	49.325	63.452	71.935	87.993	6.642	53.578	0.915	0.973	2.912
Cows	11.034	20.672	26.462	21.658	31.462	27.572	7.649	21.532	0.643	0.684	3.641

Our results are presented in Table 1 and Table 2. In Table 2 and Table 3, we compared the Sudan's comparative advantage of these agricultural products with other countries that have recently showed high productivity and higher market shares in the international trade.

The Tables above illustrate the RCA results for Gum Arabic, Cotton (Cotton, not carded and Cotton seed oil-cake) and Animals (Camels, Sheep, Goats and cows) over the recent period from 2000-2013. The Table also shows that the Sudan has a comparative advantage in the Gum Arabic ($RCA \geq 1$) for all the periods, it also shows the comparative advantage has decline between 2000 and 2007. That means the volatility of the productivity is decreased in these years. The Cotton products are also shows that Sudan has a comparative advantage in these products, and since 2012, the Cotton products showed higher than the previous years which refers to the efficiency of the Three Years Program. This confirms the results found by [14].

Further ECA analysis demonstrates that Sudan has comparative advantage in all animal products. However, these products have showed the volatility of the production and prices makes the comparative advantages difficult in the years 2011 and 2013 except the Sheep, which shows a higher comparative advantage due to fact that Sudan has experienced in this product long time ago.

Table 2. RCA Results for Sudan's Gum Arabic compared with Chad and Nigeria in 2013

Chad	Nigeria	Sudan
12.647	17.492	174.568

Compare Sudan with most exported countries, Table 2 shows that Sudan has a higher comparative advantage than Chad and Nigeria. The increasing demand for Gum Arabic, which used in the pharmaceuticals, soft drink and cosmetics industries, this makes the market more competitive.

However, Sudan has exported in 2012 about 50,000 metric tons and the quantity was increased due to fact that the efficiency of the government policies the productivity has increased to 77,000 metric tons in 2013, this data puts Sudan in the top of 80% market share, it expected to reach 100,000 tons by the end of 2014.

Table 3. RCA Results for Sudan's Cotton compared with China and India 2013

	Sudan	China	India
Cotton, not carded	12.347	273.672	112.043
Cotton seed oil-cake	16.826	485.227	189.562

The high production and prices helps Sudan to earn US\$104.5 million in 2013 compared to US\$91.2 million in 2012 [18].

For the table above, even though it has a comparative advantage, Sudan showed lowest among the cotton producers. In 2013, China (6,967,000 metric tons), India (6,641,000 metric tons), USA (2,811,000 metric tons), Pakistan (2,068,000 metric tons), Brazil (1,633,000 metric tons), Uzbekistan (904,000 metric tons), Australia (893,000 metric tons), Turkey (501,000 metric tons), Turkmenistan (327,000 metric tons) and Greece (298,000 metric tons) have leading the producing Cotton in the world. However, Sudan has produced 17605 metric tons in 2013 compared to 41440 metric tons in 2012.

5. Conclusion

This study has concentrated on the development of the comparative advantages of Sudanese agricultural products. We have known that nearly 70% of the Sudan's population lives in rural areas, where they earn their livelihood from agriculture, if we go back and review the development process of the national economy during the 1970s and until late 1980s, we will find that the agricultural sector output was accelerated economic growth, since the late 1990s, because mobilized labour transferred to non-agricultural sectors.

We have demonstrated that Sudan has many opportunities to regain it is comparative advantages for most of agricultural products. Consequently, whether other countries can compete in the same products that Sudan supposed to specialized in.

However, there is a need for building strategic for agricultural development; some people might ask question how we develop the agricultural sector with current lack fiscal and monetary policies?

For better or worse, the comparative advantage never remains constant every year unless the country has sustainability for producing these products in a high quality. On the other hand, if the Sudan concentrates on these products because has a highest productivity and high quality then the comparative advantage can remain.

Our work suggests that Sudan has to concentrate on these three agricultural products namely the Gum Arabic, Cotton and animal products because it has comparative advantages for many years and it beneficial to stimulate economic growth, decreases the inflation rate and creates new jobs, and eventually remains in the international markets.

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