



Sudan Gum Arabic Exports Composition: Changes, Causes and Implications

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Abstract

This study aimed to analyze the changes that occurred in the composition of Sudan's gum arabic exports and their causes and implications. The study depended on secondary data obtained from official government institutions for the period 1970-2016 which was divided into six sub-periods. Descriptive statistical analyses were done to analyze the changes in gum exports' composition. Also a One-way ANOVA analysis for the comparison of means was conducted in order to test the statistical significance of the changes in the export shares of hashab, talha and processed gum. The Results showed significant changes in gum exports composition in Sudan during the six sub-periods of the study. The study also found that the competition from Chad and Nigeria and the liberalization policy had a positive impact on talha gum export share, while the financial and administrative problems that faced the Gum Arabic Company had significantly increased processed gum exports share. In addition, the study found that these increases in talha or processed export shares were always at the expense of hashab exports. The changes that have occurred in gum arabic exports composition were expected to have environmental and economic implications. The environmental aspects would include the cutting of *Acacia Senegal* trees in the northern sandy soils of the gum belt with its negative impacts of more degradation and desertification. Economically, these changes in exports indicated abandoning processed gum production and exports which meant loss of employment opportunities and loss of value added from exports of processed gum. The study recommended that: 1) government policies related to gum arabic should be conducive to the revival of processed gum production in order to benefit from the value added from gum processing through the reduction of taxes and fees. 2) Sudan should make serious efforts to fight against and cancel the resolution that changed gum arabic specifications and included talha gum.

Keywords: Gum Arabic Specification, Hashab, Processed, Talha.

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Introduction

The most important non-wood forest product (NWFP) in Sudan is gum Arabic, an exudate

of either the *Acacia Senegal* tree, known as hashab or hard gum, or the *Acacia Seyal* tree, known as talha or friable gum. Both species

spread naturally in the central belt of the low rainfall savannah. The sandy soils of the western Sudan have pure stands of *Acacia Senegal* trees, while both *Acacia Senegal* and *Acacia Seyal* trees exist in mixed stands in the clay plains of eastern and southern Sudan. In addition to the significant role the gum Arabic crop plays in the country's economy, it plays an important role in rural life, providing a steady income for the rural families of the gum belt when other crops fail especially in the dry years.

The world market for gum Arabic is dominated by a few countries in terms of exports, re-exports and imports. The European Union is the biggest importer of gum Arabic (over 70 percent of world imports) followed by the United States. Within the EU, France, UK and Germany are the major re-exporters of processed gum. On the other hand, export of gum Arabic is almost exclusively African because it is mainly produced in the Nile River basin (Sudan, Ethiopia), the Lake Chad region (Chad, Nigeria, Cameroon, Niger, Central African Republic) and the Senegal River basin (Senegal, Mali, Mauritania). Economically speaking, gum Arabic mainly comes from Sudan, Chad and Nigeria.

Historically, Sudan was known to be a major gum exporter, producing more than 80 percent of the supply in the world market (Macrae (2002) Beshai, (1984) and Larson (1991)). This domination, however, has become less marked in recent years. Years of the Sahel drought (1970s -1980s) have led to erratic and low supplies of gum from Sudan and to a huge rise in prices that have choked off the demand for gum Arabic. As a result many clients turned to manufactured substitutes such as modified starches and celluloses and many importers began an effort to expand the available sources of gum Arabic in order to build a reliable and affordable supply. The technical properties of samples of gum Arabic from other African countries were assessed and the quality of gum Arabic

from Chad and Nigeria was found to be good; consequently, some importing companies started to be active in supporting the promotion of gum development in these countries (Coppin (1999)).

In the meantime a technique was developed to decolorize the naturally dark friable gum without damaging its attractive natural properties (ISC (undated)). This development opened new markets for friable gum in food and pharmaceutical applications which require colorless solutions. Market studies on gum Arabic suggest that the demand for friable gum has increased in recent years and is expected to increase further following the recent specification of gum Arabic by the Joint FAO/WHO Expert Committee on Food Additives (JECFA) which consolidated the position of gum from *Acacia Seyal* as a food additive (JECFA (1999)). The old definition had confined gum Arabic to the exudates of *Acacia Senegal* and closely related species. However, the new definition of gum Arabic according to JECFA is "the dried exudates from the trunk and branches of *Acacia Senegal* or *Acacia Seyal*, of the family leguminosae".

The increased demand for friable gum further opened the way for other African exporters that are specialized mostly in the export of friable (low quality) gum and Sudan currently faces a growing competition from Chad and Nigeria.

On the other hand the period 1970-2016 witnessed several changes in the export marketing of Sudanese gum Arabic. In 1969, the Government of Sudan granted the Gum Arabic Company (GAC) the exclusive right of exporting raw gum Arabic products; in 1995 gum Arabic export was partially liberalized through allowing the private sector to manufacture and export processed gum Arabic; finally, in June 2009, the government abolished the export concession right of GAC over raw gum Arabic and established the Gum

Arabic Council to liberalize gum Arabic trade in the domestic and export markets.

All the above local and international changes had a direct effect on the composition of Sudan's gum exports throughout the past decades. Consequently, this paper aimed to explore and analyze the changes that occurred in the composition of Sudan's gum Arabic exports during the period 1970-2016 and to study the causes and implications of these changes.

Materials and Methods

The study depended on secondary data obtained from official government institutions for the period 1970-2016. The data were related to gum export quantities for the three export components hashab, talha and processed gum. These export quantities were then transformed into export percentages according to the objectives of the study analyses.

Descriptive statistical analyses were carried out including graphical presentations (line graphs and bar charts) and statistical commentary (i.e. a discussion of the results). The total period was divided into six sub-periods according to common characteristics within each period based on observation. Subsequently, One-way ANOVA analysis was conducted in order to analyze the changes in gum Arabic export composition between these periods to test their statistical significance; this analysis is used to test the **Tukey-Kramer Critical Range Post Hoc Test**: this test indicates which populations' means are significantly different, e.g.: $\mu_1 = \mu_2 \neq \mu_3$. It is carried out if the null hypothesis of

claim that three or more populations' means are equal and the technique can be used only for [numerical data](#) Howell (2002). The one-way ANOVA is often followed by a post-hoc multiple comparison test to identify the populations whose means are significantly different from those of the rest of the populations.

However, before carrying out the One-way ANOVA test, hashab, talha and processed gum export percentages data were subjected to normality tests and homogeneity of variances tests which are pre-requisites for the One-way ANOVA analysis to be valid.

The ANOVA Model

The hypothesis test for analysis of variance for g populations is:

$$H_0: \mu_1 = \mu_2 = \dots = \mu_g$$

$$H_a: \text{not all } \mu_i \text{ (} i = 1, \dots, g \text{) are equal}$$

The F-Test in ANOVA: It can be shown that if the null hypothesis is true and there are no differences between the populations' means, the variance between groups (MS_B) and the variance within groups (MS_W) will be very similar. On the other hand, if the populations' means are different MS_B will be greater than MS_W . Therefore, the ratio MS_B/MS_W is a statistic that is approximately equal to 1 if the null hypothesis is true and larger than 1 if there are differences between the populations' means.

equal means is rejected by the F-test. It allows pair-wise comparisons and compares absolute mean differences with a critical range

$$\text{CriticalRange} = Q_U \sqrt{\frac{MS_W}{2} \left[\frac{1}{n_i} + \frac{1}{n_j} \right]}$$

where: Q_U = value from Studentized Range Distribution with (c) and (n - c) degrees of freedom for the desired level of α , MS_W = mean square within a group, n_i and n_j = sample sizes from groups i and j.

Effect size estimates: Maxwell and Delaney (1990) indicated that two categories of measures of effect size are commonly utilized in the literature: measures of strength of association (according to variance accounted for) and measures of effect size (according to group mean differences). These measurements attempt to estimate to what extent the degree

of difference or association is large enough to be of 'practical significance' Cohen (1962).

Effect Size to Measure strength of Association (Omega squared ω^2):

A measure of the strength of the association between the independent variable and the dependent variable in ANOVA is ω^2 , omega squared. Omega squared indicates the proportion of the total variance in the dependent variable that is accounted for by the levels of the independent variable. The formula for omega squared is:

$$\omega^2 = \frac{SS_B - (k - 1)SS_W}{SS_B + SS_W}$$

Effect Size According to Group Mean Differences:

Cohen's d = difference between sample means / pooled standard deviation:

$$d = \frac{M_1 - M_2}{\sqrt{\frac{[SD_1^2 + SD_2^2]}{2}}}$$

Where, d = Cohen's d value which represents the effect size, M_1 , M_2 = mean values of the first and second dataset, SD_1 , SD_2 = standard deviation of the first and second dataset. The sign of Cohen's d tells the direction of the effect. If M_1 is the experimental group and M_2 is the control group, then a negative effect

size indicates that the effect is a decrease in the mean while a positive effect size indicates that the effect is an increase in the mean. The table below contains descriptors for magnitudes of $d = 0.01$ to 2.0 , as initially suggested by Cohen (1988)^[10] and expanded by Sawilowsky (2009)^[11]

Table 1: Descriptors for Magnitudes of d

d	0.01	0.20	0.50	0.80	1.20	2.0
Effect size	Very small	Small	Medium	Large	Very large	Huge
Reference	Sawilowsky, 2009		Cohen, 1988			

Results and Discussion

Changes in Gum Arabic Exports Composition (1970-2016) and the Underlying Causes

During 1970-1991 (period one), and as shown in figures (1) and (3), Sudan exported raw gum Arabic only composed of hashab (89%) and talha (11%). hashab was the dominant export component accounting for more than 80% of Sudan gum Arabic exports, except in 1985 when it accounted for less than 50% of exports only and this was due to drought. During that period there was no strong competition from natural substitutes.

During 1992-1994 (period two), and as shown in figures (1) and (3), Sudan continued to export only raw gum Arabic similar to the

previous period and gum exports were composed of hashab (67%) and talha (33%). hashab was still the dominant component in gum Arabic exports, but there was a change in export shares by an increase in talha's share from (11%) to (33%) on average coupled by a decrease in hashab's share from 89% to 67%; this could be attributed to: 1) Sudan's response to the increase in gum Arabic exports of its main competitors, Chad and Nigeria, in the international markets and whose exports were mainly talha gum and 2) drought which affected hashab production adversely.

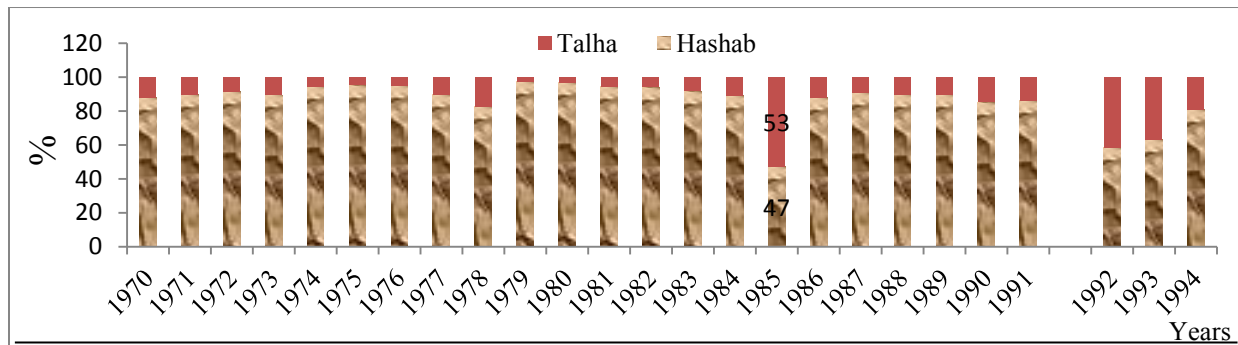


Figure 1: Sudan Gum Arabic Exports Composition during 1970-1994

Source: designed by the Researcher based on data from the Central Bank of Sudan and Gum Arabic Company (1970-1994)

The period 1995-2006 (period three) witnessed the introduction of processed gum in gum Arabic exports composition for the first time in 1995 after the partial liberalization policy made by the government in which the private sector was allowed to manufacture and export processed gum Arabic. Consequently, there was a change in the gum Arabic exports structure which now consisted of hashab, talha and processed gum. As shown in figures (2) and (3), hashab was still the dominant component in gum Arabic exports and the shares of the three gum export components were (55%), (21%) and (24%) for hashab, talha and processed gum,

respectively. Thus, the introduction of processed gum led to a negative change in the averages of hashab and talha shares compared to the previous period (-12% and -12%, respectively).

During that period JECFA initiated negotiations concerning gum Arabic specifications in an attempt to include talha gum besides hashab gum. These negotiations ended in 1998, and since 1999 a new specification for gum Arabic was determined which included talha gum besides hashab gum. The Gum Arabic Company opposed this new specification for gum Arabic and continued to focus on hashab exports; its exports of talha continued to be minimal not

exceeding 20% of its total gum exports. This acted as an obstacle to the strong demand for talha gum by the international importers of gum Arabic; thus, their only access to high quantities of talha gum from Sudan was through processed gum Arabic which was mostly from talha.

During period four (2007-2009) there was no change in gum Arabic exports structure compared to period three (hashab, talha and processed gum). However, this period witnessed the dominance of processed gum over the other two types of gum for the first time as shown in figures (2) and (3); processed gum constituted about 53% of total gum Arabic exports on average compared to hashab and talha gums which constituted 25% and 22% of gum exports, respectively. There was a huge negative change in the share of hashab exports (-30%), a small positive change in the share of talha exports (1%) and a huge positive change in the share of processed gum exports (+31%). The share of processed gum reached as much as 63% of total gum exports in 2009; this was the highest share achieved by processed gum throughout all the periods. On the other hand, hashab's share reached its lowest level ever in this same year 2009 accounting to only 10% of total gum exports.

Thus, period four showed a shift in competition, which in the past was exclusively between hashab and talha exports, to a new type of competition this time between hashab and processed gum exports.

The major changes that characterized the performance of gum exports composition during this period could be attributed to two main factors, namely, 1) the strong pressure exerted by a rising opinion in favour of abolishing the monopoly of the Gum Arabic Company on the exports of raw gum Arabic. 2) Administrative and financial problems that faced the Gum Arabic Company and led to weaknesses in its performance in raw gum exports.

Figures (2) and (3) show that period five (2010-2011) experienced a sudden large increase in hashab gum exports composition reaching as much as 80% of the total gum exports on average with an increase of 55 % compared to the previous period. This was accompanied by a decrease in the shares of processed gum and talha gum, accounting to only 6% and 14% of total gum exports on average, respectively. A huge drop could be noticed in the share of processed gum (47%) with a much smaller drop in talha's share (8%).

During that period a major change in the gum Arabic sector policies led to the above changes; in 2009 the Sudanese government, as expected, abolished the monopoly privilege that was formerly granted to the Gum Arabic Company on raw gum exports, and raw gum export activity was liberalized. However, opposite to expectations of an increase in talha exports based on international demand which concentrated on talha gum, it was hashab gum's share which increased while talha's share dropped slightly. This could be attributed to an inevitable transitional period during which new exporters could break in this sector and existing exporters could restructure their activity. At the same time, GAC probably owned large stocks of hashab gum which it started to get rid of during that period.

Figure (2) shows that the gum exports in period six (2012-2016) were composed of talha, hashab and processed gums with average shares of 61.3%, 38.1% and 0.6%, respectively as shown in figure (3). Thus, there was a sudden large increase in talha's export share (+47.3%) and it became the dominant gum export constituting more than 50% of the total gum exports. This was at the expense of hashab whose export share declined largely (-41.9%). Export activity in processed gum became negligible and it even stopped during 2013, 2014 and 2016. It could

be noticed that this period witnessed a shift in competition which in periods three and four was exclusive between hashab and processed gums to the exclusive competition between hashab and talha gums. Clearly, the main change that influenced gum exports during this period was that after the

previous transitional period which experienced a restructuring of the gum export sector it became completely liberalized and new exporters, individuals and companies, emerged. Consequently, Sudan gum export activity started to respond easily to the rising international demand for talha gum.

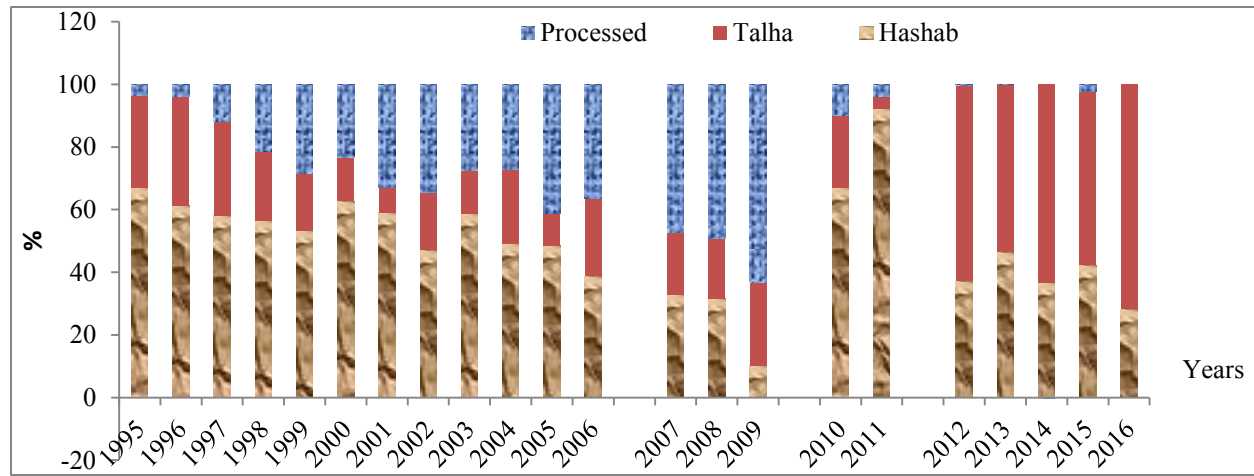


Figure 2: Sudan Gum Arabic Exports Composition during 1995-2016

Source: designed by the Researcher based on data from the Central Bank of Sudan (1995-2016) and Gum Arabic Company (1995-2008).

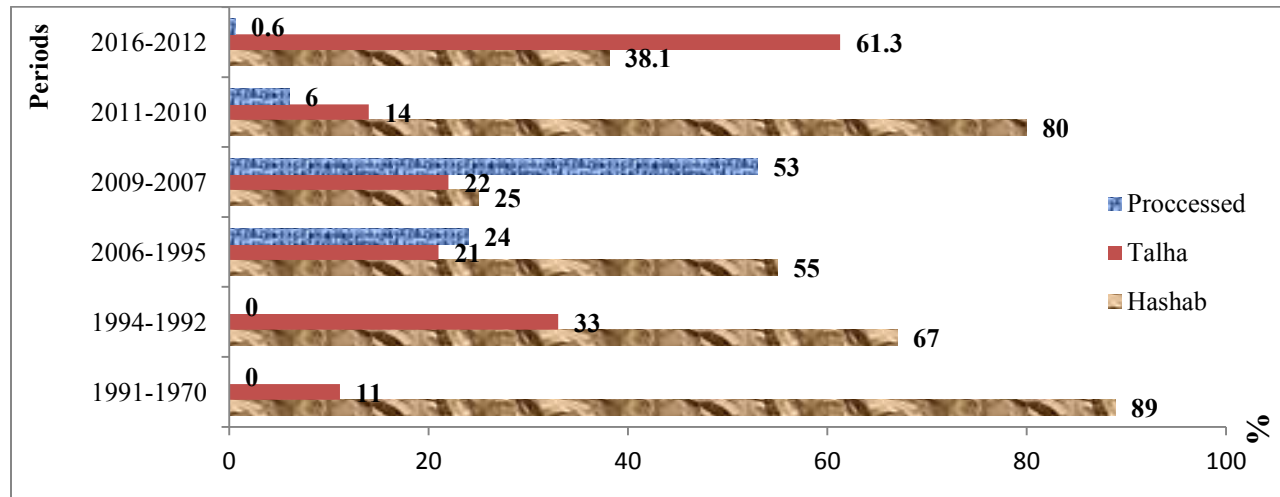


Figure 3: Average hashab, talha and processed Gum Exports Share for the Six Periods

Source: By the Researcher Depending on Data from Central Bank of Sudan (1970-2016) and Gum Arabic Company (1970-2008).

Significance of the Changes in Gum Arabic Exports Composition during 1970-2016

As shown above, the whole period of the study (1970-2016) was divided into six sub-

periods based on major changes that occurred in the composition of gum exports. A One-way ANOVA test for comparison of means was then conducted to analyze the statistical significance of these changes followed by an effect size test which indicated the practical significance of these changes.

For the F-test of the One-way ANOVA to be valid Levene's test for homogeneity of variances was conducted first. The results for Levene's test are shown in table (2); the insignificant p-values for hashab, talha and processed gum exports (at 5% level of significance) indicate a homogeneity of variances for all three products. Thus, an F-test would be valid.

Table (2) shows significant p-values of the F-test for hashab, talha and processed gum exports (0.000 for all three). Thus, a significant difference exists between two or more of the export means of the six periods

for each of hashab, talha and processed gums. This proves that significant changes have occurred in Sudan's gum Arabic export composition throughout the period 1970-2016.

Table (2) also shows the results for the Omega-squared test which measures association. Omega-squared values (ω^2) for hashab, talha and processed gum export percentages were 0.83, 0.71 and 0.72, respectively. This means that approximately 83%, 71% and 72% of the variation in the means for hashab, talha and processed gum export share, respectively, can be attributed to the grouping that has been carried out in this study. hashab gum export share had the highest ω^2 (83%) which means that hashab's export share was affected the most by this grouping.

Table 2: Results of Levene, F-test and Omega Squared Tests

Type	Levene	P-value	F	P-value	Omega Squared
hashab	.707	.829	46.476	.000	.828
talha	.424	.621	24.507	.000	.714
processed	3.116	.052	19.968	.000	.721

Source: By the Researcher Depending on Data from Central Bank of Sudan (1970-2016) and Gum Arabic Company (1970-2008).

Since the One-way ANOVA test proved the existence of a statistically significant difference between two or more of the means for each of the three gum Arabic export composition values, a Post Hoc Multiple Comparisons test (Tukey- Kramer) was then conducted for all three gum exports to determine which of the means of the six periods were significantly different.

It is known that the One-way ANOVA and the Post Hoc Multiple Comparisons analysis only test the statistical significance of the changes that occur in means. But in order to detect the implications of these changes from a practical point of view to see if they are real

changes, effect size analysis was subsequently conducted in this study.

Table (3) summarizes the results for the Post Hoc Multiple Comparisons and the Effect Size (Cohen's d) analyses in addition to the other results of the study. The following could be concluded from these results:-

1. The strong competition from talha exporters, Chad and Nigeria, in the international markets since 1991 led to a significant change in the gum Arabic exports composition during 1992-1994 compared to period 1970-1991 through significantly increasing talha's export

- share ($p=0.007$) and significantly decreasing hashab's share ($p=0.008$) (significant at $\alpha=0.05$). This is considered
2. talha). Despite this large change, however, hashab continued to be the dominant component in gum Arabic exports.
 3. The permission given by the government to the private sector to export processed gum in 1995 led to a change in Sudan gum exports structure, now consisting of hashab, talha and processed gum. This led to a significant change in gum Arabic exports composition during the period 1995-2006 compared to the period 1992-1994 through a significant increase in processed gum exports share ($p=0.012$) (significant at $\alpha=0.05$); this was a real
 5. remove its monopoly over gum exports. These factors led to significant changes in gum Arabic exports composition during this period compared to the previous period. A highly significant increase occurred in processed gum exports share ($p=0.001$) at the expense of hashab exports share which, in turn, faced a highly significant decrease ($p=0.000$). Both changes were of practical value with a huge effect size for hashab ($d = -3.05$) and processed gum ($d = 2.96$). The increase in talha export share wasn't significant ($p=1.000$) because of the small magnitude of this change (+1%). During this period, and for the first time, the dominance of hashab over gum exports ceased and processed gum became the dominant component.
 6. In 2009 the Sudanese government abolished the monopoly of the Gum Arabic Company on raw gum Arabic exports, and the period 2010-2011 was a transitional period that witnessed a restructuring of Sudan's gum export market. This led to significant changes in gum Arabic exports composition compared to period 2007-2009; there was a highly significant increase in hashab's
- to be a large change with a very large effect size ($d = -1.9$ for hashab and 1.9 for
- change with a huge effect size ($d=2.80$). This could be attributed to the large international demand for talha gum which was now met indirectly through processed talha exports. The decrease in hashab and talha export shares wasn't significant ($p=0.385$ for hashab 0.366 for talha); this was due to the small drop in the export shares of hashab (-12%) and talha (-12%). hashab continued to be the dominant item in gum Arabic exports.
4. During the period 2007-2009, the Gum Arabic Company faced administrative and financial problems as well as pressure to share ($p=0.000$) accompanied by a simultaneous high significant decrease in processed gum's export share ($p=0.000$). This represented a real change for both export components with huge effect sizes for processed gum ($d= -7.71$) and hashab gum ($d=3.65$). The decrease in talha's export share wasn't significant ($p=0.944$) because the increase in hashab's share was mostly at the expense of processed gum. Hashab gum regained its dominance over gum Arabic exports during this period.
 7. During 2012-2016 the gum Arabic export sector surpassed the transitional period of restructuring and the new export policy started to take its full effect. There was a significant change in the gum Arabic exports composition compared to period 2010-2011 which reflected the trend of the international gum Arabic markets that always favoured talha gum over hashab gum due to the lower prices of the former; thus a highly significant increase occurred in talha's share ($p=0.000$) at the expense of hashab's share which decreased significantly ($p=0.000$). This change was of practical value with a huge effect size for talha ($d= 4.38$) and hashab

($d=3.06$). The decrease in processed gum's share wasn't significant ($p=0.974$) because processed gum exports had already started to diminish and became minimal since the previous period after export liberalization. During this period talha gum replaced hashab gum in its dominance over gum Arabic exports for the first time.

Implications of Changes in Gum Arabic Exports Composition during 1970-2016

1) Environmental Consequences of Drop in hashab Gum Exports Share

8. *Acacia Senegal* has a remarkable adaptability to drought and frost^[12]. Although it is difficult to quantify the environmental benefits of *Acacia Senegal* land use system, a distinction can be made between benefits such as soil stabilization, water retention and nitrogen fixation which are to some extent 'internalized' through maintaining or enhancing the yield of field crops within the system and the more 'external' benefits such as dune fixation and large scale desertification control^[13]. Thus, the *Acacia Senegal* tree plays a very significant environmental role especially in the sandy soils of the north of gum belt where the tree is widespread and which are characterized by high levels of degradation. Therefore, if hashab export trend continues to decline for the favour of talha gum as indicated by the study results during the past years this could result in a replacement of the traditional *Acacia Senegal*-based agro-forestry system by a pure agricultural system since producers will be expected to cut *Acacia Senegal* trees in order to cultivate the more profitable field crops. Consequently this would have a negative environmental impact

making these areas more prone to degradation and desertification.

2) Economic Consequences of Stoppage of processed Gum Exports

9. The study results indicated that gum exporters have abandoned processed gum exports and confining their activities to exports of raw gum only. This is expected to be the trend at least in the near future. This will result in the closing of gum Arabic processing factories and the consequent loss of many employment opportunities for low skilled labor. In addition, Sudan will lose the value added from exports of processed gum which has much higher prices in the world markets compared to raw gum.

Conclusions

1) During 1970-1991 Sudan only exported raw gum Arabic with hashab dominating gum exports with a share of over 80%.

2) The strong competition from talha and its exporters in the international market during 1992-1994 led to a significant decrease in hashab's share and an increase in talha's share. This change in gum Arabic exports composition was of practical value with a large effect size. Sudan continued to export only raw gum Arabic and hashab remained as the dominant export component.

3) The introduction of processed gum in gum exports since 1995 represented a significant change in Sudan gum exports structure now composed of three export items. The export share of processed gum represented a real change for this new component with a huge effect size. Again hashab remained to be the dominant gum export component.

4) After 2006 the Gum Arabic Company faced administrative and financial problems and pressures to remove its monopoly. This led to a significant change in gum Arabic

exports composition with a significant increase in processed gum's share and a highly significant decrease in hashab's share.

Both changes had a huge effect size. Processed gum dominated gum exports for the first time.

Table 3: Results for Post Hoc Multiple Comparisons Test (Tukey- Kramer) and Effect Size Test (Cohen's d)

Type	Period	Causes	Change in Mean (%)	Dominant Export Component	Tukey-Kramer (p-value)	Effect Size (d-value)	Evaluation of Effect Size)
hashab	1 - 2	New Competitors in international Gum market	(-22)	Hashab	.008	-1.9	Very Large
talha	1 - 2		(+22)		.007	1.9	Very Large
hashab	2 - 3	Introduction of processed Gum in Exports	(-12)		.385	2.80	Very Large
talha	2 - 3		(-12)		.366		
processed	2 - 3		(+24)		.012		
hashab	3 - 4	Administrative and Financial problems in the Gum Arabic Company coupled with a pressure to remove Monopoly	(-30)	Processed	.000	-3.05	Huge
talha	3 - 4		(1)		1.000		
processed	3 - 4		(+29)		.001	2.96	Very Large
hashab	4 - 5	Monopoly Abolished. A	(+55)	Hashab	.000	3.65	huge
talha	4 - 5	Transitional Period	(-8)		.944		
processed	4 - 5		(-47)		.000	-7.17	Very Large
hashab	5 - 6	Liberalization took its Full Effect	(-41.9)	Talha	.000	-3.06	huge
talha	5 - 6		(+47.3)		.000	4.38	huge
processed	5 - 6		(-5.4)		.974		

Periods: 1=1970-1991 2= 1992-1994 3= 1995-2006
 4=2007-2009 5=2010-2011 6= 2012-2016

Source: By the Researcher Depending on Data from Central Bank of Sudan (1970-2016) and Gum Arabic Company (1970-2008)

5) In 2009 the Sudanese government abolished the Gum Arabic Company's monopoly on exports of raw gum Arabic, and 2010-2011 was a transitional period during which the gum export market was restructuring. There was a significant change in gum Arabic exports composition with a highly significant increase in hashab's share and a highly significant decrease in processed gum's share, both changes had a huge effect size. hashab gum dominated gum exports.

highly significant decrease in hashab gum's share; both changes had a huge effect size and talha gum exports dominated gum Arabic exports.

6) By 2012 the full liberalization of gum Arabic foreign trade had its full effect and a significant change in gum Arabic exports composition took place through a highly significant increase in talha's share and a

It could be noticed from the above results that hashab gum dominated the periods in which exports were not liberalized. However, this did not reflect the real international demand for gum Arabic which was always in favour of talha gum. Consequently, any periods that witnessed any level of export liberalization whether partial (through allowing private sector export of processed gum) or full liberalization (in 2009) witnessed negative changes in hashab's export share either through a reduction in this share or a

complete change through hashab losing its dominance for the benefit of either processed gum (mainly from talha gum) or raw talha.

Recommendations

In the short run: government policies related to gum Arabic should be conducive to the revival of processed gum production in order to benefit from the value added from gum processing. This could be achieved through reduction of taxes and fees imposed on this sector in order to reduce production costs and provision of an export subsidy privilege for processed gum exporters.

In the long run: Sudan should make serious efforts to fight against and cancel the resolution that changed gum Arabic specifications and included talha. This decision was intended to deprive Sudan of its distinct position in the world gum market and its absolute advantage in the production of hashab gum.

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تركيبة صادر الصمغ الصادرات العربي في السودان: التغيرات والأسباب والآثار

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المستخلص

هدفت هذه الدراسة إلى تحليل التغيرات التي طرأت على ترديّة صادرات الصمغ العربي خلال الفترة 1970-2016م وأسبابها وآثارها اعتمدت الدراسة على البيانات ثانوية تم الحصول عليها من المؤسسات الحكومية الرسمية للفترة 1970 - 2016م. أجريت تحليلات إحصائية وصفية لتحليل التغيرات في تركيبة صادرات الصمغ خلال فترة الدراسة تم تقسيم فترة الدراسة بأكملها إلى ست فترات فرعية، وتم إجراء تحليل أنوفا أحادي الاتجاه لمقارنة المتوسطات واختبار المقارنات البعدية وذلك لاختبار الدلالة الإحصائية للتغيرات في حصص تصدير صمغ الهشاب، الطلحة والصمغ المصنع خلال هذه الفترات الست؛ وقد رافق ذلك تحليل درجة الارتباط بين الفترات التي تم إنشاؤها والتغيرات التي حدثت في متوسط الصادر للمكونات الثلاثة لصادر الصمغ باستخدام اختبار مربع أوميغا. وأخيراً، تم تقييم الأهمية العملية لهذه التغيرات باستخدام تحليل حجم التأثير. أظهرت النتائج وجود تغيرات معنوية في تركيبة صادرات الصمغ في السودان خلال الفترات الفرعية الست للدراسة ووجدت الدراسة أيضاً أن المنافسة من تشاد ونيجيريا وسياسة التحرير كان لها تأثير إيجابي مع حجم تأثير كبير على حصة صمغ الطلح (عند مستوى معنوية 1%)، في حين أن المشاكل المالية والإدارية التي واجهت شركة لصمغ العربي كانت لها زيادة معنوية في حصة صادرات الصمغ المصنع (عند مستوى معنوية 1%) مع حجم تأثير كبير بالإضافة إلى ذلك، توصلت الدراسة إلى أن هذه الزيادات في حصص صادر صمغ الطلح أو الصمغ المصنع كانت دائماً على حساب صادرات الهشاب وبتأثير كبير الحجم. ومن المتوقع أن يكون للتغيرات التي حدثت في تركيبة صادرات الصمغ العربي آثار بيئية واقتصادية وتشمل الجوانب البيئية قطع أشجار الهشاب في التربة الرملية الشمالية لحزام الصمغ مع آثاره السلبية على مزيد من التدهور والتصحر واقتصادياً، فإن هذه التغيرات في الصادرات تشير إلى لتخلي عن إنتاج وتصدير الصمغ المصنع مما يعني فقدان فرص العمل وفقدان القيمة المضافة من صادرات الصمغ المصنع. أوصت الدراسة بما يلي: (1) أن تكون السياسات الحكومية المتعلقة بالصمغ العربي مواتية لإحياء إنتاج الصمغ المصنع للاستفادة من القيمة المضافة من تصنيع الصمغ من خلال تخفيض الضرائب والرسوم المفروضة على الصمغ المصنع من أجل تخفيض تكلفة الإنتاج ومن خلال توفير امتياز إعانة التصدير لمصدري الصمغ المصنع. (2) يجب على السودان أن يبذل جهوداً جادة لمكافحة وإلغاء القرار تغيير مواصفات الصمغ العربي ليشمل صمغ الطلحة. يهدف هذا القرار إلى حرمان السودان من موقعه المتميز في سوق الصمغ العالمي وميزته المطلقة في إنتاج صمغ الهشاب.