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Do grain reserves necessarily contribute to prices stability and food security in Sudan? An assessment

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Abstract Most governments in Africa implement policies aiming to stabilize the prices of staple foods, which often include building up grain reserves, besides other trade measures insulating their domestic market from the world market. The mechanism should ideally work as follows, grains should be bought and stored from areas, during the surplus seasons (after harvest) so as to assure fair prices to producers and should be distributed during deficit seasons, in deficit areas besides in cases of emergencies. However, ideal approaches are not necessarily followed in many developing countries due to different constraints and situations. The Strategic Reserve Corporation (SRC) is an institution that is established ten years ago to play such a role in Sudan. This paper tries to assess the performance of the SRC against the overall goals and to study the related obstacles if any. We use a sample of 112 respondents from the SRC staff, related and grain farmers as our data source. Results of the research revealed numerous financial and administrative constraints that obstruct SRC from playing the intended role, which need to be considered so as to contribute to price stability and food security in Sudan.

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1. Introduction

Sudan is a large African country with an area of 1.9 million square kilometers and considered the third largest strategic food reservoir in the world (Mohamed, 2011; Ahmed, 2002). Prior to its secession in 2011, Sudan has around 86 million hectares of high-yield arable land matched by abundant water resources. Its share of the Nile river system provides 1085 billion cubic meters of water annually, while rain-fall reaches on average 1000 billion cubic millimeters per year, both adding to seasonal streams, rivers and groundwater catchments (Jack, 1980). The secession of Southern Sudan has deprived the country of 25% of its total area, 24% of population, over 80% of

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its oil income, 75% of its vegetation cover and 30% of potential arable land. In addition, Sudan stands to tolerate at least 25% of its water resources (Mohamed, 2011).

Sudan has a diverse climatic condition from arid plains to savannah, forests and tropical south apart from land and water resources. Sudan has around 40 million acres of forests, 134 million herds of livestock, and its fisheries from the Nile and the Red Sea waters produce 110,000 tons of fish per year. It is considered one of the three countries in the world that can contribute to the international food security by resources endowment (Mohamed, 2011). The total cultivable area in the pre-secession Sudan is estimated at 85 million hectares, which is diminished by no less than 35% after separation. Nonetheless, less than 20% of this area is utilized in crop production under the major farming systems in the country, namely (1) irrigated sector, (2) mechanized rain-fed sector and (3) traditional rain-fed sector (Mohamed, 2011; Ahmed, 2004). The main food crops grown in the traditional rain-fed sector are sorghum and millet with sorghum being the staple food for the majority of the people in the entire country; while millet is the staple food in the western states particularly in Darfur. Wheat is also an important staple food in the Northern and central states. Grain production in Sudan is entirely influenced by rainfall because it is mainly produced by traditional rain-fed sector, hence, rainfall fluctuations are always correlated to supply and price volatilities and ultimately food unavailability.

The majority of Sudanese population lives in rural areas and depends on agriculture as a source of food, income and employment opportunities. The production of sufficient food does not only represent an important element for food security, but also has implications related to population movements such as rural urban migration. Despite the enormous resources at hand and the importance of the sector to the country and the surrounding region, Sudan does not produce enough food to feed its population (Mohammed et al., 2008).

Maintaining stocks of grain in the good harvest years to protect people from famines during the low harvest years has been found to be important and a common practice throughout the history. The earliest recorded instance was the biblical reference to the build-up of stocks by the ancient Egyptians during seven years of plenty to cover for the prophesied seven lean years (Mohammed et al., 2008). In modern times, the maintenance of strategic grain reserves, or food security reserves, stemmed after the prolonged drought that hit Sahel during the early 1970s, has resulted in a series of disasters throughout the region. The situation was even simultaneously aggravated by a worldwide cereal shortage which boomed food prices to record levels. With limited availability and high prices the donor community was only able to provide limited amounts of food aid; hence, many people in the region were exposed to famines and diseases (FAO, 2009).

The food crises of 1972–1974 and 1983–1985 that occurred in most parts of Africa showed how vulnerable are the lives and livelihoods there to droughts, hence, governments continent-wide revisited their food security policies. Therefore, providing food relief through the strategic reserve for people affected by food emergencies has become an increasingly important food-security instrument for most African governments over the past two decades (Asfawand and Sirry, 2008).

The Government of Sudan pursued a policy of intervention in grain markets for the first time following the 1984/85

drought that hit hard the country. The problem of food insecurity was magnified by acute shortage of production and inadequate infrastructure and transportation facilities. Consequently, the movement of grain stocks from the surplus production areas of central and eastern Sudan to the deficit areas of Darfur and Kordofan, which were hit hard by drought and armed conflicts was limited (Mohammed et al., 2008; Idris, 2004). The Agricultural Bank of Sudan (ABS) continued to undertake responsibility for the strategic reserve until 1992 when the liberalization policies were introduced. According to these policies, the free market mechanisms determine the supply, demand and prices of sorghum with no intervention from the Government. However, the sharp increase in prices of 1995/96 due to a record low production of only 2.4 million tons and the resulting huge food gap prompted the intervention of the Government. The ABS was used again as an instrument for purchasing, storing and distributing sorghum to the beneficiaries (Idris, 2004).

Agricultural production in Sudan is characterized by its seasonality and vulnerability to natural disasters which reduce productivity, hence decline the supply and increases in prices. In addition, political instability and economic sanctions contribute to fluctuation in the supply, exports and imports of food. During the three consecutive decades of 1970s, 1980s, and 1990s, there have been several episodes of food shortages in Sudan, which prompted a huge need for establishing the cereal strategic reserve (Mohammed et al., 2008).

The Strategic Reserve Authority (now Strategic Reserve Corporation (SRC) was established by a presidential decree on September 20th, 2000 as an autonomous body with a legal entity that is answerable directly to the Minister of Finance and National Economy. The main objectives were to: (1) build cereal reserves and make available the required finance in collaboration with the relevant institutions; (2) make the necessary precautions to bridge food gaps; (3) be responsible for storage facilities, replacement, distribution of reserves and (4) manage selling portions of stocks in local markets in cases of shortages and in export markets in cases of surplus. According to Mohammed et al. (2008), the specific mandates of the SRC include: (1) availing the finance needed to procure a strategic reserve of commodities; (2) coordinating with relevant institutions to ensure the availability and procurement of reserves of staple cereals and take the necessary actions to avoid food deficits; (3) determining the volume of reserves; (4) allocating, distributing and replenishment of reserves according to approved procedures; (5) selling reserves in the local markets of different states when there is a shortage of production and exporting the excess quantities when there is a surplus; and (6) increasing the storage capacity to absorb the increasing production and to fulfill the requirements of domestic markets.

Based on this background, this paper tries to assess the overall performance of this institution after 12 years since it was first established in 2000 against the above-mentioned goals. We investigate the level of satisfaction amongst related individuals represented by different cereal grain farmers as well as different related institutions involved in agriculture and food security in Sudan. In addition, we further enquire about any obstacles believed to be obstructing the SRC from playing the intended role in food price stabilization in Sudan, based on which the paper draws some policy recommendations.

2. Methodology

For the purpose of this study both primary and secondary data were collected and used. Primary data were collected using the structural questionnaire focusing on SRC senior and junior staff, representatives of the Agricultural Bank of Sudan (ABS), representatives of the Ministry of Agriculture and Forests (MOAF), and selected cereal grain farmers. A sample of 135 respondents were formed leading to a final number of 112 observations, which comprises 40 SRC staff members, 10 staff members from MAF, 5 staff members from ABS and 57 cereal grain farmers. To assure the representation of the entire cereal farmers' atmosphere throughout the country in the sample, farmers from five major cereal producing states are selected as follows: (1) 26% of the farmers are selected from Sennar state, (2) 23% are selected from White Nile State, (3) 19% are selected from Blue Nile State, (4) 18% are selected from Gedarif State, and (5) 14% of the farmers are selected from North Kordofan State.

In order to have a sample that represents a wide range of grain producers in Sudan, it is designed to account for grain producers across different agricultural subsectors in Sudan. Therefore, 80% of the interviewed farmers are from the mechanized rain-fed sectors, 18% from the traditional rainfed sectors and 2% are from the irrigated sector. The sample also considers differences in the farm size as 17% of the farmers have a farm size of about 100–500 feddans¹, 40% of the farmers have a large farm size of more than 500 feddans, and the remaining farmers' farm size is lower than 100 feddans. In addition, secondary data were collected from different relevant sources and descriptive statistics and trend analysis were applied to analyze the primary and secondary data mainly using SPSS.

3. Results and discussion

The main findings of the study reveal that only 33% of the interviewed respondents including staff members of the SRC, ABS and MAF besides the interviewed grain farmers believe that the SRC is doing fine and achieving its stated goals. However, the remaining 67% of the interviewed respondents mentioned that SRC has not achieved its objectives and is unable to narrow down food gaps in time. Moreover, responding to the questions related to the obstacles constraining the SRC from playing the intended role and complying to its mandates, the respondents believe that the following are the major constraints: (1) the lack of administrative autonomy; (2) financial dependency and poor financial resources; (3) absence of clear purchasing and reserve building policies; (4) irresponsible depletion of SRC reserves; (5) insufficient storage facilities for storing intended reserves; and (6) unfair distribution policies in connection with politically and socially influenced distribution mechanisms.

The lack of administrative autonomy is manifested by SRC's lack of delegation of power and insufficient information about the exact amount of production, stocks available and forecasted prices so that, the timely decisions would be taken in connection with grain purchases, distribution and replenishment. The financial dependency and poor financial resources of the SRC are reflected in the late release of budget items from

the MFNE which affects the time of grain purchases, therefore, purchases are made in different portions, different payments and different prices, which do not assure that reserves are built at lower costs and with less harms to farmers and suppliers.

3.1. Purchasing grain reserves

One of the obstacles is the absence of clear purchasing and reserve building policies as the SRC purchasing policies are mainly planned by the MFNE in addition to the SRC. This process involves several investigations and administrative steps including (1) determining the size of the required reserve to be purchased, which depends on assessing the extent of the existing food gap; (2) determining the deficit regions; (3) determining surplus regions and size if any; (4) determining the purchasing price; and (5) approving the budget by MFNE depending on the funding possibilities and assigning purchasing mechanisms. By inquiring about the participation of SRC's staff in the design of policies and decision making, only 7% of the interviewed staff members have confirmed their participation in relation to the SRC purchasing policies.

One of the most important determinants of the successful grain reserve building that contributes to price stability is the time of purchases. In response to the study's question about the desired time for SRC to intervene and make purchases, 84% of the interviewed farmers agreed that it should be made right after the harvest (Fig. 1). This is explained by the fact that farmers are forced to fulfill loans taken to pay for the agricultural inputs, which if not paid immediately in cash to lenders, would be taken in kind valued at extremely low and unfair prices. In this regard however, 88% of the farmers have confirmed that, the SRC purchasing process does not usually take place in time allowing many brokers and middlemen to enter the market and purchase the grain harvests from the farmers at lower prices, which afterward, they resell to the SRC at higher prices. This leads to a double loss as the SRC purchases at higher prices and farmers sell at low prices, hence the SRC can hardly contribute to grain price stabilization (Fig. 1).

Based on the untimely purchasing policies of the SRC, all our study's respondents agreed that the SRC purchasing has negative effects on the producers as the product will be on the hands of traders at the cost of producers. 92% of the respondents confirmed that this process forces the producers to sell their product at extremely low prices, while 78% of the respondents mentioned that producers are trapped in big losses and debts and 73% of the respondents thought that this might get producers out of the agricultural production.

Due to the unclear procurement policy adopted by the SRC particularly in connection with purchasing the grains from the local markets during the surplus (harvest) period, the SRC was found to lose an amount of 180,883 tons of sorghum in 2005. In this specific instance, 100,000 tons of sorghum were imported from India to compensate the deficit in the domestic market in that year (Mohammed et al., 2008).

As shown in Box 1, the imported grain was imported at the cost of SDG 7 million according to domestic equivalent in the same year, while a quantity of 180883 tons would have been purchased at the same cost considering the 2004 price, which would have generated an additional surplus of 80883 tons for the country and the SRC.

¹ 1 Feddan = 0.42 Hectares.

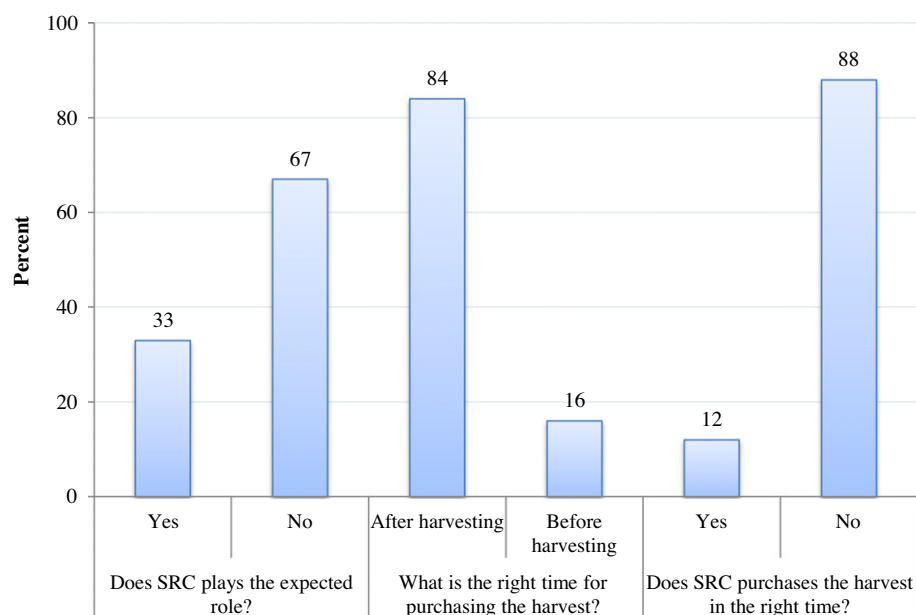


Figure 1 Respondents' assessment of the SRC roles.

Box 1 Local versus imported grain procurement in 2004/05. Iyman (2005).

Targeted Quantity	100,000 tons of sorghum	<i>Domestic equivalent</i>
Import price (CIF)	242 US\$/ton	<i>55 SDG^a/sack</i>
Costs per imported sack	Import-related costs: 36 US\$/tons	<i>8 SDG/sack</i>
	Transport costs	<i>1.64 SDG/sack</i>
	Other costs	<i>5 SDG/sack</i>
Final price (SDG/Sack) at SRC stores		<i>69.64 SDG</i>
Total costs (100,000 tons) in SDG		<i>100000 ton × 10 sack × 69.64 SDG = 69640000</i>
Domestic Sorghum price in 2004		<i>385 SDG/ton (38.5 SDG/sack)</i>
Equivalent quantity to be purchased from local market		<i>696,400,0/385 = 180883 tons</i>
SRC actual loss		<i>180833 – 100000 = 80833</i>

^a The SDG is the Sudanese Pound. 1 SDG = US\$ 0.37 as of February 26, 2012.

There are various methods the SRC adopts to purchase grains including direct purchase, deferred payment, importing and collection of debts from agricultural projects. In the direct purchasing method, the SRC buys cereals directly from the

producers. However, as shown in Table 1, this method constituted less than 2% of the total domestic production during the period between 2001 and 2007. This could be constrained by the fact that, the SRC's direct purchases depend on the

Table 1 SRC purchases of cereals (2001–2007). SRC (various issues).

	2001	2002	2003	2004	2005	2006	2007
Amounts purchased (1000 tons)							
Total production	3305	5219	3738	5857	3623	5418	6294
Direct purchases	40	29	15	56	29	72	127
Deferred purchases	0	85	109	0	29	210	89
Imports	100	0	0	0	100	28	0
Collection of debts	8	14	0	0	0	0	0
Total amount purchased	148	128	124	56	158	310	216
In percentage of the total domestic production							
Direct purchases	1.2	0.6	0.4	1.0	0.8	1.3	2.0
Deferred purchases	0.0	1.6	2.9	0.0	0.8	3.9	1.4
Imports	3.0	0.0	0.0	0.0	2.8	0.5	0.0
Debts	0.2	0.3	0.0	0.0	0.0	0.0	0.0
Total purchases	4.5	2.5	3.3	1.0	4.4	5.7	3.4

approved and available funds at the MFNE and considering the production surplus at the time.

The SRC always resorts to deferred purchase when there was surplus in production and default in self-financing during harvest time. Under such circumstances large quantities of grain will be grabbed by the banks and large traders. Deferred purchase is performed by credit letters for one year or through permanent orders from large traders and banks. Table 1 shows that, deferred purchase represents the major component of the total amount purchased by the SRC. It represented 88%, 70% and 64% of the total amount purchased in 2003, 2006 and 2002, respectively. Nonetheless, deferred purchases do not help or protect small producers because these purchases do not take place right after harvest, where the prices are very low.

SRC tends to import grains if the domestic production is low and their grain reserves of the past years are inadequate. In 2001 and 2005, the SRC imported grains to fill out the domestic food gaps, which were prominent in several states and more specifically dominant in Kordofan and Darfur. In 2003, the production was only 373.8 thousand tons; however, there were no imports due to the availability of previous years' reserves. Nevertheless, the importation of 28 thousand tons of grains in 2006 despite a yearly production amounting to 5418 thousand tons is cited as an example of the absence of appropriate purchasing policies at the SRC.

The last purchasing method followed by the SRC is the collection of debts from agricultural projects. These debts were a sort of finance provided to national agricultural projects by MFNE for cleaning the irrigation canals and purchasing agricultural inputs. The SRC takes the responsibility of collecting these debts in kind on behalf of the MFNE on the one hand, and to maintain part of its strategic reserve, which is ultimately paid for by the MFNE. The collection of these debts depends on the size of production and the purchase price of strategic reserve, which is usually announced by the government. Accordingly, the more remunerative the prices are from the producers' view point, the higher will be the collection of debts, but lower the future distribution prices for both SRC and the ultimate cereal consumers.

3.2. Distribution of reserves

As depicted in Fig. 2, both SRC's purchase and distribution show increasing trends for both over time. On average,

distribution increased by about 20,000 tons over the period between 2001 and 2007, while the purchase increased by 16,000 tons during the same period (Fig. 2). In addition to selling grains in the domestic markets, the SRC distributes certain amounts at no cost to poor and vulnerable segments of the population particularly during crises. However, 89% of the study's respondents thought that the free of charge distribution of grains by the SRC could lead it to run out of financial resources, hence, its inability to perform in the long-run.

As the distribution of cereals surpasses their purchases, this might ultimately lead to reserves' depletion if not rationally governed by the situation on the ground in terms of production and demand. As shown in Fig. 2, the year 2006 could be shown as the year when the SRC has irrationally behaved as production was high, and distribution was low, which could be considered as a surplus year, however, there were imports of 28 thousand tons of grain.

3.3. SRC storage facilities

It is essential to have grain stores in the producing regions as well as in the major consumption areas, i.e. storage facilities have a similar importance in the surplus as in the deficit areas. There are different methods of grain storage in Sudan with varying efficiencies including above ground and underground facilities. Both types include traditional and modern storage facilities. However, large amounts of grain are lost during post-harvest operations such as threshing, cleaning, storing and transportation. Evidently, this is due to the poor traditional harvesting and storage methods as well as the inadequate threshing tools. Grain losses in the traditional stores can reach 50%, they range between 5% and 13% for modern storage facilities; 6% in the underground pits and only 1% in silos (Eltay, 2005).

The SRC has long suffered and still so from the insufficient storage capacities as well as the lack of required standard in many of its traditional stores. These stores lead to rapid deterioration of the quality of stored grains accompanied by the high cost of fumigation and other preservation processes. Since 2001, the SRC has been trying to obtain funds for establishing adequate stores that decrease the storage costs and provide sufficient capacity. In 2005, the corporation contracted with Chinese company (EMEC) to build a silo in Rabak city with a capacity of 100,000 tons at a total cost of US\$ 27.4 million.

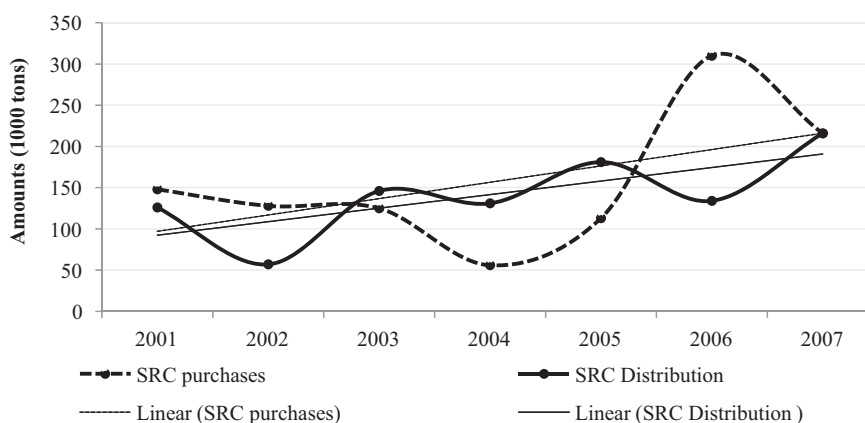


Figure 2 SRC's grain purchases and distribution (000 tons), 2001–2007. Source: SRC (2001–2007).

The establishment of the silo has started in 2007 and the building was finished in 2010. Similar efforts were also allocated to purchasing and establishing other silos and quality stores in Kosti Nyala, El Fasher and Elgunaina, which are expected to significantly improve the SRC storage capacity and contribute to price stability.

The SRC plans to establish a reserve of 600,000 tons of grain, however, 67% of this study's respondents see that building these reserves is beyond the SRC's financial ability since it lacks the adequate fund for purchasing the amounts as well as the required storage facilities. The annual total silo costs for storing such amount are estimated to be SDG 12.5 million (US\$ 5.8 million). That is because the costs besides re-packing and transportation to deficit area include annually about SDG 950.4 thousand for rent and SDG 3000 thousand for fumigation costs, which account in total for SDG 12.5 million/year (US\$ 5.8 million).

3.4. Transportation of grains

Transportation of grains is one of the challenges facing the SRC due to the huge distance between the production surplus and food deficit areas within the country. The transportation costs are particularly higher if the grains are to be transported to conflict areas that are associated with food deficits and population vulnerability, but also with uncertainty and risks with respect to transportation. Similar situations are also associated with areas affected by flooding excessive rains given the very limited paved roads.

The SRC distribution of cereals is also influenced by political aspects and social relations as 78% of the SRC staff agreed that the distribution mechanisms applied by the SRC are extremely affected by political situations and social relations. The respondents relate that to the nature of communities in Sudan where policies and social relations are not separated from the entire decision making process. They assume that tribal and family linkages influence the decisions of a majority of the population in the country not only at the individual level, but also at institutional levels. Some respondents also thought that the SRC is constrained from playing a better role by its complete financial dependency on the state represented by the MFNE.

4. Concluding remarks

In this paper, attempts have been made to study the state of food grain reserves in Sudan with particular focus on assessing the performance of its responsible body, which is the Strategic Reserve Corporation (SRC). Description of the roles played by the SRC is presented, with the focus being on its establishment objectives and their assessment against the performance on the ground during the last decade. It is clear from the investigations and findings that the SRC objectives and mandates are so wide and contradicting; therefore, it is difficult to achieve them within the existing budget, administrative structure, and targeting mechanism. The study recommends that the SRC should limit its roles to building up the grain reserves from the surplus generated during the harvest time, which could be used as a mechanism of fair price assurance for

producers as well as for closing or narrowing the food gaps during the periods of food shortages and to provide emergency assistant to vulnerable groups. In order to achieve these goals, the following should be considered. (1) SRC should be administratively and financially autonomic depending on highly efficient administrative and technical cadres who as well consider investment opportunities within the overall mandate to improve and sustain its financial independency; (2) clear grain procurement, distribution and reserve replenishment policies that prevent domestic food market distortions and are independent from any political and social influences need to be developed; (3) the SRC should focus on establishing an effective information system for stocks, domestic production, and domestic and international food prices. It also needs to strengthen its coordination with other related government institutions, domestic and international organizations working on grain purchase, food aid and food security; and (4) the SRC needs to assure the availability of standard sufficient storage facilities that consider different kinds of grains and the surplus and deficit areas in order to reduce transportation costs, assure grain quality and timely action in purchases and distribution. The establishment of quality storage facilities in surplus and deficit areas would also help in avoiding the challenges evolving from transporting the grain during the rainy or droughty seasons as well as during conflicts.

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