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Armed Conflict and Business Operations in Sudan

Survey Evidence from Agri-food Processing Firms

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ABSTRACT

This study assesses how agri-food processing enterprises have been affected during the first 3 months of the on-going conflict in Sudan between the Sudan Armed Force (SAF) and the Rapid Support Forces (RSF). The food processing and beverage manufacturing sector plays a significant role as a source of food, employment, and value addition in Sudan. Thus, the ensuing conflict will have both direct and indirect negative consequences to livelihoods and food security. We collected data from representatives of food processing and beverage manufacturing companies throughout Sudan via web-based interviews. The findings highlight the immediate implications of the conflict on the agri-food processing and manufacturing sector. The impact of the conflict has immediately extended beyond direct destruction of the infrastructure and equipment of the firms to cause serious negative employment effects. Furthermore, it led to a growing scarcity of the key material inputs/raw materials and an associated spike in the price of these key ingredients to the production processes. We discuss the implications of these findings vis-à-vis the fluid nature of the continuing conflict and propose some options in preparations to rebuilding the agri-food enterprises once the cessation of hostilities and the end of conflict is achieved.

Key words: Sudan conflict, agri-food firms, employment, SAF, RSF, operation.

1 INTRODUCTION

Armed conflict broke out on April 15th, 2023, in Khartoum between the Sudan Armed Forces (SAF) and the Rapid Support Forces (RSF). The conflict has resulted in tragic losses of lives, unprecedented human suffering, and caused massive damage to Sudan's infrastructure. This disrupted economic activity It and inflicted devastating impacts on civilians (UN-OCHA, 2023a, Abushama et al., 2023). while it displaced close to 3 million people (2.4 million internally and about 650,000 refugees to neighboring countries), the conflict also led to deaths of more than 2000 people and (UN-OCHA, 2023a, 2023b). Meanwhile, there has been an alarming increase in the number of sexual assault cases across the country.

The unfolding conflict has major implications on the different domains of the Sudanese economy. Besides the political and humanitarian crises, the scarcity of goods and public services, the degraded purchasing power and surging inflation have collectively contributed to economic contraction (Elamin, 2023). Furthermore, the loss of key infrastructure and disruptions to domestic and international trade have also disrupted production and reduced agricultural activities.

The food processing and beverage manufacturing sector plays a significant role as a source of food and employment and value addition in Sudan. The disruption of their activities due to the conflict is likely to reduce the supply of food and jobs in the economy. In this study, we provide an immediate assessment of how agri-food processing and manufacturing enterprises have been affected during the first 3 months of the on-going conflict. Specifically, we provide highlights on the operational status, access to and cost of material inputs, access to markets, and employment. Besides, we present the perceptions of the firms on expected time for resumption of "normal" operations.

The remaining paper is structured as follows: Section 2 provides a background on the agri-food processing sector in Sudan. Section 3 describes the methodological approach used in this study. Section 4, which presents and discusses the results, characterizes the various food processing and beverage manufacturing enterprises, identifies the operational status and consequently discusses the likely implications on the revenues and the changes in access to and costs of production inputs. The results section also identifies the possible employment effects by assessing how workers/employees have been affected and looks at the magnitude of the damage to the firms' infrastructure as well as the firms' perception on they would be able to return to normal operations. Section 5 summarizes the results, provides an outlook and policy implications in relation rebuilding of agri-food enterprises and loses by highlighting the limitations of the study.

2 THE AGRI-FOOD PROCESSING AND MANUFACTURING SECTOR IN SUDAN

Primary agriculture (on-farm activities) generates about 20 percent of total Gross Domestic Product (GDP) of Sudan based on detailed data from 2019, while employing close to 50 percent of the total labor force (Diao et al., 2023). However, considering the entire agri-food system[1] (primary and off-farm agricultural activities), these contributions increase to 34 percent and 58 percent, respectively. This

[1] The agri-food system is a network of economic actors connected by their differing roles that include providing supportive services and inputs to producers and processors and in managing the supply, processing, marketing, and consumption of agrifood products.

shows the significance of the off-farm component of the agri-food system in Sudan and implies that for every dollar of GDP generated on the farm, an additional 70 cents of GDP are generated off the farm. A large portion of this off-farm GDP is from agri-food processing, where labor productivity measured in GDP per worker is much higher than for the whole agri-food system - USD 6,301 per worker versus USD 1,554 per worker, respectively (Diao et al., 2023). In other words, the off-farm components of the agri-food system alone contribute 14 percent and 8 percent to GDP and employment, respectively. These components are agri-food processing (contributes 4 percent and 2 percent to GDP and employment, respectively), trade and transport (6 percent and 5 percent), hotels and food services (3 percent and 1 percent), and input supply (1 percent and 0.3 percent) (Diao et al., 2023).

Agri-food processing in Sudan is mainly directed towards the domestic market for local consumption, with little and specific value-added food products set for international trade. Food manufacturing processes in Sudan are largely tied to the agricultural sector, with the primary agricultural sector providing many essential raw materials and input products for the most important processed foods such as sugar, beverages, textiles, leather, and others (World Bank 2021). The agri-food processing and manufacturing sector remains limited in terms of the variety of value-added products. The agri-food processing industry is dominated mostly by sugar and some flour mills, leaving high unleashed potential in processing of other goods such as meat and oils at a larger scale (World Bank 2021). Particularly, for at least three of Sudan's key exports there is significant potential to increase value-added of exports. Sheep, goat, and gum Arabic have considerable potential in terms of product upgrading, which paves the way for increased job creation and pricing upside for export commodities, while scaled commercial processing is limited to specific commodities, leaving room to explore other areas (World Bank 2021).

Investigating the performance of the agri-food system in Sudan during the period from after the secession of South Sudan to just before the start of the global COVID-19 pandemic (2011-2019) by Diao et al. (2023) reveals a modest growth that is mainly driven by the expansion in domestic market-oriented value chains. It also shows that the sector's supply of processed foods remains below the demand for agri-food products. The agri-food processing sector constitutes 10 percent of agri-food exports while household demand for processed foods accounts for 27 percent of total agri-food demand (Diao et al., 2023),.

The contributions of agri-food processing to GDP and employment in Sudan is about one third of its contributions in neighboring countries like Egypt and Kenya (World Bank 2021). This could be attributed to the sector's focus on primary processing and low-level value-added operations. The private sector's extensive presence is within the primary processing level, and is mostly comprised of SMEs, operating in bakeries, animal feed, edible oils processing, meat and poultry processing, livestock rearing and transport, horticultural products and transport, and others (World Bank 2021).

The agri-food processing sector faces multiple constraints including the low productivity of primary agriculture , weak infrastructure and transport facilities, macroeconomic downturns affecting inflation rates and market prices, and limited knowledge and market information dissemination. (World Bank 2021). Moreover, due to the high demand for agri-processed goods, and the intertwined constraints related to unleashing the potential of agri-food processing in Sudan, the sector is a net importer of agri-processed goods with 85 percent of agri-food imports being processed foods (Diao et al., 2023).

3 DATA AND METHODS

3.1 Data and Methodology

This study was designed to monitor and assess the early impacts of the conflict on the operations of the food processing and beverages manufacturing sector in Sudan. The analysis covers a sample of 15 firms. The data collection process was implemented via an online tool both in English and Arabic that was deployed on the last week of June. The instrument contained a total of 15 anonymized questions covering the various themes discussed in the subsequent sections. A total of 18 companies, active in agri-food processing sector were identified and contacted. Using snowballing approach, the firms that received the survey link were also asked to forward it to any other company or companies that they may be in contact with. The aim was to reach as many firms as possible. Following this approach and accounting for companies whose render unreachable due to the war, a total of 15 company representatives responded to the questionnaire.

3.2 Food and beverages sector profile

This sub section outlines the basic characteristics of the surveyed firms, i.e., firm size -following the Standard Industry Classification (SIC)-, type of ownership, type of product(s) the firm produce and States where the main operations (processing or manufacturing plants) are located.

Results reveal that the surveyed firms are diverse with respect to the main location where they are operating. Table 1 shows that 57 percent of the firms operate in Khartoum alone, while 36 percent operate in Khartoum and another State. This confirms that Khartoum is the processing and manufacturing hub in Sudan.

Table 1: Main location of firms' operations

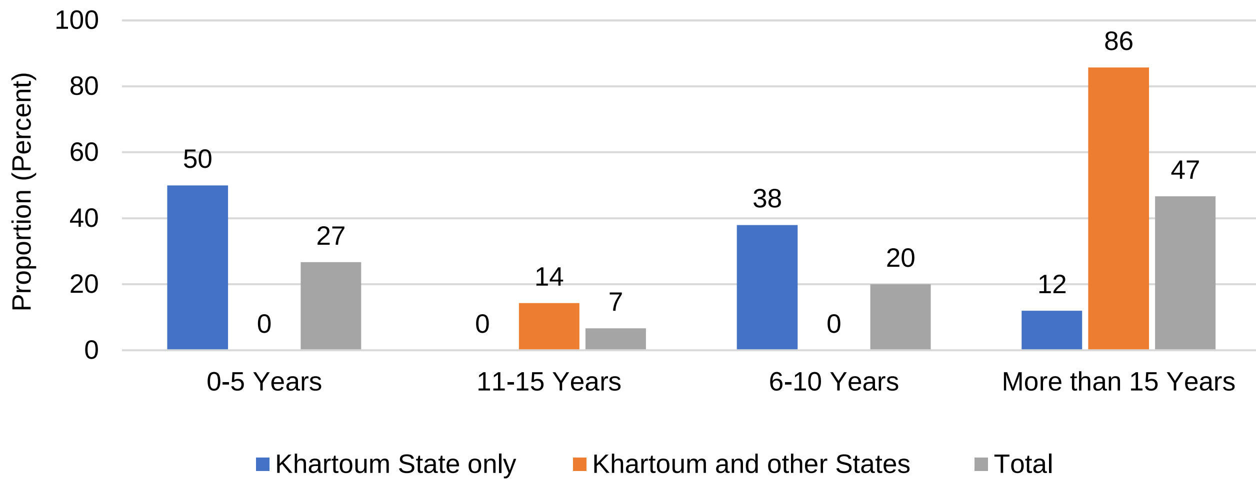
Location: State(s)	Number of firms	Proportion of firms
1. Khartoum	8	57.1
2. Khartoum and Other States	6	35.7
a. Khartoum and Al Jezira	1	6.7
b. Khartoum and White Nile	1	6.7
c. Khartoum and East Darfur	1	6.7
d. Khartoum, White Nile and Sennar	1	6.7
e. Khartoum, River Nile and Northern State	1	6.7
f. Khartoum, Al Gaderif, White Nile, North Kordofan, East Darfur, Sennar and Northern State	1	6.7
3. West Kordofan and Sennar	1	6.7
Total	**15**	**100**

Source: Authors' compilation based on firms' survey data.

Only 7 percent (or 1 firm) of the firms that responded have their operations entirely out of Khartoum (both in Sennar and Northern State) (Table 1). This indicates that although the main processing and manufacturing facilities could be located in one State, the distribution of products is countrywide and sometimes internationally.

Characterizing the firms by their years of operation, suggests that 27 percent of the firms were established during the last five years, while 47 percent are in operation for more than 15 years (Figure 1). Within the Khartoum State, 50 percent of the firms were established within the last 5 years while 38 percent are established before6-10 years and 12 percent were established before more than 15 years. On the other hand, with the in experienced firms' group (more than 15 years of operation), the overwhelming majority (86 percent) are operating in Khartoum and other States or elsewhere and not in Khartoum are quite old (more than 15 years). This indicates that firms mostly start in Khartoum and extend their operation in other states as they gain more experience.

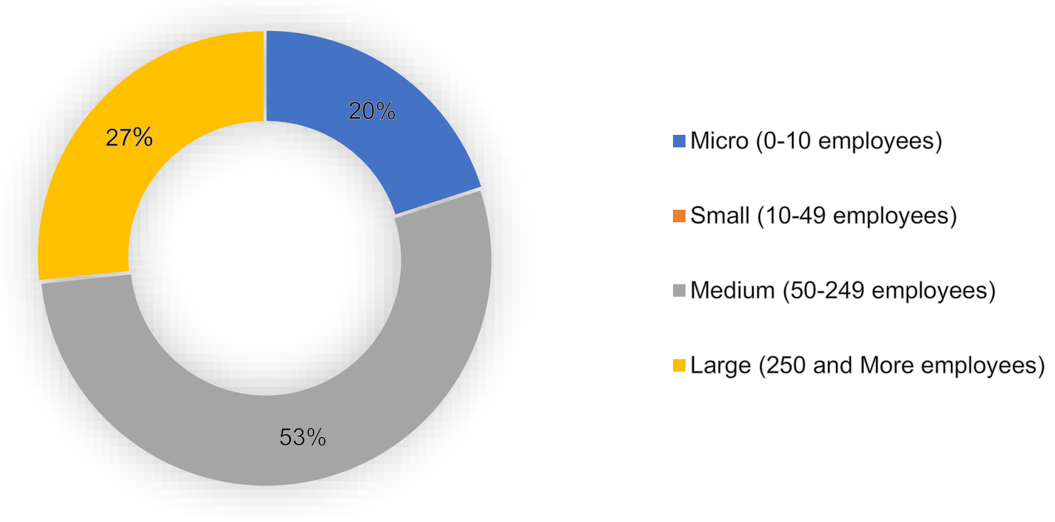
Figure 1: Firm's years of operation



Source: Authors' compilation based on firms' survey data.

Another defining characteristic of these enterprises is their diversity in terms of their sizes. Following the SIC, most of the firms (53 percent) under our assessment are medium-sized enterprises employing about 50-249 people (Figure 2). Another 27 and 20 percent of the firms are considered large and micro firms, respectively. Large firms usually employ more than 250 people while the micro firm employ up to 10 employees (Figure 2).

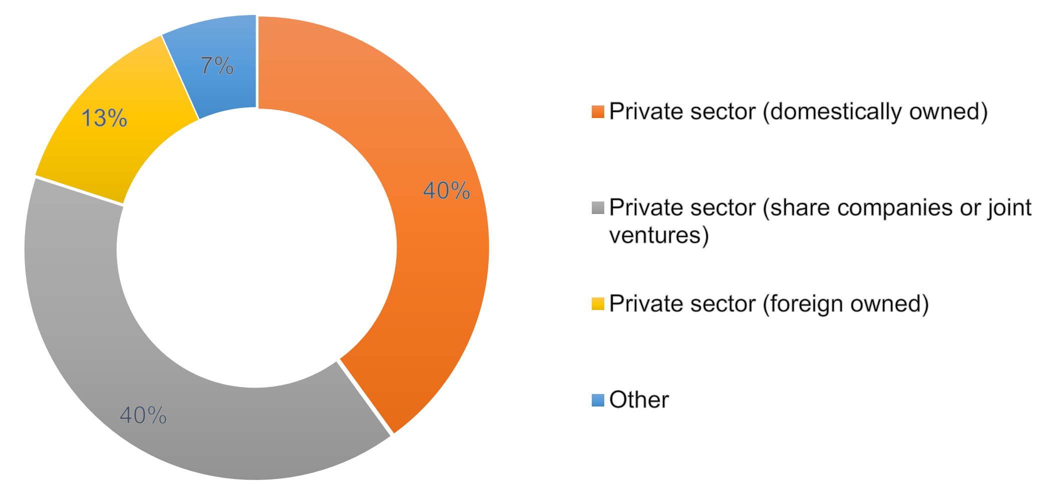
Figure 2: Firm size



Source: Authors' compilation based on firms' survey data.

The ownership structure presents a diverse picture of the agri-food firms. While a majority are private sector firms owned locally (40 percent) or shared ownership or joint venture (40 percent), 13 percent of the firm are foreign owned (Figure 3). Besides, some of the firms are also owned by farmers' cooperatives.

Figure 3: Type of ownership of the agri-food firms



Source: Authors' compilation based on firms' survey data.

The agri-food processing firms in Sudan produce a wide range of products. While some firms produce a single product such oil or sugar, others produce multiple products such as meat and dairy. The most popular products that are produces by a larger share of companies are fats and oils (produced by 33 percent of firms), meat products (27 percent) and non- processed crop (grains, legumes, and or horticultural crops) which is produced by 20 percent of the firms (Table 2). Other product produced by a singular company include dairy products, grain/milling products sugar and confectionery products and animal feeds (Table 2).

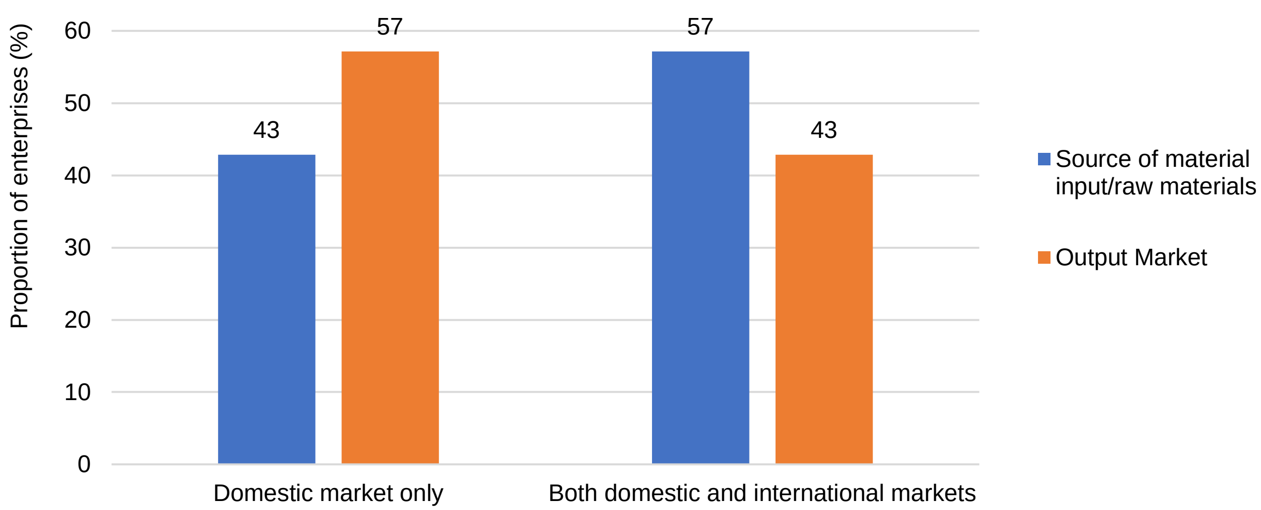
Table 2: Product types produced by agri-food firms in Sudan

Products	Percentage of firms
Fats and Oils	33
Meat Products	27
Grains, Legumes, Horticultural crops (non-processed)	20
Miscellaneous Food Preparations and related Products	13
Live animals	13
Dairy Products	7
Grain/Milling Products	7
Sugar and Confectionery Products	7
Animal Feeds	7
Other	27

Source: Author's compilation based on firms' survey data.

The firm source their input material from different sources and sells their product in different markets. They operate in different locations (states) but acquire the raw materials both locally and internationally (Figure 4). The survey data show only 43 percent of the firms sourcing their material inputs exclusively from the domestic market, while 57 percent of them source their material inputs both domestically and internationally. For the market where products are sold, most of the firms (57 percent) sell their products in the local market, while 43 percent sell both in the domestic and international markets.

Figure 4: Input and output market destinations



Source: Authors' compilation based on firms' survey data.

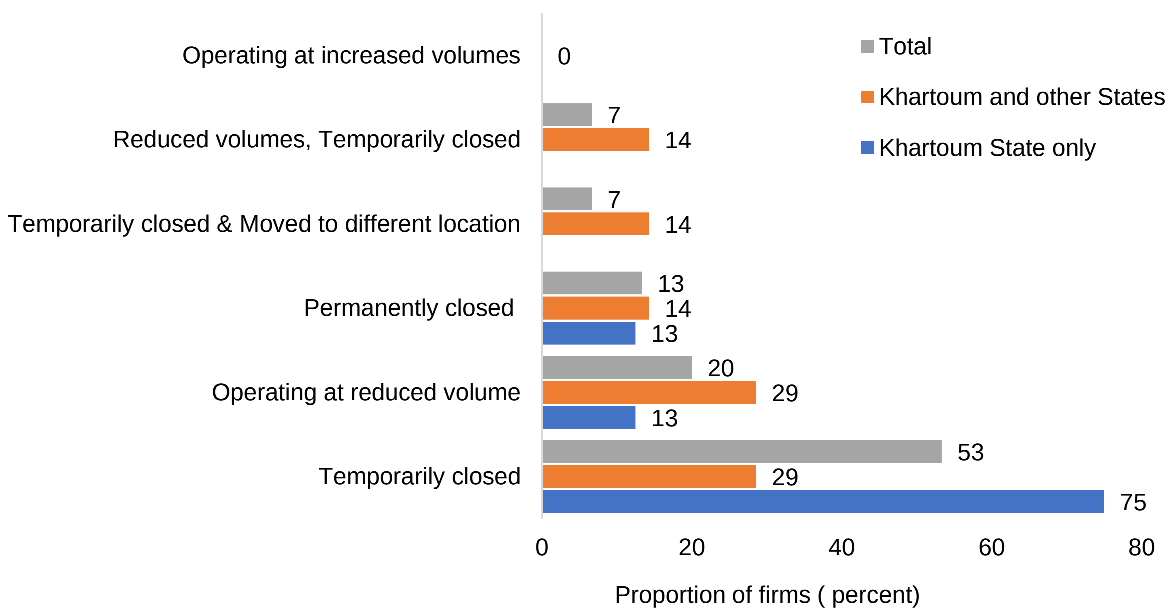
4 RESULTS

4.1 Impact of the conflict on firms' operations

The survey data suggest that agri-food processing and manufacturing enterprises have been severely affected by the on-going conflict (Figure 5). Two-thirds of the firms have either permanently ceased operations (13 percent) or are temporarily closed (53 percent). Some firms (20 percent) are in operation but on reduced production capacity. Only 7 percent of the firms have combined strategies to ensure their ability to continue operation, including temporarily closing and reducing the capacity. Likewise, another 7 percent have reduced the production volumes and temporarily closed during this period (Figure 5). Subsequent surveys would seek to establish the resilience of the enterprises currently in operation and whether those that were temporarily closed are able to bounce back to operation.

At the state level, the 75 percent of firms operating exclusively in of Khartoum State are temporarily closed. While an equal proportion of firms (29 percent each) operating both in Khartoum and in other State(s) or exclusively out of Khartoum State are either temporarily closed or operating on reduced capacity (Figure 5).

Figure 5: Status of operation of the agri-food enterprises

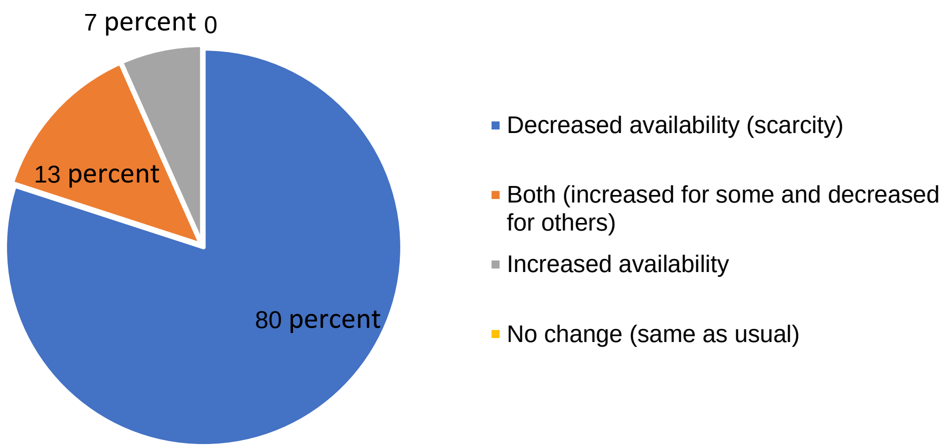


Source: Authors' compilation based on firms' survey data.

4.2 Impacts on access to and cost of material inputs for production.

We also investigated the extent to which the conflict affected access to and the prices of raw materials amongst the firms. Figure 6 shows that an overwhelming majority of the agri-food processing firms (80 percent) reported scarcity of the required material inputs. This is expected because the supply routes have been greatly hampered. Additionally, the storage facilities raided and destroyed by the warring groups lead to losses of key products such as grain for flour production.

Figure 6: Availability of material inputs for production



Source: Author's compilation based on firms' survey data.

Investigating the spread of scarcity across the country shows that the scarcity of raw materials is felt across the country. Whereas 75 percent of firms with exclusive operations in Khartoum report shortages of the necessary production inputs, 86 percent of the firms with operations both in Khartoum and elsewhere report the same (Table 3).

Table 3: Availability of material inputs for production

Status of availability of material inputs	Khartoum State only(percent)	Khartoum and other States(percent)	Total(percent)
Decreased availability (scarcity)	75	86	80
Both (increased for some and decreased for others)	13	14	13
Increased availability	13	0	7
No change (same as usual)	0	0	0
Total	**100**	**100**	**100**

Source: Author's compilation based on firms' survey data.

Furthermore, 80 percent of the respondents reported hiked prices of these raw material (Table 4). Further, 13 percent of the firms reported a mixed experience – both increase in prices of some materials and decrease in others. The residual, that is 7 percent of firms, saw a decline in prices of raw materials (Table 4). The logistical challenges resulting from closed routes, destroyed infrastructure and increased insecurity are contributing to the increasing costs of raw materials. A closer look at State level shows that all firms with operation both in and outside Khartoum have experienced price increase of raw materials (Table 4). On the contrary, 65 percent of firms exclusively located in Khartoum State have seen price increases while another 25 percent reported a mixed reaction – increases in prices of some raw materials and decreases in others. Interestingly, the conflict has seen a reduction in prices of raw materials by 13 percent of the firms located in Khartoum State (Table 4). The closure of processing plants may have led to a dive in demand and associated price drop in some of the material inputs for production.

Table 4: Prices of material inputs/raw materials by proportion

Prices trends	Khartoum State only (percent of firms)	Khartoum and other States (percent of firms)	Total (percent)
Increase in prices	63	100	80
Both (increases in some and decreases in others)	25	0	13
Decrease in prices	13	0	7
No change in prices	0	0	0
Total	**100**	**100**	**100**

Source: Authors' compilation based on firms' survey data.

4.3 Impacts on firms' employees.

Reponses to a question on how firms' employees and workers have been affected by the conflict are shown in Table 5, and the situation is bleak. Overall, majority of the firms have either put their workers on unpaid leave (47 percent) or laid off all of them (20 percent). Another 20 percent of the firms kept their staff working but on reduced schedules. Moreover, 7 percent of the firms sent their staff on paid leave while another 7 percent kept them working as usual (Table 5). These numbers, however, vary by State where the firms are located. For instance, majority of firms (63 percent) exclusively operating in Khartoum sent their employees and workers on unpaid leave. While 29 percent of the firms operating both in Khartoum and other States put their workers on unpaid leave and another 29 percent kept them working but on reduced schedules and production volumes (Table 5). The ensuing conflict coupled with a dysfunctional financial system might signify tough times for the employees or workers on paid leave or still on work (reduced) schedule.

Table 5: Employment status of workers (employees)

Status of employees/workers	Khartoum State only	Khartoum and other States	Total
Unpaid leave	63	29	47
Working but on reduced schedules	13	29	20
Have been laid off	25	14	20
Working as usual	0	14	7
Paid leave	0	14	7
Total	**100**	**100**	**100**

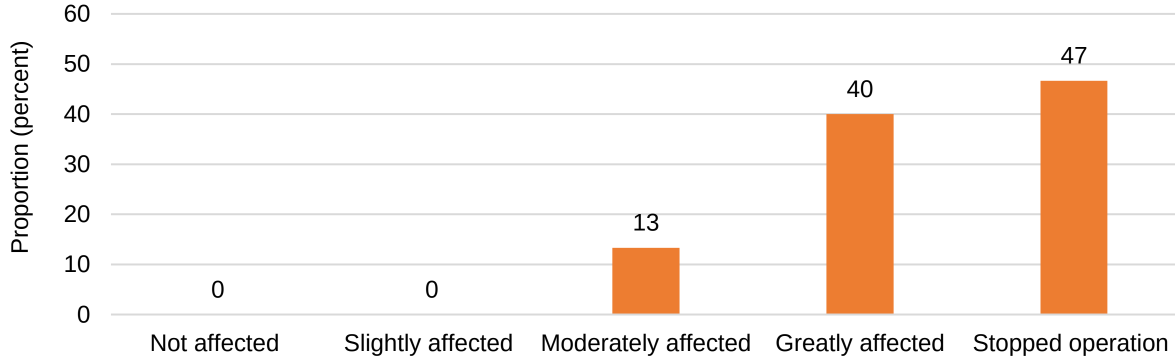
Source: Authors' compilation based on firms' survey data.

4.4 Impact of the instability of financial services on firms' operations

Access to financial services is key for the firms to meet their obligations – including paying for raw material, workers and employees. The disruptions of the financial services therefore have consequences on firms' ability to meet their obligations. We investigated to what extent the disruptions in the financial sector impacted the agri-food processing firms. In cases where the conflict does not directly lead to firms closing, the failure of financial services may indirectly lead them to closure. Findings show that 47 percent of the firms stopped operation due to the disruption of the financial services (Figure

7). Another 40 and 13 percent of the firms reported that their ability to operate was greatly and moderately, respectively affected by the disruption of the financial services (Figure 7). This implies that these firms have had to find solutions to address the cash crunch in the interim.

Figure 7: Impact of disruption of financial services on firm's operations

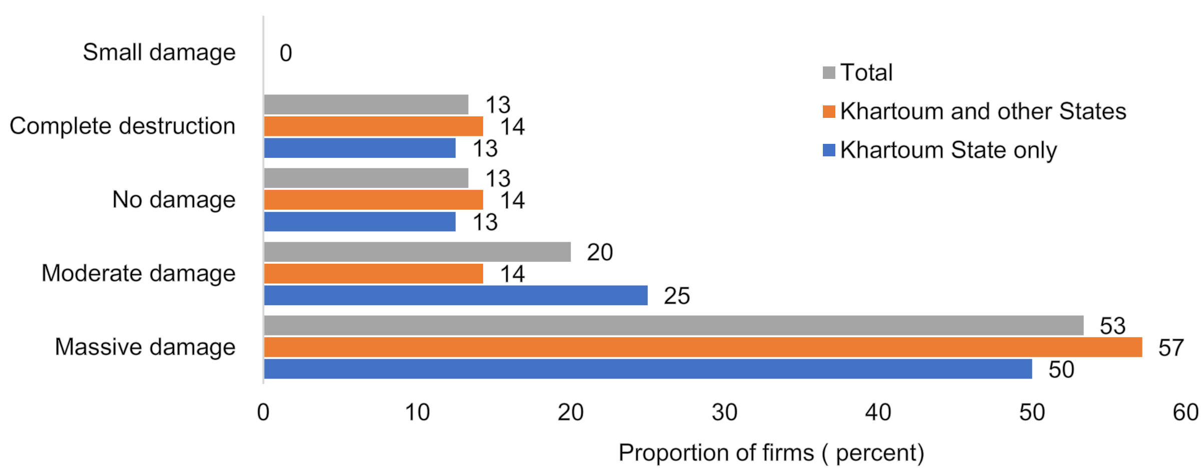


Source: Authors' compilation based on firms' survey data.

4.5 Damage on firms' physical infrastructure and equipment

Perhaps the single most proximate impact of the war on enterprises is the direct impact on their infrastructure and equipment. The Sudanese agri-food processing firms have borne the brunt of war directly. Overall, though the epicenter of the conflict began and continued to persist in Khartoum State, the level of destruction across the country is quite similar (Figure 9). An overwhelming majority of the firms have either reported massive direct destruction of their infrastructure and equipment (53 percent of the firms) or have been completely destroyed (13 percent of the firms) by the war (Figure 9). Another 20 percent reported moderate damage. Only a handful of the firms (13 percent) (Figure 9) reported no damage at all. The picture is similar across states.

Figure 8: Level of damage on firm's physical infrastructure and equipment

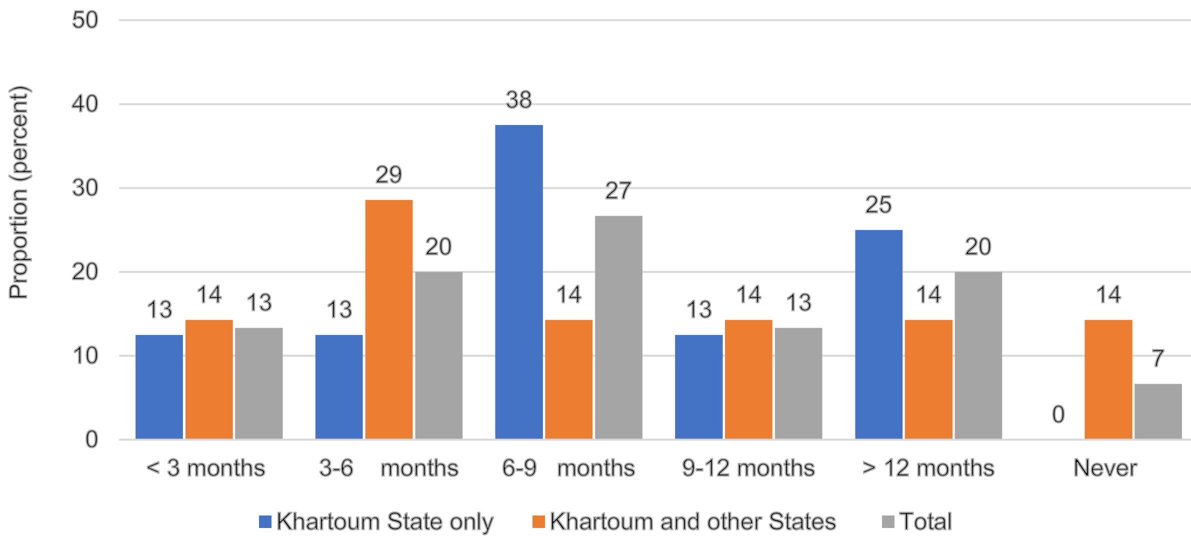


Source: Authors' compilation based on firms' survey data.

4.6 Expected time to resume "normal" operations

Following the ensuing levels of destruction and the protracted spat between SAF and RSF, we sought to understand the perception of the firms with respect to the amount of time they would need to resume normal operations. We consider normal operations the status quo before the conflict erupted. Overall, findings show that a slim majority of the firms (27 percent) believe that normal operations could be achieved between six to nine months (Figure 10). A few firms are optimistic normality can be achieved sooner – in less than 3 months (13 percent) or between 3 and 6 months (20 percent). Some 20 percent of the firms think that the situation could be protracted beyond 1 year. Importantly, 7 percent of the firms (having been completely destroyed) have no hope of returning to their previous state before the conflict (Figure 9). All these firms have operations both in Khartoum and other State(s). We note here that returning to normal operations requires rebuilding and rehabilitation of destroyed plants and equipment. Thus, the firms experiencing massive to complete destruction of their enterprise would require substantive investments both in resources and time to achieve their previous state.

Figure 9: Firms' perception of resuming normal operations.



Source: Authors' compilation based on firms' survey data.

5 CONCLUSIONS AND IMPLICATIONS

The armed conflict broke out on April 15th, 2023, in Sudan between the SAF and RSF now lasted for more than 12 weeks. The economic, social, and humanitarian impacts of this conflict are of monumental proportions – ranging from tragic loss of life, internal and cross-border displacement, unprecedented human suffering, and massive damage to infrastructure. This study provides evidence on the immediate implications on the agri-food processing and manufacturing sector.

Evidence from a survey of an initial 15 agri-food enterprises points to severe impacts on the sector. The conflict has not only led closure of operations for most of the firms but has also led to severe damages to the physical infrastructure and equipment for most of the firms. Evidence from the survey shows two-thirds of the firms are either closed temporarily (53 percent) or permanently (13 percent). A small number of firms are either still in operation but on reduced capacity or have moved operations to other locations considered safe. Later studies would be useful to identify the resilience of these few firms that have persisted in their operations given the fluid nature of the conflict.

Whereas many firms have been directly affected, the employment effects are also dire. Few companies have adopted different strategies to hold onto or support their employees and workers such as paid leave consideration (7 percent), or continued engagement but on reduced volumes (20 percent). Yet, for two-thirds of the firms, laying off employees (20 percent) or having them on unpaid leave (47 percent) have been the only viable strategies.

It is instructive that the availability and the cost of raw materials have also been significantly impacted. While the majority of the firms reported scarcity in access to these key inputs and subsequent increase in their prices. This may imply that the supply chains have also been hampered, due to the destruction of key transport infrastructure and security. For instance, farmers contracted to supply material inputs for the processing firms may have suffered losses. The raw materials also in the storage facilities of the processing firms may have been rendered unusable following power disruptions, destroyed or stolen during the raids by the armed groups during the preceding days of the conflict.

Many firms have also been physically damaged due to the close proximity of the fighting to many food processing firms and factories. Thus, returning to normal or meaningful operations would imply significant investments in rebuilding the plants, repairing, or procuring new equipment. To facilitate the comeback and rebuilding in the face of the negative impacts of the conflicts, priority should be given to providing firms with financial support, better access to raw materials and social safety nets for employees. Notably, many firms stopped operations due to the disruption of financial services. Thus, this crisis presents an opportunity for innovations in financial service provision. For instance, the development and deployment of digital financial services (including savings, credit, insurance, and payments) and mobile banking services.

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