SUDAN

IFPRI

SUDAN STRATEGY SUPPORT PROGRAM WORKING PAPER 24 NOVEMBER 2025

Impact of Conflict on Key Agro-Industries in Khartoum State, Sudan

Wheat Flour Milling, Oil Processing, and Packaging

Ammar Ibrahim, Shima Mohamed, Mohamed Abdel-Karim, and Khalid Siddig

ABSTRACT

This study evaluates the effects of the ongoing armed conflict in Sudan on the agro-industrial sector in Khartoum state, with a focus on the wheat flour milling, edible oil, and packaging materials industries. The conflict, which started in April 2023, has led to widespread population displacement, destruction of infrastructure, and severe economic disruptions, especially in Khartoum, Sudan's most industrialized and densely populated state.

The assessment is based on a combination of primary data, including satellite imagery, site visits, technical questionnaires, and key informant interviews, and secondary sources, such as official reports. Data were collected from 15 industrial facilities located in the Khartoum North, Garri, and Soba industrial zones. These include four facilities in the wheat flour milling sector, ten in the edible oil sector, and one in the packaging materials sector.

Due to security constraints and widespread infrastructure destruction, access to the industrial zones and the factories was restricted. Moreover, price volatility, inflation, and shortages of skilled labor and materials further complicated the assessment, making it difficult to accurately value the observed and reported damages and losses in these industries.

Our estimate of the total estimated damages and losses across the three sectors is USD 407 million. Financial losses represent 51 percent of these losses, while about 23 percent of the losses were related to losses of inventory and 11 percent to losses of logistical and maintenance assets of the agro-businesses. The wheat flour milling sector incurred the highest overall losses. Notably, financial losses dominate across the three sectors, primarily driven by the conflict halting factory operations and disrupting supply chains.

Recovery for these industries will be prolonged. In the wheat flour milling sector, the average repair timeline anticipated for bringing production buildings back into full use is 6.8 months, while for electrical systems, it is 5.7 months. Estimated repair periods for the edible oil sector are 6.0 months for oilseed handling and preparation machinery and 5.9 months for electrical systems. Expected repair periods for electrical components in the packaging materials are similarly 6.0 months, reflecting relatively similar challenges in restoring operational capacity across the three industrial sectors.

Stakeholder interviews underscored the urgent need for enhanced security, improved access to financing, tax relief, and market protection. Government responses—guided by the 2024 Sudan Industrial Development Conference—have focused on deploying security forces, improving institutional coordination, and providing limited financial support to the country's factories. However, significant implementation gaps remain, particularly in access to financing for and enforcement of regulatory measures within the industrial sector.

A phased, sector-specific industrial recovery strategy is recommended that prioritizes financial recovery, inventory replenishment, and restoration of infrastructure critical to industrial production. Also needed is stronger coordination between public and private sector actors, improved access to concessional financing, and a better alignment of industrial policy with agricultural supply chains to foster long-term resilience in the agro-industrial sector.

CONTENTS

TABLES

FIGURES

IMAGES

1. INTRODUCTION

On 15 April 2023, severe armed conflict erupted in Khartoum state between the Sudanese Armed Forces (SAF) and the Rapid Support Forces (RSF). The conflict quickly spread to Al Jazirah and Sennar states and the Darfur region, with less intense effects in the Kordofan region and in Blue Nile and White Nile states. By November 2024, the conflict had resulted in over 28,700 fatalities (ACLED 2024), and 13.2 million people were forcibly displaced, of which 3.4 million fled to neighboring countries, including Chad, Egypt, Ethiopia, Central African Republic, Libya, and South Sudan (DTM Sudan 2025). The most affected states in terms of displacement include Khartoum, with over 30 percent of the population displaced, and South Darfur and North Darfur states, with over 20 percent displaced. The states hosting large shares of this internally displaced population are South Darfur and North Darfur, each of which hosts about 18 percent of the internally displaced population, and Central Darfur, which hosts about 10 percent (DTM Sudan 2025).

In early 2025, SAF successfully recaptured the Al-Jaili petroleum refinery in Khartoum North, marking a significant turning point in the conflict in the Khartoum area. Additionally, since March 2025, hostility between the conflicting parties has significantly decreased in several states, including Khartoum, Al Jazirah, Sennar, and White Nile. Voluntary returns among displaced residents have been recorded, particularly in Khartoum and Al Jazirah, which are among the most densely populated states in Sudan. According to DTM Sudan (2025), approximately 2.3 million persons returned to their areas of origin between November 2024 and July 2025, about 15 percent of the total displaced population. About 80 percent of these returnees came from within Sudan.

However, while easing in Khartoum to some degree, the conflict continues to create significant challenges for many agro-industrial establishments, particularly constraining their operational capacity. These challenges go beyond extensive direct damage to their industrial facilities and related infrastructure to continuing scarcities of key inputs to the industrial production processes and associated spikes in the prices of those inputs (Kirui et al. 2023). There is also considerable unmet demand for agro-industrial products. Securing food supplies remains a challenge in conflict-affected areas and has become a top priority to support the return of displaced populations.

Among the most urgent needs are staple food items, such as bread and edible oil. Following the outbreak of conflict in Khartoum in April 2023, wheat flour production dropped by 90 percent largely due to the destruction of the flour mills (WFP 2024). Before the conflict, Khartoum state accounted for 65 to 70 percent of Sudan's commercial wheat flour production, primarily through large-scale industrial mills. The edible oil sector experienced similar disruptions. Khartoum state similarly hosted over 60 edible oil factories, contributing 45 to 50 percent of all edible oil consumed in Sudan (FSD Africa 2023, FAO 2022).

2. OBJECTIVES OF THE STUDY

This study aims to assess the impact of the ongoing armed conflict on the agro-industrial sector in Khartoum state, with a particular focus on factories in the Khartoum North industrial area.

The assessment is structured around four main areas:

1. Wheat flour milling in the Khartoum North industrial area.
    - The operational status of flour mills, including levels of physical damage and reductions in production capacity.
    - Analyze the disruptions across the supply chain, particularly in relation to wheat imports, electricity and fuel shortages, and workforce displacement.
2. Edible oil processing in the Khartoum North and Soba industrial areas.
    - Assess the extent of damage to cooking oil factories and related infrastructure.
    - Evaluate changes in production output and the availability of edible oil in local markets.
3. Packaging material industry in Khartoum state (to a more limited degree than the other assessments).
4. The socioeconomic and humanitarian impacts of the effects of the ongoing armed conflict on these agro-industries.
    - Food security, particularly shortages of bread and cooking oil.
    - Employment losses within these industries.
    - Price inflation of essential food commodities.

3. METHODOLOGY—DATA SOURCES AND ASSESSMENT APPROACH

The assessment relied on both primary and secondary data sources. Primary data were collected by the study team (Annex 4) through key informant interviews with industry stakeholders and government officials (Annex 3), technical questionnaires distributed to operators of industrial facilities, satellite imagery analysis, and on-site visits to selected factories. Security was a paramount concern in all fieldwork (Annex 2). Desk reviews of documentation on agro-industry in Sudan and on the current conflict made up much of the secondary data analysis.

3.1 Facility coverage

A total of 15 industrial facilities were assessed, comprising four wheat flour mills, ten edible oil factories, and one packaging materials factory. Of these, 13 facilities are located in the Khartoum North industrial area, one in the Garri area in the north of Khartoum state, and two in the Soba industrial zone south of the Blue Nile. Twelve facilities completed the technical questionnaire, and 13 were visited on-site during fieldwork (Table 1).

Table 1: Sources of primary data for the study

Source of data	Wheat flour mills	Edible oil factories	Packaging material factories
Key informant interviews	4	10	1
Technical questionnaire	4	6	1
Satellite imagery	4	10	1
Site visits	4	8	1
Short video analyses	0	1	0

Source: Compiled by authors

3.2 Technical questionnaire design

The questionnaire was structured into three sections: general information, inventory and financial losses, and infrastructure damage.

- The general information section included questions about the availability of raw materials, barriers to resuming industrial operations, and the expected timeframe for restarting production.
- The inventory and financial losses section addressed direct and indirect financial losses, including losses in raw materials, packaging materials, and finished products, as well as damage to equipment, vehicles, and spare parts.
- The infrastructure damage section covered damage to machinery—mechanical, electrical, and non-structural—as well as structural damage to buildings and impacts on information and telecommunications infrastructure and security systems.

3.3 Remote sensing and site visits

Before conducting site visits, satellite imagery was used to assess the condition of each industrial facility studied. These images provided insights into the types and extent of physical damage, site accessibility, and the structural integrity of buildings.

Site visits were conducted at 13 factories in Khartoum North and Garri industrial areas, using tailored technical forms developed by the study team (Annex 1). These forms captured infrastructure damage patterns, sector-specific equipment assessments, e.g., flour milling equipment and edible oil machinery, and general infrastructure conditions, such as roads, electricity, and water supply. Due to security constraints, one edible oil factory in the Soba industrial area was assessed remotely using short video recordings, which was useful for evaluating the damage to machinery and buildings at the facility.

Secondary data were obtained through a comprehensive desk review, which covered reports, statistical data, and official documents. The desk review provided a clear understanding of the nature and capacity of the wheat flour milling, edible oil production, and packaging materials industrial sectors in Sudan, with a particular focus on Khartoum state. It also addressed infrastructure-related issues in the Khartoum North industrial area, with special attention given to water supply, power availability, and transportation modes.

Quantitative data were analyzed by applying descriptive statistics and comparative analysis to examine the distribution of damages and losses across the three industrial sectors and the different types of industrial infrastructure. For factories that could not be physically accessed,

satellite imagery was used to assess visible structural damage, providing supplementary data to support and validate the reports submitted by factory owners. This approach ensured a more comprehensive understanding of the extent of destruction across all assessed factories.

4. STUDY AREA

The industrial area in Khartoum North, commonly referred to as Khartoum Bahri, is one of Sudan's most important industrial hubs. Situated on the northern bank of the Blue Nile, adjacent to both Khartoum and Omdurman, it forms a vital part of the Khartoum metropolitan area. The industrial area hosts food processing, chemical production, plastics, engineering, textiles, and other industrial manufacturing firms. It is home to numerous small and medium-sized enterprises that contribute significantly to local production and employment.

Khartoum North industrial area includes some of Sudan's largest agro-industrial facilities, such as the Sayga and Wheata flour mills and the Al-Tetal and Al-Hamamtain edible oil factories. Its strategic location near the River Nile historically supported river-based transport and distribution. Additionally, its proximity to the Khartoum North railway station and Khartoum International Airport enhances its logistical advantages, making it a key node for importing raw materials and exporting finished goods. The railway network, though generally underused, is a critical supply channel for several of the factories assessed, which rely on it for transporting raw materials, fuel, and finished products. Connectivity is further strengthened by major road bridges across the Blue and White Nile rivers, facilitating efficient land transport from North Khartoum across the Khartoum metropolitan area.

The Khartoum North industrial area is supported by essential infrastructure. Water supply is supported by a station with a capacity of 40,000 to 50,000 cubic meters per day, serving both industrial and residential needs. The area also hosts one of Sudan's largest thermal electrical power stations. This station produced between 250 and 300 megawatts before the conflict, but production declined sharply to between 100 and 150 megawatts due to conflict-related damage. As the conflict continued, it went completely out of service—the estimated cost of rehabilitation of the power station is USD 5 million. These utilities, when operational, create a conducive environment for industrial production. The area has also benefited from government incentives and tax exemptions, which have attracted several international industrial investment projects.

5. SUDAN'S WHEAT FLOUR MILLING, EDIBLE OIL, AND PACKAGING MATERIALS INDUSTRIES

5.1 Wheat flour milling industry

Wheat, sorghum, and millet are the primary staple foods in Sudan. Nationally, sorghum accounts for 50 to 55 percent of total cereal consumption, wheat for 35 to 40 percent, and millet for 5 to 10 percent (FAOSTAT 2025). However, wheat consumption is much higher in urban areas, making it the dominant cereal in major cities and towns. Most of the wheat flour consumed in Sudan is produced locally, relying heavily on the country's network of industrial milling facilities.

In 2022, Sudan's domestic consumption was estimated at 2.7 million mt of wheat, 3.8 million mt of sorghum, and 0.7 million mt of millet (FAOSTAT 2025). However, both wheat and sorghum production have shown a declining trend between 2020 and 2024 (Table 2).

Table 2: Wheat, sorghum, and millet production in Sudan, mt, 2019/20–2023/24

Year	Wheat	Sorghum	Millet
2019/20	726,000	5,150,000	1,920,000
2020/21	718,000	3,528,000	900,000
2021/22	602,000	5,248,000	1,900,000
2022/23	476,000	3,055,000	684,000
2023/24	400,000	3,300,000	1,000,000

Source: USDA (2025)

Sudan has over 30 industrial wheat mills nationwide. Prior to the outbreak of the conflict, Khartoum state accounted for approximately 55 percent of the country's total milling capacity, concentrated in the Khartoum North industrial area, with one additional mill located in the Garri industrial area. Another 25 percent of the national milling capacity was located in Gezira state, particularly in the cities of Madani and Al Managel. Together, 80 percent of Sudan's total industrial wheat milling capacity is in these two regions.

This study identified eight industrial flour mills operating in the Khartoum North industrial area and one, Rotana, in the Garri industrial area. Table 3 presents the individual daily production capacities of these mills.

Table 3: Wheat flour mills in Khartoum North and Garri industrial areas

Flour mill	Production capacity, mt/day
Albadren	500
Almusharaf	300
El-Sayed	500
Gina	1,200
Rotana	2,500
Sad	600
Sayga	2,400
Seen	900
Wheata	1,750

Source: Authors' compilation

Rotana Flour Mills, located in Garri, is one of the largest flour mills in Sudan. Gina Flour Mills is currently leased to Sayga, while Almusharaf Flour Mills is leased to Seen. These arrangements reflect ongoing shifts in ownership and operational management within the wheat milling sector, even under conditions of conflict.

Sayga Flour Mills also operates a dedicated production line for milling sorghum and other cereal flours, making it the only large-scale industrial facility in Sudan equipped to produce alternative flours to wheat flour at significant volumes. Additionally, wheat flour byproducts, such as bran, are an important input for Sudan's commercial animal feed industry, contributing to livestock nutrition.

5.2 Edible oil industry

The cooking oil industry is a critical component of Sudan's agro-industrial landscape, supplying a substantial portion of the country's edible oil needs. Although Sudan is a major producer of oilseeds, including sesame, groundnut, and sunflower, the country continues to face a significant domestic shortfall in edible oil production. This gap has resulted in a heavy reliance on imports to meet consumer demand (Table 4).

Table 4: Edible oil demand versus production in Sudan, mt, 2021–2023

	2021	2022	2023
Total demand	362,000	312,000	280,000
Local production	235,000	247,000	210,000
Gap filled by imports	127,000	65,000	70,000

Source: FAO (2024b); FAO (2022); UN (2023)

The main causes of this deficit include an inconsistent supply of oilseed driven by fluctuations in agricultural output, disruptions in supply chains, and limited investment in oilseed cultivation. Additionally, a large volume of groundnut exports further reduces the availability of oilseed as raw materials for domestic processing. Other contributing factors include outdated processing technologies, high production costs, and inefficiencies in refining and distribution systems.

Per capita consumption of edible oils in Sudan is estimated at 5.6 kilograms per year (FAO 2024a). With a population of approximately 50 million, total annual consumption was projected to be around 280,000 mt in 2023. When accounting for informal trade and exports to neighboring countries, actual consumption may be up to 360,000 mt.

Following the outbreak of conflict in 2023, Sudan witnessed a decline across all key indicators related to edible oils. Total demand, local production, and the production gap for edible oils all decreased, reflecting the broader impact of instability on agricultural output and market dynamics (Table 5).

Table 5: Edible oil production estimates for different types of oilseeds, mt, 2021–2023

Oilseed type	2021	2022	2023
Sesame oil	103,000—113,000	50,000—70,000	78,000—88,000
Groundnut oil	182,000—202,000	160,000—180,000	130,000—147,000
Sunflower oil	57,000—63,000	60,000—75,000	56,000—63,000
Cottonseed oil	38,000—42,000	40,000—50,000	47,000—53,000
Other oilseeds	18,000—22,000	15,000—20,000	10,000—15,000

Source: FAO (2024b); FAO (2022); UN (2023)

In 2024, sesame ranked as the third-highest export commodity by value, with almost 290,000 mt exported with a total value of over USD 330 million (CBOS 2024). Groundnut followed closely, ranking fourth with almost 360,000 mt exported with a value of almost USD 293 million. In 2024, the value of exports of sesame seeds and groundnut seeds declined significantly (Table 6).

Table 6: Oilseed exports from Sudan, value, USD thousand, 2020–2024

Oilseed	2020	2021	2022	2023	2024
Sesame	689,000	450,000	433,000	N/A	330,276
Groundnut	451,000	440,000	419,000	N/A	292,984

Source: CBOS (2024)
Note: N/A = not available.

Prior to the outbreak of the conflict, Sudan had about 215 oilseed processing units, ranging from small-scale mills to large industrial plants. In addition to full-cycle oilseed milling facilities, Sudan also hosts several refinery-only plants. These are designed to process imported crude edible oils or domestic oils that were milled by other local processors.

Notably, 50 to 60 percent of the country's total oil milling capacity is concentrated in the Khartoum North and the Al Bagir (Soba) industrial areas of Khartoum state, underscoring the strategic importance of Khartoum as the central hub for oilseed processing and refining in Sudan. There are approximately 60 oil processing facilities operating in the state (FSD Africa 2023). Our study identified 25 major edible oil factories in Khartoum state, with four located in El Bagir (Soba) industrial area and 21 in Khartoum North industrial area (Table 7).

Table 7: Edible oil factories in Elbagair (Soba) and Khartoum North industrial areas

Factory	Production capacity, mt/day
Elbagair (Soba) industrial area	
Alsharafa Oil Refinery	100–refinery only
Green Food Oil Processing Industries	450 to 500
Savola Edible Oil Refinery	600
White Horse Oil Refinery	70–refinery only
Khartoum North industrial area	
Al Kubayah	70
Al Tadamon	60
Al Tietal Oil Mills	400
Alamain	100
Alansari	100
Alqatani Oil Company	100
Arabic Sudanese Vegetable Oil	100
Ayman Al Nafora	50
Ba-Yasir	70
Bittar Oil	100
Coftea	100–refinery only
Delta	400–to be commissioned
Green Valley Oil and Peeling (Aseel)	80
Malik Industrial Company (Al-Hamamtain)	225
Marhab	150
Montana Oil	400–to be commissioned
Onnab Oil	50
Satty	100
Zohal	100

Source: Authors' compilation

This geographic concentration and segmented structure of edible oil processing underscore the sector's vulnerability to conflict-related disruptions. It also highlights the urgent need to

assess damage to milling and refining infrastructure in these industrial areas to inform recovery planning, restore production capacity, and reduce Sudan's dependence on imported edible oils.

Looking ahead, revenue in Sudan's edible oils market is projected to reach approximately USD 108 million by 2025, with an expected annual growth rate of 4.8 percent from 2025 to 2030 (Statista 2025). Additionally, byproducts from the oil industry, particularly oilseed cake, are considered valuable inputs for Sudan's animal feed industry, contributing to various livestock and livestock product value chains.

5.3 Packaging materials industry

Khartoum North has long been the central hub for Sudan's packaging industry, hosting a range of factories that produce diverse types of packaging materials. Prior to the outbreak of conflict, the area was home to manufacturers specializing in plastic packaging, such as bags, plastic film, and bottles; corrugated cardboard and paper-based packaging; flexible packaging for food, beverages, and consumer goods; and protective packaging, such as polystyrene (Styrofoam) and bubble wrap.

The major industrial facilities producing packaging materials include:

- Sudan Packing & Packaging Industries—produces both plastic and paper packaging.
- Al-Nilein—engaged in multiple packaging production activities.
- Bahri Plastic Factory—specializes in plastic bags and containers.

In addition to these large-scale operations, numerous small and medium-sized enterprises supply the local market with essential packaging materials, contributing to the sector's overall resilience and diversity.

However, like many other industries in Sudan, the packaging sector has suffered severe disruptions due to the ongoing conflict. Reports indicate widespread looting and destruction of factories that produce packaging materials, including in Khartoum North, Soba, and the Khartoum Central Market areas. Losses have included not only finished goods and raw materials, but also critical machinery and infrastructure essential for the continued operations of these factories.

Despite these setbacks, the packaging industry in Khartoum North remains an important component of Sudan's manufacturing and distribution networks. Its recovery is essential for rebuilding supply chains for processed products and supporting broader industrial revival across the country.

5.4 Overview of the current situation and outlook

Since the outbreak of conflict in April 2023, Sudan's agro-industrial production sectors have faced severe disruptions. One of the immediate impacts has been a shift in domestic consumption of wheat flour and edible oil toward imported products, placing substantial pressure on the national economy and contributing to rising inflation. For example, prior to the conflict, the price of a 100 to 120 gram loaf of bread was approximately 50 Sudanese

Pounds (SDG). By March 2025, an 80 to 100 gram loaf was priced between 125 and 142 SDG, reflecting both reduced quality and increased unit costs.

Similarly, edible oil prices have surged significantly due to a sharp decline in local production and escalating inflation. A comparison of pre- and post-conflict edible oil prices is presented in Table 8.

Table 8: Prices of edible oils before and during the conflict

	Before conflict	During conflict, March 2025
Sesame oil, 1 liter	17,000	20,000
Sunflower oil, 1 liter	10,000	15,000
Cottonseed oil, 1 liter	7,000	9,000
Groundnut oil, crude, 36 lbs.	10,000	12,000

Source: Key informant interviews.

Industrial activity in the Khartoum North industrial area has nearly come to a halt. Facilities have suffered from direct physical damage due to bombing, shelling, and vandalism; loss of inventory, including raw materials and finished goods; and financial losses from halted production, inflation, and theft.

The most important loss to energy infrastructure for industry has been the Khartoum North thermal electrical power station, with an estimated rehabilitation cost of USD 5 million for its main substation. Additional damage to electric cables and other components of the electricity distribution network is reported, though reliable cost estimates of repairs to the network are still unavailable.

Water supply is another major challenge. The Khartoum North water plant has been out of service since the early days of the conflict and requires urgent maintenance to resume operations. Communication and internet connectivity remain weak, hindering the functionality of information and telecommunications systems across industrial zones. Encouragingly, physical damage to roads and railway tracks is relatively limited.

The depopulation of Khartoum North locality presents a major challenge for industrial recovery. Most factories in the area depend on nearby residents to meet labor demands, and the displacement of these communities due to the conflict has severely disrupted the availability of this workforce. Prior to the conflict, the total workforce across the assessed industrial facilities was over 2,300 employees, plus an additional 235 outsourced or rotating shift workers. The factory owners reported that most of these workers have now lost their jobs. This widespread unemployment signals a serious socioeconomic concern, particularly when considering the broader implications for the Khartoum North industrial area and other industrial zones across Khartoum state.

5.5 Limitations of the study

Due to the ongoing dangerous security situation, our assessment of agro-industries in Khartoum state was conducted using limited tools, and there was no opportunity to carry out detailed evaluations of individual industrial enterprises. Furthermore, many buildings were found to be destroyed, making it impossible to access the interior areas to inspect the machinery and equipment.

In addition, this research faced challenges in estimating the value and magnitude of different forms of damages and losses. The significant volatility in prices since the beginning of the conflict continues. A shortage of workers, most notably skilled labor, has resulted in uncertain wage rates. Shortages of supplies, engineering tools, and construction materials make it difficult to estimate how much construction and machinery repairs will cost. The extensive destruction of infrastructure, such as to the electricity and water distribution networks, high inflation rates, and the general economic downturn all result in uncertainties around expected costs and returns. These market challenges are all accompanied by a severe decline in purchasing power for most Sudanese, including agro-industrial business operators.

6. DISCUSSION OF STUDY RESULTS

This section presents the key findings from the assessment of selected agro-industrial sectors in greater Khartoum state, with a focus on the wheat flour milling and edible oil industries, plus some attention to the packaging materials industry. The analysis draws on field observations, stakeholder interviews, and secondary data sources to evaluate the extent of physical damage, disruptions in production, and broader socioeconomic impacts resulting from the ongoing conflict. Particular attention is given to the Khartoum North and Garri industrial areas, which previously served as major hubs for agrifood processing and supply in Sudan.

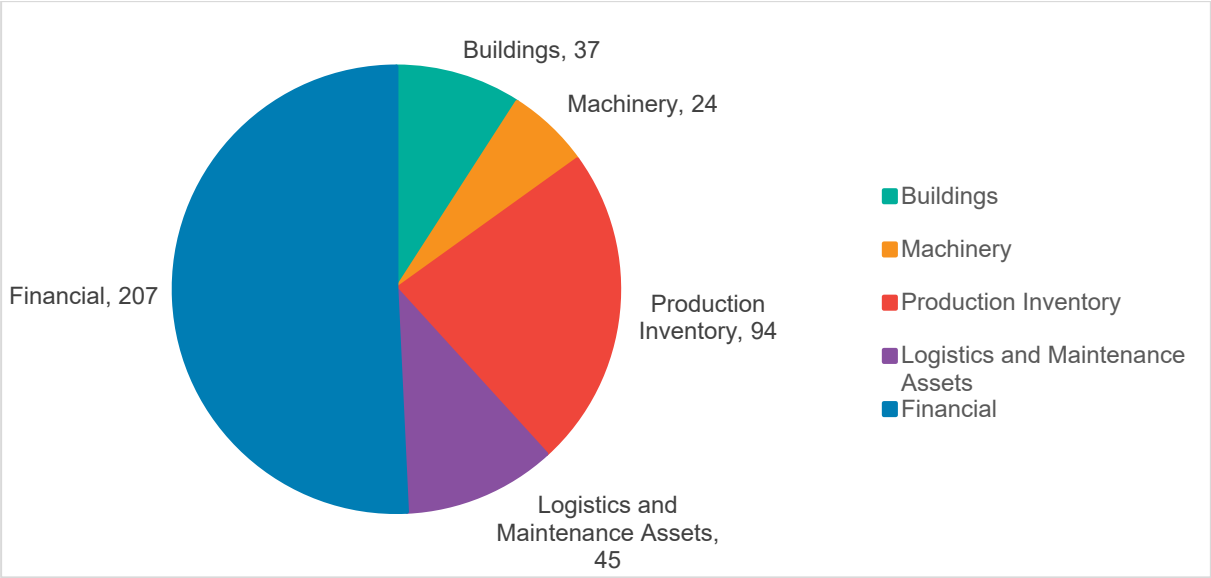
To facilitate a comprehensive assessment, the data collected from each industrial sector were categorized into five main areas:

- Damage to buildings and information technology infrastructure, including administrative offices, production facilities, and auxiliary structures;
- Losses and damage to production machinery and electrical systems;
- Inventory losses, covering raw materials, finished products, and packaging materials;
- Logistics and maintenance asset losses, such as trucks, vehicles, spare parts, fuel, and lubricants; and
- Financial losses, which encompass receivable losses, financing penalties, foreign exchange impacts, labor cost disruptions, demurrage charges, procurement contract breaches, rental inefficiencies, opportunity costs, and goodwill losses.

6.1 Overall damages and losses

Complete detailed information on damages and losses for the study was obtained from four wheat flour milling factories, six edible oil factories, and one packaging materials factory. The total estimated damages and losses across the 11 assessed agro-industrial factories amount to USD 407 million. Financial losses represent the largest share, estimated at USD 207 million or 51 percent of the total. Figure 1 illustrates the distribution of total joint damages and losses across all three assessed sectors, disaggregated by the type of loss.

Figure 1: Wheat flour milling, edible oil, and packaging materials industries in Sudan, estimated joint total damages and losses due to conflict, USD million



Source: Authors' compilation based on survey responses and on-site assessments.

Jointly, the four factories in the wheat flour milling sector experienced the highest level of damages and losses, estimated at USD 261 million in total or over USD 65 million per factory on average (Table 9). Financial losses made up more than half of these losses. The joint losses of the six edible oil factories from which complete data were obtained (nine factories were originally surveyed) were close to USD 145 million, but the per factory losses were considerably lower than those experienced by the wheat flour mills—average losses were just over USD 24 million. Financial losses also dominate for the edible oil industry, although losses of production inventory are also significant in the sector. The data for the one packaging materials factory in the study also shows financial losses to be the dominant category of losses. However, this category of losses made up just over one-third of the estimated total losses for the factory—a significantly lower share than those seen for both the wheat flour milling and edible oil factories studied. Building damage also made up a significant share of total damage in the packing materials factory.

Table 9: Estimated damages and losses, by category, by industry

Industrial sector	Buildings	Machinery	Production Inventory	Logistics and Maintenance Assets	Financial	Total
Total joint losses (USD thousand):						
Wheat flour milling (n=4)	36,422	19,180	39,836	26,803	138,984	261,225
Edible oil (n=6)	393	4,934	54,304	17,842	67,302	144,775
Packaging materials (n=1)	282	257	180	160	460	1,339
Total (n=11)	37,097	24,372	94,320	44,805	206,746	407,340
Per factory losses (USD thousand):						
Wheat flour milling	9,105	4,795	9,959	6,701	34,746	65,306
Edible oil	65	822	9,051	2,974	11,217	24,129
Packaging materials	282	257	180	160	460	1,339
Total	3,372	2,216	8,575	4,073	18,795	37,031
Per factory losses (% share):						
Wheat flour milling	13.9	7.3	15.2	10.3	53.2	100.0
Edible oil	0.3	3.4	37.5	12.3	46.5	100.0
Packaging materials	21.1	19.2	13.4	11.9	34.3	100.0
Total	9.1	6.0	23.1	11.2	50.6	100.0

Source: Authors' compilation based on survey responses and on-site assessments.

6.2 Wheat flour milling industry assessment

6.2.1 Overall damage and loss assessment

Four wheat flour mills were assessed—three in Khartoum North and one in the Garri industrial area. Factories 1 and 2 are smaller mills that produce less than 1,000 mt/day, while Factories 3 and 4 are larger mills producing more than 1,000 mt/day. The value of the estimated losses and damage for all four factories and the average for each were presented in Table 9. The same information disaggregated by the four factories studied is presented in Table 10. The estimated level of damage varies significantly across the facilities, ranging from USD 12 million to USD 146 million, reflecting differences in production capacity, infrastructure scale, and exposure to conflict-related disruptions.

Table 10: Wheat flour milling, estimated damages and losses, by category, by factory studied

Wheat flour milling factory	Buildings	Machinery	Production Inventory	Logistics and Maintenance Assets	Financial	Total
Losses (USD thousand):						
Factory 1 (small)	728	1,720	4,017	54	7,653	14,172
Factory 2 (small)	734	1,602	2,288	1,140	6,725	12,489
Factory 3 (large)	1,050	753	11,731	20,499	54,606	88,639
Factory 4 (large)	33,910	15,106	21,800	5,109	70,000	145,925
Total	36,422	19,180	39,836	26,803	138,984	261,225
Share of total losses for factory (%):						
Factory 1 (small)	5.1	12.1	28.3	0.4	54.0	100.0
Factory 2 (small)	5.9	12.8	18.3	9.1	53.8	100.0
Factory 3 (large)	1.2	0.8	13.2	23.1	61.6	100.0
Factory 4 (large)	23.2	10.4	14.9	3.5	48.0	100.0
Total	13.9	7.3	15.2	10.3	53.2	100.0

Source: Authors' compilation based on survey responses and on-site assessments.

6.2.2 Building damage

The total estimated damage to buildings in the wheat flour milling sector in Khartoum state is USD 36.4 million (Table 10). Factory 4 experienced the most significant damage, accounting for nearly 93 percent of the total building-related losses among the four factories assessed. Overall, the share that building damage makes up of all estimated losses for the four wheat flour milling factories is 13.9 percent, highlighting that while physical infrastructure suffered the most, disruptions to production also contributed meaningfully to the sector's overall vulnerability.

The buildings at the factory sites can be disaggregated into production, auxiliary, and administration buildings (Table 11). For the wheat flour milling factories, production facilities sustained the highest level of damage, with estimated joint losses for such buildings of USD 31.4 million, which is 86.0 percent of the value of all building losses at the four factories. The value of damage to auxiliary buildings was estimated at 12.6 percent of all building losses, while administrative buildings experienced the least impact. This pattern in building losses shows the disproportionate effect of the conflict on core production infrastructure within the wheat flour milling sector. This pattern was observed across all surveyed factories, except Factory 1, where damage to administrative facilities accounted for 58 percent of the building-related damage.

Table 11: Wheat flour milling, estimated buildings damages, by category, by factory studied

Wheat flour milling factory	Administration Facilities	Auxiliary Facilities	Production Facilities	Total
Losses (USD thousand):				
Factory 1 (small)	422	68	238	728
Factory 2 (small)	16	4	714	734
Factory 3 (large)	19	18	1,0123	1,050
Factory 4 (large)	12	4,489	29,409	33,911
Total	469	4,580	31,373	36,422
Share of total buildings damages for factory (%):				
Factory 1 (small)	58.0	9.4	32.6	100.0
Factory 2 (small)	2.2	0.6	97.3	100.0
Factory 3 (large)	1.8	1.8	96.5	100.0
Factory 4 (large)	0.0	13.2	86.7	100.0
Total	1.3	12.6	86.1	100.0

Source: Authors' compilation based on survey responses and on-site assessments.

Visual evidence from field assessments conducted in March 2025 highlights the extensive structural damage sustained by wheat flour mills in the Khartoum North industrial area. Image 1 shows significant damage to silos at Factory 1, indicating compromised storage capacity and potential contamination risks. Image 2 further reveals the impact of fire, with silos at the same facility exhibiting severe burn marks and structural deterioration. At Factory 3, Image 3 documents the complete loss of a building's roof, exposing internal machinery and materials to environmental hazards. Similarly, Image 4 captures the total loss of the roof of a building at Factory 1, reinforcing the widespread nature of infrastructure damage across multiple sites. These images collectively underscore the vulnerability of key production and storage assets in the wheat flour milling sector and the urgent need for rehabilitation and protective measures.

Image 1: Silo damage at wheat flour mill Factory 1, Khartoum North industrial area, March 2025

Source: Photo taken by site visit team during field assessment, March 2025.

Image 2: Burned and damaged silos at wheat flour mill Factory 1, Khartoum North industrial area, March 2025

Source: Photo taken by site visit team during field assessment, March 2025.

Image 3: Complete roof loss at wheat flour mill Factory 3, Khartoum North industrial area, March 2025

Source: Photo taken by site visit team during field assessment, March 2025.

Image 4: Roof loss at wheat flour mill Factory 1, Khartoum North industrial area, March 2025

Source: Photo taken by site visit team during field assessment, March 2025.

The estimated time required to repair such damaged infrastructure in the wheat flour milling sector varies by building type. Production facilities, which are central to the operational capacity of the sector, have the longest average estimated repair time at 6.8 months, reflecting the complexity and scale of damage sustained. Administrative facilities and auxiliary structures both have average estimated repair durations of 5.8 months. However, auxiliary buildings have a wider range of such estimates—from a minimum of 2 months to a maximum of 10 months—suggesting variability in the extent of damage across sites. These estimates highlight the prolonged recovery timeline for restoring full industrial functionality, particularly in production areas, and underscore the need for targeted rehabilitation planning (Table 12).

Table 12: Wheat flour milling, estimated repair time by factory building type, months

Building type	Minimum	Average	Maximum
Administrative buildings	3	5.8	8
Auxiliary buildings	2	5.8	10
Production facilities	3	6.8	9

Source: Authors' compilation based on survey responses and on-site assessments.

6.2.3 Machinery damage

The total estimated damage to machinery across the four assessed wheat flour mills in Khartoum state amounts to USD 19.2 million, with Factory 4 accounting for the largest share of these losses at over USD 15 million (Table 10). Despite this, the impact on the daily production capacity of the factories is relatively moderate, estimated at USD 15,306 per mt/day. Overall, machinery-related losses represent 7.3 percent of the total damage and losses incurred by the flour mills studied. This indicates that, although equipment damage was evident, it contributed the least compared to other types of damage experienced by wheat flour milling factories as a result of the conflict.

The machinery at the wheat flour milling factory sites can be disaggregated into several sub-categories (Table 13). Of these, electrical systems sustained the highest level of damage across the types of wheat flour milling machinery, with estimated total damage of USD 14.8 million, 77 percent of the total costs of damage to machinery. Such damage includes the destruction of electrical switch panels and transformers and the theft of electric cables, all of which are critical to operational continuity (Image 5, Image 6).

Table 13: Wheat flour milling, estimated machinery damages, by category, by factory studied

Wheat flour milling factory	Wheat handling & storage	Wheat conditioning	Milling Process	Electrical Systems	Packaging & handling	Utilities, Surveillance	Total
Losses (USD thousand):							
Factory 1 (small)	109	38	597	976	-	-	1,720
Factory 2 (small)	88	30	304	1,095	85	-	1,602
Factory 3 (large)	88	-	-	60	538	67	753
Factory 4 (large)	2,423	13	-	12,643	-	27	15,106
Total	2,708	82	900	14,774	622	94	19,180
Share of total machinery damage for factory (%):							
Factory 1 (small)	6.3	2.2	34.7	56.7	-	-	100.0
Factory 2 (small)	5.5	1.9	19.0	68.4	5.3	-	100.0
Factory 3 (large)	11.7	-	-	8.0	71.4	8.9	100.0
Factory 4 (large)	16.0	0.1	-	83.7	-	0.2	100.0
Total	14.1	0.4	4.7	77.0	3.2	0.5	100.0

Source: Authors' compilation based on survey responses and on-site assessments.

Such damage was consistently reported across all four facilities, underscoring the vulnerability of power infrastructure and its critical role in maintaining industrial production. Damage to grain handling and storage machinery ranked second in terms of damage to factory machinery, accounting for almost 14 percent of the total estimated costs of machinery damage to the four wheat flour mills.

Image 5: Damaged electrical system panel, wheat flour mill Factory 1, Khartoum North industrial area, March 2025

Source: Photo taken by site visit team during field assessment, March 2025.

Image 6: Damaged electrical transformer at wheat flour mill Factory 3, Khartoum North industrial area, March 2025

Source: Photo taken by site visit team during field assessment, March 2025.

The estimated time frame for repairing different types of machines at the four wheat flour milling factories ranges between three and six months, depending on the complexity and function of the component. Systems such as utilities, surveillance, information and telecommunications, firefighting, and quality control have the shortest average repair time, estimated at around three months. In contrast, more technical systems, including electrical infrastructure, milling processes, and pneumatic systems, require repairs that will take more time to complete. For these systems, repairs are estimated to require six months, reflecting the specialized nature of the repairs needed (Table 14).

Table 14: Wheat flour milling, estimated repair time by machinery subcategory, months

Machinery subcategory	Minimum	Average	Maximum
Wheat handling and storage machinery	3	3.7	6
Wheat conditioning and preparation machinery	3	4.0	6
Milling processes and pneumatic systems	3	5.2	6
Packaging and handling systems	3	3.7	6
Electrical systems	3	5.7	6
Auxiliary utilities, surveillance, information and telecommunications, quality monitoring, and firefighting systems	3	3.0	6

Source: Authors' compilation based on survey responses and on-site assessments.

6.2.4 Production inventory losses

The total estimated production inventory losses due to theft or destruction across the four wheat flour mills in Khartoum state amount to USD 39.8 million, with Factory 4 incurring the highest individual loss (Table 10). Overall, damage attributed to production capacity represents 15.2 percent of total losses across all facilities, highlighting the significant—but not dominant—role of operational disruption due to loss of production inventory in the broader economic impact of the conflict on these wheat flour milling firms.

The production inventory losses in the wheat flour milling sector can be disaggregated into raw materials, finished goods, and packaging materials. Raw materials accounted for the largest share of production inventory losses at an estimated USD 25.3 million, or 64 percent of all production inventory losses. Losses in finished goods made up 23 percent of these losses, with the balance of losses made up by packaging materials. These losses highlight the significant disruption to both supplies of raw materials and the availability of the final products caused by the conflict (Table 15).

Table 15: Wheat flour milling, estimated production inventory losses, by category, by factory studied

Wheat flour milling factory	Raw Materials	Packing Material	Finished Goods	Total
Losses (USD thousand):				
Factory 1 (small)	3,070	151	796	4,017
Factory 2 (small)	1,750	360	178	2,288
Factory 3 (large)	5,523	3,313	2,895	11,731
Factory 4 (large)	15,000	1,600	5,200	21,800
Total	25,343	5,424	9,069	39,836
Share of total production inventory losses for factory (%):				
Factory 1 (small)	76.4	3.8	19.8	100.0
Factory 2 (small)	76.5	15.7	7.8	100.0
Factory 3 (large)	47.1	28.2	24.7	100.0
Factory 4 (large)	68.8	7.3	23.9	100.0
Total	63.6	13.6	22.8	100.0

Source: Authors' compilation based on survey responses and on-site assessments.

6.2.5 Logistics and maintenance asset losses

The total estimated damage or losses of logistics and maintenance assets in the four wheat flour milling factories in Khartoum state amounts to USD 26.8 million and contributed to 10.3 percent of total losses (Table 10). The distribution of losses of logistics and maintenance assets was not evenly distributed across the four mills studied. Such losses account for 23.1 percent of the total losses reported by Factory 3, while such losses for the other three mills were 7.5 percent or less of total losses.

The logistics and maintenance asset losses in the wheat flour milling sector can be disaggregated into spare parts, vehicles and handling equipment, including cars, trucks, and forklifts, and fuel and lubricants (Table 16). Among these, the highest losses were reported in spare parts, estimated at USD 23.5 million or 88 percent of all logistics and maintenance asset losses. Estimated losses of vehicles and handling equipment and fuel and lubricants were much lower. This holds true for all four assessed flour mills, except Factory 1, where losses in vehicles (cars and trucks) and equipment accounted for 78 percent of the factory's total logistics losses.

Table 16: Wheat flour milling, estimated logistics and maintenance asset losses, by category, by factory studied

Wheat flour milling factory	Fuel, Lubricants, etc.	Cars, Trucks and Equipment	Spare parts	Total
Losses (USD thousand):				
Factory 1 (small)	12	42	-	54
Factory 2 (small)	850	290	-	1,140
Factory 3 (large)	350	1,693	18,456	20,499
Factory 4 (large)	109	-	5,000	5,109
Total	1,321	2,025	23,456	26,803
Share of total logistics and maintenance losses for factory (%):				
Factory 1 (small)	22.2	77.8	-	100.0
Factory 2 (small)	74.6	25.4	-	100.0
Factory 3 (large)	1.7	8.3	90.0	100.0
Factory 4 (large)	2.1	-	97.9	100.0
Total	4.9	7.6	87.5	100.0

Source: Authors' compilation based on survey responses and on-site assessments.

6.2.6 Estimated financial losses

Financial losses make up the largest share of total losses for all four of the wheat flour milling factories studied. These were estimated to be almost USD 139 million or 53.2 percent of total losses (Table 10). At the individual factory level, financial losses made up about 62 percent of the losses incurred by Factory 3. For the other factories, financial losses as a share of total losses were closer to 50 percent.

For this study, financial losses in wheat flour mills were categorized into 13 distinct components (Table 17Table 17). These include losses related to receivables, penalties related to disrupted loan repayment, foreign exchange impacts, labor disruptions, and opportunity costs, among others. The largest share of financial losses was attributed to forgone profits and opportunity costs, which account for over half of the total financial losses, followed by losses on receivables. This breakdown of the financial costs borne by the wheat flour milling firms during the conflict highlights the significant economic strain placed on milling operations over the conflict period, particularly in terms of missed business opportunities and disrupted financial flows.

Table 17: Wheat flour milling, estimated financial losses, by category, by factory studied

Wheat flour milling factory	Receivable losses	Foreign exchange losses	Labor cost disruption	Foreign profit and opportunity cost losses	Goodwill losses	Other financial losses	Total
Losses (USD thousand):							
Factory 1 (small)	767	195	489	4,775	1,000	427	7,653
Factory 2 (small)	-	-	600	2,500	1,500	2,125	6,725
Factory 3 (large)	27,522	3,141	953	21,500	-	1,490	54,606
Factory 4 (large)	15,000	-	3,500	50,000	-	1,500	70,000
Total	43,289	3,336	5,542	78,775	2,500	5,542	138,984
Share of total financial losses for factory (%):							
Factory 1 (small)	10.0	2.6	6.4	62.4	13.1	5.6	100.0
Factory 2 (small)	-	-	8.9	37.2	22.3	31.6	100.0
Factory 3 (large)	50.4	5.8	1.7	39.4	-	2.7	100.0
Factory 4 (large)	21.4	-	5.0	71.4	-	2.1	100.0
Total	31.1	2.4	4.0	56.7	1.8	4.0	100.0

Source: Authors' compilation based on survey responses and on-site assessments.

In summary, the assessment of the wheat flour mills in Khartoum state during the current conflict reveals that financial losses represent their most significant burden on wheat flour mills during the conflict period, accounting for 53.2 percent of total damages across the four factories studied (Table 10). However, the other types of losses could be quite significant for some factories, whether large or small. These findings underscore the urgent need for financial recovery strategies, inventory restocking, and infrastructure rehabilitation to restore the functionality and economic resilience of the wheat flour milling sector in Khartoum state and across Sudan.

6.3 Edible oil industry assessment

6.3.1 Overall damages and losses assessment

The assessment was planned to cover nine edible oil factories in Khartoum state, with a combined estimated production capacity of 2,705 metric tons per day. Eight of these factories are located in the Khartoum North industrial area, while one is situated in the Soba industrial area. At the onset of the conflict, two factories were still under commissioning. Site visits were conducted for eight factories, while one was assessed remotely through short video footage due to security constraints. However, complete data was only obtained from six of the nine factories, so in reporting on damages and losses in this section, only data from these six factories are presented.

The total joint estimated damages and losses for the six factories in the edible oil sector amount to just under USD 145 million (Table 18). Production capacity varies across the assessed factories. In Table 18, "small" refers to factories with a production capacity of less than 500 metric tons per day, while "large" refers to those with a capacity of 500 metric tons per day or more. Levels of losses vary significantly across the six factories, ranging from just under USD 6 million to over USD 58 million, reflecting differences in production capacity, infrastructure scale, and exposure to conflict-related disruptions.

Table 18: Edible oil industry, estimated damages and losses, by category, by factory studied

Edible oil Factory	Buildings	Machinery	Production Inventory	Logistics and Maintenance Assets	Financial	Total
Losses (USD thousand):						
Factory 2 (large)	103	573	3,508	482	17,890	22,556
Factory 3 (large)	14	233	12,544	687	1,037	14,514
Factory 4 (small)	4	931	1,191	877	2,945	5,949
Factory 5 (large)	60	221	19,362	1,250	13,900	34,794
Factory 7 (small)	5	2,609	13,750	14,330	27,500	58,194
Factory 9 (large)	207	368	3,949	216	4,030	8,769
Total	393	4,934	54,304	17,842	67,302	144,775
Share of total losses for factory (%):						
Factory 2 (large)	0.5	2.5	15.6	2.1	79.3	100.0
Factory 3 (large)	0.1	1.6	86.4	4.7	7.1	100.0
Factory 4 (small)	0.1	15.7	20.0	14.7	49.5	100.0
Factory 5 (large)	0.2	0.6	55.6	3.6	39.9	100.0
Factory 7 (small)	0.0	4.5	23.6	24.6	47.3	100.0
Factory 9 (large)	2.4	4.2	45.0	2.5	46.0	100.0
Total	0.3	3.4	37.5	12.3	46.5	100.0

Source: Authors' compilation based on survey responses and on-site assessments.
Note: Nine edible oil factories were included in the study. However, for only six of these there was complete information on estimated damages and losses obtained. Only data from these six factories are reported.

Similar to the wheat flour milling sector, financial losses represent the largest share of damages and losses, accounting for 46.5 percent of the total. This is followed by production inventory losses at 37.5 percent. Damages to and losses of logistics and maintenance assets and damage to buildings and machinery are relatively small. These findings highlight the significant financial strain placed on edible oil producers, with implications for both their short-term recovery and the long-term resilience of the edible oil industrial sector (Table 18).

6.3.2 Building damage

The total estimated damage to buildings reported across six edible oil factories amounts to USD 393,000 (Table 18). The highest damage to factory buildings was recorded by factory 9, with losses of USD 207,000. While building damage represents a relatively small share of sector losses overall, it can still significantly disrupt operations at the factory level.

Disaggregating the damage to factory buildings by type of building—production, auxiliary, and administration buildings—the largest share of building damage was to production buildings, accounting for more than half of all building damage in the edible oil factories studied, followed by damage to administration facilities. These findings suggest that rehabilitation efforts should prioritize restoring production infrastructure, as it represents the core of operational functionality (Table 19).

Table 19: Edible oil industry, estimated buildings damages, by category, by factory studied

Edible oil factory	Administration Facilities	Auxiliary Facilities	Production Facilities	Total
Losses (USD thousand):				
Factory 2 (large)	76	8	18	103
Factory 3 (large)	2	-	12	14
Factory 4 (small)	3	1	-	4
Factory 5 (large)	11	-	49	60
Factory 7 (small)	1	-	4	5
Factory 9 (large)	27	59	121	207
Total	120	68	205	393
Share of total buildings damage for factory (%):				
Factory 2 (large)	74.2	8.0	17.8	100.0
Factory 3 (large)	11.1	-	88.9	100.0
Factory 4 (small)	71.4	28.6	-	100.0
Factory 5 (large)	18.1	-	81.9	100.0
Factory 7 (small)	20.0	-	80.0	100.0
Factory 9 (large)	13.2	28.2	58.6	100.0
Total	30.5	17.3	52.2	100.0

Source: Authors' compilation based on survey responses and on-site assessments.
Note: Nine edible oil factories were included in the study. However, for only six of these there was complete information on estimated damages and losses obtained. Only data from these six factories are reported.

Metal roof damage remains one of the most common forms of building damage in the edible oil industry. Image 7 shows a common pattern of roof loss observed across all three types of agro-industries examined in this study. This type of damage poses serious risks to equipment and inventory, and its recurrence across sectors highlights the need for reinforced solutions in future rehabilitation efforts.

Image 7: Edible oil industry, theft of roof sheeting at edible oil factory, Khartoum North industrial area, March 2025

Source: Photo taken by site visit team during field assessment, March 2025.

Satellite imagery was used to assess the extent and types of damage in edible oil factories and to evaluate safety and security risks prior to site visits. Satellite images provided a general overview of structural damage by comparing the condition of the factory building from before the conflict to its current condition. Image 8 makes this comparison for three edible oil factories in the Khartoum North industrial area.

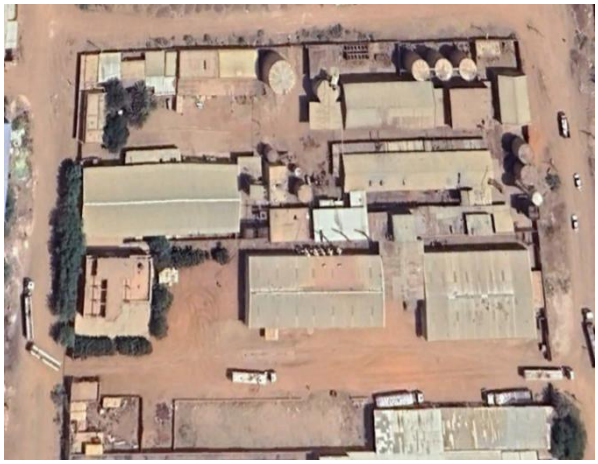
Image 8: Satellite images from before and during the conflict showing damage to edible oil factories in the Khartoum North industrial area

Images from April 2023, before start of conflict

Images from March 2025, during the conflict

Edible oil factory 4:

Some damage near a storage building.



Edible oil factory 5:

Holes in roofs of two storage facilities

Edible oil factory 6:

Extensive damage to southwestern side of the factory, and minor damage to building in the east

Source: Compiled by authors.

Information was collected from factory owners on the time that they estimated it would take to repair the damaged buildings at their edible oil factory sites. These estimates vary by building type. Production facilities require the longest average repair time at 5.0 months, followed by administrative facilities at 4.4 months, and auxiliary facilities at 3.6 months (Table 20). This variation highlights the complexity of restoring core operational infrastructure and

the need to prioritize production areas within factories to minimize downtime and efficiently restore industrial processing capacity.

Table 20: Edible oil industry, estimated repair time by factory building type, months

Building type	Minimum	Average	Maximum
Administrative buildings	1	4.4	7
Auxiliary buildings	1	5.0	6
Production facilities	1	3.6	6

Source: Authors' compilation based on survey responses and on-site assessments.

6.3.3 Machinery damage

The total estimated damage to machinery across the six edible oil factories in Khartoum state amounted to approximately USD 4.9 million (Table 18). Factory 7 experienced the highest machinery damage at over USD 2.6 million, while factory 4 reported the highest share of damage to machinery in total damages incurred, highlighting the uneven impact of the conflict across facilities.

The machinery at the edible oil factory sites can be disaggregated into several subcategories. Of these, electrical systems sustained the highest level of damage across the types of edible oil processing machinery, accounting for at least three-quarters of the costs of all damage to machinery. Such damage includes the destruction of electrical transformers and theft of electric cables, which accounted for 88.8 percent of total machinery damage. both of which are critical to the operations of the factories. Oilseed milling machinery damages were the second most common categories of machinery damaged. However, the costs associated with damage to this machinery were much lower than those associated with damage to the factories' electrical systems (Table 20).

Table 21: Edible oil industry, estimated machinery damages and losses, by category, by factory studied

Edible oil factory	Electrical Systems	Oil Mills	Handling, Storage, & Cleaning	Refinery	Filling &Packing	Auxiliaries and Others	QC/ Laboratory	Total
Losses (USD thousand):								
Factory 2 (large)	532	-	-	-	17	23	-	596
Factory 3 (large)	232	-	-	-	-	-	1	233
Factory 4 (small)	686	245	-	-	-	-	-	931
Factory 5 (large)	220	-	-	-	1	-	-	221
Factory 7 (small)	2459	2	-	23	-	72	52	2681
Factory 9 (large)	338	20	10		-	-	-	368
Total	4467	267	10	23	19	95	53	5030
Share of total machinery damage for factory (%):								
Factory 2 (large)	89.3				2.9	3.9	-	100.0
Factory 3 (large)	99.7	-	-	-	-	-	0.3	100.0
Factory 4 (small)	73.7	26.3	-	-	-	-	-	100.0
Factory 5 (large)	99.5	-	-	-	0.5	0.0	-	100.0
Factory 7 (small)	91.7	0.1	-	0.9	-	2.7	1.9	100.0
Factory 9 (large)	91.8	5.4	2.8					100.0
Total	88.8	5.3	0.2	0.5	0.4	1.9	1.1	100.0

Source: Authors' compilation based on survey responses and on-site assessments.
Note: Nine edible oil factories were included in the study. However, for only six of these there was complete information on estimated damages and losses obtained. Only data from these six factories are reported.

Image 9: Edible oil industry, damaged electrical transformer at edible oil factory 5, Khartoum North industrial area, March 2025

Source: Photo taken by site visit team during field assessment, March 2025.

Table 22 shows that the estimated repair time for damaged edible oil processing machinery ranges from one to seven months, depending on the type of equipment. Machinery used for oilseed handling and preparation has the longest average repair time at six months, followed by electrical systems, which require between four and seven months for restoration. These results suggest that rehabilitation efforts will be uneven across machinery types, with critical operations—particularly those involving electricity and seed processing—facing prolonged downtime.

Table 22: Edible oil industry, estimated repair time by machinery type, months

Building type	Minimum	Average	Maximum
Oilseed handling and preparation machinery	6	6.0	6
Oil milling machinery	1	3.6	6
Oil refining machinery	1	1.0	1
Filling and packaging machinery	1	4.0	6
Product handling, storage, cleaning, and preparation machinery	1	1.0	1
Solvent extraction machinery	1	1.7	3
Electrical systems	4	5.9	7
Auxiliary machinery	3	3.0	3

Source: Authors' compilation based on survey responses and on-site assessments.

6.3.4 Production inventory losses

Total estimated damages to the production inventory of the edible oil factories studied totaled USD 54.3 million, accounting for 37.5 percent of total damages and losses (Table 18). Among the high damage/production capacity edible oil factories, Factory 5 reported the highest damage at USD 19.4 million, accounting for almost 56 percent of its total losses, followed by factory 7 with USD 13.8 million. The production inventory losses in the edible oil sector are disaggregated into raw materials, finished goods, and packaging materials. More than half of the production inventory losses (66.6 percent) reported were related to raw materials. Losses in finished goods followed. These figures highlight the vulnerability of

supply chains during conflict, particularly in securing raw materials as inputs and preserving the final processed products (Table 23).

Table 23: Edible oil industry, estimated production inventory losses, by category, by factory studied

Edible oil factory	Raw Materials	Packing Material	Finished Goods	Total
Losses (USD thousand):				
Factory 2	3,140	-	369	3,508
Factory 3	6,455	839	5,251	12,544
Factory 4	341	20	830	1,191
Factory 5	12,000	1,062	6,300	19,362
Factory 7	7,700	400	5,650	13,750
Factory 9	2,968	692	288	3,949
Total	32,604	3,013	18,687	54,304
Share of total production inventory losses for factory (%):				
Factory 2	89.5	-	10.5	100.0
Factory 3	51.5	6.7	41.9	100.0
Factory 4	28.7	1.6	69.7	100.0
Factory 5	62.0	5.5	32.5	100.0
Factory 7	56.0	2.9	41.1	100.0
Factory 9	75.2	17.5	7.3	100.0
Total	60.0	5.5	34.4	100.0

Source: Authors' compilation based on survey responses and on-site assessments.
Note: Nine edible oil factories were included in the study. However, for only six of these there was complete information on estimated damages and losses obtained. Only data from these six factories are reported.

6.3.5 Logistics and maintenance asset losses

Estimated losses of logistics and maintenance assets for the six factories in the edible oil sector amounted to USD 17.8 million, representing 12.3 percent of the sector's total damages and losses (Table 18). Factory 7 experienced the highest losses in this category, which, as a share of total damages and losses, amounted to about a quarter of the factory's losses. Losses of these assets for factory 4 were about 15 percent of total losses. Logistics and maintenance asset losses for the other factories were a relatively small share of total losses.

The logistics and maintenance asset losses in the edible oil sector can be disaggregated into spare parts, oil pumps, vehicles, including cars, trucks, and product handling equipment, and fuel and lubricants. Among these, the highest losses were reported for vehicles, which made up 90.4 percent of all logistics and maintenance asset losses. Losses of other assets were minimal (Table 24).

Table 24: Edible oil industry, estimated logistics and maintenance asset losses, by category, by factory studied

Edible oil factory	Fuel, Lubricants, etc.	Cars, Trucks and Equipment	Spare parts	Total
Losses (USD thousand):				
Factory 2 (large)	-	382	100	482
Factory 3 (large)	48	486	153	687
Factory 4 (small)	243	149	485	877
Factory 5 (large)	-	1,250	-	1,250
Factory 7 (small)	500	13,680	150	14,330
Factory 9 (large)	25	191	-	216
Total	817	16,138	888	17,842
Share of total logistics and maintenance asset losses for factory (%):				
Factory 2 (large)	-	79.3	20.7	100.0
Factory 3 (large)	7.0	70.7	22.3	100.0
Factory 4 (small)	27.7	17.0	55.3	100.0
Factory 5 (large)	-	100.0	-	100.0
Factory 7 (small)	3.5	95.5	1.0	100.0
Factory 9 (large)	11.7	88.3	-	100.0
Total	4.6	90.4	5.0	100.0

Source: Authors' compilation based on survey responses and on-site assessments.
Note: Nine edible oil factories were included in the study. However, for only six of these there was complete information on estimated damages and losses obtained. Only data from these six factories are reported.

6.3.6 Estimated financial losses

Total financial losses in edible oil factories amounted to approximately USD 67.3 million, which represented 46.5 percent of total estimated losses in this sector (Table 18). At factory level, financial losses significantly vary amongst studied edible oil factories. Factory 7 reported the highest financial losses, but the financial losses for factory 2 as a share of total damages and losses were the highest in relative terms at 79 percent. These data underscore that financial losses constitute the overwhelming majority of total damages and losses, emphasizing the scale of the economic impact of the conflict on the sector. This highlights the need for targeted financial recovery strategies, especially for factories where such losses represent a substantial portion of total damages and losses.

For this study, financial losses in the edible oil factories studied were disaggregated into 11 components. The largest share of financial losses for the edible oil factories was attributed to forgone profits and opportunity costs, which account for about one-third of total financial losses for the factories, followed by losses on receivables, which account for about 29 percent of their financial losses (Table 25). This breakdown of the financial costs borne by the edible oil factories during the conflict highlights the significant economic strain placed on oilseed processing operations over the conflict period, particularly in terms of missed business opportunities and disrupted financial flows. These findings underscore the need for financial recovery strategies for agro-industrial sectors in Sudan that go beyond physical asset restoration.

Table 25: Edible oil industry, estimated financial losses, by category, by factory studied

Edible oil factory	Receivable losses	Loan penalty	Foreign exchange losses	Labor cost disruption	Foreign profit and opportunity cost losses	Goodwill losses	Other financial losses	Total
Losses (USD thousand):								
Factory 2 (large)	37	-	2,500	250	15,000	-	104	17,890
Factory 3 (large)	187	72	154	44	230	-	350	1,037
Factory 4 (small)	350	-	530	750	1,250	-	65	2,945
Factory 5 (large)	4,000	400	3,000	1,000	1,000	3,000	1,500	13,900
Factory 7 (small)	15,000	2,000	2,500	500	3,500	2,000	2,000	27,500
Factory 9 (large)	-	567	-	15	1,370	-	2,078	4,030
Total	19,573	3,038	8,684	2,559	22,350	5,000	6,096	67,302
Share of total financial losses for factory (%):								
Factory 2 (large)	0.2	-	14.0	1.4	83.8	-	0.6	100.0
Factory 3 (large)	18.0	6.9	14.9	4.3	22.2	-	33.8	100.0
Factory 4 (small)	11.9	-	18.0	25.5	42.4	-	2.2	100.0
Factory 5 (large)	28.8	2.9	21.6	7.2	7.2	21.6	10.8	100.0
Factory 7 (small)	54.5	7.3	9.1	1.8	12.7	7.3	7.3	100.0
Factory 9 (large)	-	14.1	-	0.4	34.0	-	51.6	100.0
Total	29.1	4.5	12.9	3.8	33.2	7.4	9.1	100.0

Source: Authors' compilation based on survey responses and on-site assessments.
Note: Nine edible oil factories were included in the study. However, for only six of these there was complete information on estimated damages and losses obtained. Only data from these six factories are reported.

In summary, the analysis of the composition of damages and losses due to the conflict across edible oil factories in Khartoum state reveals that financial losses dominate, which reflects the economic disruptions caused by halted operations, lost revenue and opportunity cost, and receivable losses. Inventory losses are the second most significant, highlighting the vulnerability of damage to and losses of stored raw materials and finished goods under conditions of conflict. While damage to machinery and losses of logistics and maintenance assets represent smaller shares of total damages and losses, their restoration is essential if these factories are to resume production. Importantly, the distribution of these losses is highly uneven across factories, so tailored support strategies that address the specific damage profiles and recovery needs of each facility will be required to enable the edible oil sector to regain its full production potential.

6.4 Packaging materials industry assessment

One factory was assessed in the packaging materials industry subsector. Its total estimated damage was reported at USD 1.3 million (Table 26). Financial losses made up the largest share of these losses at 34.3 percent, reflecting the substantial economic impact of disrupted operations and lost business opportunities. Building damage accounts for 21.1 percent of total losses, indicating notable structural impairment, while machinery damage represents 19.2 percent, pointing to critical disruptions in production capacity.

Table 26: Packaging materials factory, estimated damage and losses

Category	Losses (USD thousand)	Percent of total damage
Building damage	282	21.0
Machinery damage	257	19.0
Production inventory losses	180	13.5
Logistics and maintenance asset losses	160	12.5
Financial losses	460	34.0
Total	1,339	100.0

Source: Authors' compilation based on survey responses and on-site assessment.

6.4.1 Building damage

Looking at each category of damage and losses for the packaging materials factory studied starting with **damage to buildings** at the factory site, the production line buildings sustained the highest damage, making up 70.1 percent of building damage in total. Damage costs to administration and auxiliary buildings were almost equal, each at about 15.8 percent of total building damage costs (Table 27).

Table 27: Packaging materials factory, estimated building damage, by category

Category	Losses (USD thousand)	Percent of building damage
Administration Facilities	45	15.8
Auxiliary Facilities	40	14.1
Production Facilities	198	70.1
Total	282	100.0

Source: Authors' compilation based on survey responses and on-site assessment.

6.4.2 Machinery damage

Machinery damage at the packaging materials factory was overwhelmingly concentrated in electrical systems. The factory owners estimated it would take six months of work to restore them at their facility. This highlights the critical vulnerability of electrical infrastructure to agro-industrial production (Table 28).

Table 28: Packaging materials factory, estimated machinery damage, by category

Category	Losses (USD thousand)	Percent of machinery losses
Electrical Systems Losses	256	99.5
Handling, Storage, Cleaning & Preparation	1	0.5
Total	257	100.0

Source: Authors' compilation based on survey responses and on-site assessment.

6.4.3 Production inventory losses

The total estimated **production inventory losses** for the packaging materials factory primarily consisted of losses of raw materials, estimated at USD 150,000, with processed packaging material product losses at USD 30,000 (Table 29). This pattern highlights the need to ensure supplies of raw materials if agrifood value chains are to be restored and agrifood processing and related factories, like those making packaging material, are to resume production after the conflict ends.

Table 29: Packaging materials factory, estimated production inventory losses, by category

Category	Losses (USD thousand)	Percent of production inventory losses
Raw Materials	150	83.3
Packing Material	30	16.7
Finished Goods	-	-
Total	180	100.0

Source: Authors' compilation based on survey responses and on-site assessment.

6.4.4 Maintenance and logistic asset losses

The total estimated losses in **maintenance and logistics assets** for the packaging materials factory were estimated at USD 160,000, of which USD 100,000 was for damages to or losses of cars, trucks, and handling equipment, USD 30,000 in spare parts, and another USD 30,000 in fuel, lubricants, and related materials. These losses highlight the disruption to essential support infrastructure, which is critical for transportation, equipment servicing, and operational continuity (Table 30).

Table 30: Packaging materials factory, estimated maintenance and logistics asset losses, by category

Category	Losses (USD thousand)	Percent of maintenance and logistics asset
Fuel, Lubricants, etc.	30	18.8
Cars, Trucks and Equipment	100	62.5
Spare parts	30	18.8
Total	160	100.0

Source: Authors' compilation based on survey responses and on-site assessment.

6.4.5 Financial losses

The total estimated **financial losses** for the factory amounted to USD 460,000. Forgone profits and opportunity costs made up the largest share at 65.2 percent of total financial losses, reflecting the economic strain caused by market disruptions. Goodwill losses were also significant, indicating impacts of the economic challenges caused by the conflict on the reputation of the business, with the potential for breakdowns in important business relationships (Table 31).

Table 31: Packaging materials factory, estimated financial losses, by category

Category	Losses (USD thousand)	Percent of financial losses
Receivable losses	-	-
Labour cost disruption	40	8.7
Foreign profit and opportunity cost losses	300	65.2
Good will losses	120	26.1
Total	460	100.0

Source: Authors' compilation based on survey responses and on-site assessment.

6.5 Socio-economic impact of conflict on agro-industries in Khartoum

The ongoing conflict has deeply affected Sudan's agro-industries, which are critical for national food security and economic resilience. The wheat flour milling and edible oil industries are critical to the supply of staple foods that form the foundation of daily diets in Khartoum and neighboring states. The closure of major industrial plants has led to widespread job losses. Displaced factory workers now rely on remittances and charitable food aid, underscoring the growing socioeconomic vulnerability of conflict-affected communities. Reopening production in the flour milling, edible oil, and packaging sectors is essential not only for restoring livelihoods but also for stabilizing food access and supporting the repatriation of displaced populations.

Among the industrial facilities assessed through key informant interviews, all but one indicated that they had no intention to relocate outside Khartoum state. One firm has opened a branch factory in Port Sudan but also reported that it is planning to rehabilitate its original facility in Khartoum. Most factories aim to resume operations within six months, contingent on the restoration of security.

However, several challenges threaten this recovery, including political and economic instability, security concerns, unreliable electricity and water supply, financial constraints, labor shortages, and limited access to essential services, such as healthcare and law enforcement. While raw materials are currently available, many factories anticipate difficulties in financing their purchases of raw materials and transporting the inputs from production areas.

In summary, the recovery of Sudan's agro-industrial base—particularly in Khartoum—is vital for ensuring food security, restoring employment, and supporting broader socioeconomic stability. Targeted support and coordinated policy action will be crucial to overcoming the barriers to recovery and building a more resilient agro-industrial sector.

6.6 Limitations of the study

Due to the ongoing dangerous security situation, the assessment was conducted using limited tools, and a comprehensive evaluation was not feasible. In many cases, buildings were found to be destroyed, making it impossible to access interior areas for inspection of machinery and equipment.

Additionally, the study faced several challenges in estimating the value and extent of damages and losses. One major constraint was the high level of price volatility driven by conflict-related conditions, including shortages of skilled labor, essential supplies, engineering tools, and construction materials—particularly those required for rebuilding and machinery repair. The extensive destruction of infrastructure, such as roads, electricity, and water systems, further complicated recovery efforts. These challenges were compounded by high price inflation and a broad economic downturn, both of which have significantly reduced the purchasing power of consumers and businesses and distorted market prices.

7. POLICY PRIORITIES FOR RESUMING AGRO-INDUSTRIAL ACTIVITIES IN SUDAN

7.1 Stakeholders' perspectives on priority interventions

During key informant interviews with owners and managers of industrial plants in the wheat flour milling and edible oil subsectors, several critical challenges and priority interventions were identified. Most factory operators emphasized that resuming factory operations would require substantial investments, which are currently impossible due to the lack of accessible financing. Many have lost their collateral assets due to war-related destruction, making it nearly impossible to secure new loans. This is compounded by accumulated liabilities, including unpaid taxes, newly imposed fees, and the increased expectations of *zakat* contributions to the needy, all of which further strain their financial capacity.

Owners also cited legal and regulatory challenges to the rehabilitation and operation of their factories, including the imposition of unauthorized road taxes by state authorities and the lack of enforcement of national industrial laws. Some referred to Article 73 of the 1986 Tax Law, which provides a five-year income tax exemption for businesses affected by force majeure—arguing that this should be applied in the current context of conflict.

Security concerns were highlighted as another major barrier to restarting factory operations. The presence of weapons or unexploded ordnance at factory sites and the absence of basic services, such as electricity, water, and security, make industrial zones unsafe for workers and management alike.

In addition, factory owners expressed concern over market destabilization, including the influx of low-cost imports from neighboring countries that are benefiting from export incentives provided by their government, and the spread of counterfeit products using Sudanese brand names. Both of these practices damage local producers' reputation and market share.

Finally, labor and workforce issues were highlighted, with owners calling for legal clarity on their employment obligations and the protections they must offer their workers as they plan for eventual reopening.

7.2 Government support for industrial recovery

The Sudanese government's industrial development policy and response to conflict-related disruptions can be understood through recent initiatives, particularly the Sudan Industrial Development Conference that was organized in June 2024 by the Ministry of Industry and endorsed by the Sovereign Council and Cabinet of Ministers. This conference produced a set of recommendations aimed at revitalizing the industrial sector, many of which directly address the challenges raised by factory owners in the wheat flour milling, edible oil, and packaging materials industrial subsectors in Khartoum.

Security measures in industrial areas. Security has emerged as a top government priority. Special forces are being trained to secure industrial zones, and factory owners are encouraged to contract military-owned security firms. These efforts aim to restore safety and operational confidence in conflict-affected areas.

Financing and institutional support. While the government has shown willingness to support industrial recovery, implementation of financial measures remains limited The Ministry of Industry has urged factory owners to participate in these committees. However, access to external financial support remains uncertain. Only unconfirmed pledges have been received from Arab countries. Efforts continue to engage institutions like the Islamic Development Bank and the African Development Bank. Any secured funds are expected to be channeled through the Industrial Development Bank, a government-owned institution partially owned by the Sudan Union of Industrial Chambers.

Tax and customs exemptions. Machinery and spare parts for factory rehabilitation are expected to be treated as new investments and exempt from customs duties. However, VAT and profit tax exemptions remain unresolved and require further policy action.

Counterfeit goods and market competition. The government has acknowledged the issue of counterfeit products and unfair competition, particularly from subsidized imports, adversely affecting the business of agro-industries in Sudan. Stronger regulatory enforcement and formal policy responses are needed to protect local producers and restore brand integrity.

Labor and legal framework. Labor-related concerns remain largely unaddressed, though a national labor conference is to be held soon in Port Sudan to discuss employer obligations and workforce challenges during the post-conflict recovery phase.

Emergency law and tax relief. Sudan's current state of emergency has suspended some legal protections. Nonetheless, the Ministry of Industry is working to address industrial development issues within this changed legal context.

Cooking oil refinery licensing and local production policy. In order to promote local oilseed processing, the government has halted new licenses for cooking oil refineries, which often rely upon imported crude edible oils. While these restrictions support the development of domestic agricultural value chains, they may exacerbate supply shortages—particularly with reduced groundnut production in the agricultural areas of western Sudan. Stakeholders emphasized the need to align this policy with broader agricultural planning.

8. CONCLUSION AND RECOMMENDATIONS

The total estimated damages and losses across the 11 agro-industrial factories studied in Khartoum state amount to USD 407.4 million, with financial losses representing 50.8 percent of these costs (Table 9). These damages and losses underscore the severe economic disruption caused by the conflict, particularly in terms of lost revenue, payment for receivables, and business opportunities. Losses to production inventory are the second largest category of such losses at 23.2 percent, reflecting the insecurity of supplies of both raw materials and finished goods in the context of conflict. Damages and losses to logistics and maintenance assets, buildings, and machinery further highlight the widespread operational impact of the conflict on these industries.

Across the three agro-industrial subsectors examined, the four wheat flour milling factories studied experienced the highest joint losses of USD 261.2 million. Financial losses—mainly from foregone profits and opportunity costs—accounted for over half of the subsector's total losses. Significant damage was reported to production inventory and buildings at wheat flour mills, particularly in raw materials and production facilities. The six factories studied in the

edible oil subsector recorded total losses of USD 144.8 million, with financial losses dominating (46.5 percent), followed by inventory losses (37.5 percent). The financial losses were led by lost profits and opportunity cost which account for about one third of total financial losses and receivable losses accounting for 29 percent. Losses in raw materials represents 60 percent of production inventory losses. Only one factory was assessed in the packaging materials industry subsector. Its total estimated damages and losses were USD 1.3 million, of which financial losses made up the largest share (34.3 percent).

Overall, the assessment reveals a pattern of financial vulnerability across Sudan's agro-industrial sector. The uneven distribution of losses across factories—particularly among high-capacity facilities—calls for tailored rehabilitation strategies that prioritize financial recovery, inventory restocking, and restoration of critical infrastructure. A phased and subsector-specific approach will be essential to restoring functionality, safeguarding livelihoods, and building long-term resilience in Sudan's agro-industrial sector.

Based on the findings of this assessment and the views expressed by factory owners, managers, and government officials, the following priority recommendations are proposed to support the rehabilitation and long-term resilience of Sudan's agro-industrial sector:

1. Enhance security and safety in industrial zones.
    - Deploy trained security forces to protect industrial areas and ensure safe access for workers and management.
    - Clear unexploded ordnance and secure basic services, including electricity, water, and waste management, to enable safe resumption of industrial operations.
2. Facilitate access to financing for industrial rehabilitation.
    - Establish targeted financing mechanisms through the Industrial Development Bank, with concessional terms for conflict-affected factories.
    - Encourage public-private partnerships and explore blended finance models to mobilize domestic and international financial resources for Sudanese agro-industries.
    - Reassess collateral requirements for loans, considering the widespread asset destruction that has occurred under the current conflict.
3. Implement tax relief and legal incentives.
    - Enforce Article 73 of the 1986 Tax Law, granting a five-year income tax exemption for businesses affected by force majeure. The current conflict qualifies as a force majeure.
    - Provide customs and VAT exemptions for imported machinery, spare parts, and rehabilitation inputs.
    - Suspend or harmonize state-level taxes and road levies that contradict national industrial policies.
4. Support market recovery and protect local producers.
    - Strengthen enforcement against counterfeit goods and unfair competition from subsidized imports.
    - Launch a national campaign to restore consumer trust in local brands and promote Sudanese-made products.

- Align trade and industrial policies to protect strategic sectors during the post-conflict recovery phase.

5. Address labor and workforce challenges.
    - Convene the planned National Labor Conference to clarify employer obligations, worker protections, and workforce reintegration strategies.
    - Provide incentives for rehiring and training displaced workers, especially in high-capacity factories.
6. Strengthen institutional coordination and policy implementation.
    - Operationalize the recommendations of the Sudan Industrial Development Conference (2024).
    - Ensure representation of private sector stakeholders in industrial recovery strategy implementation and monitoring processes.
    - Improve coordination between federal and state authorities to avoid industrial policy fragmentation.
7. Align industrial policy with agricultural supply chains.
    - Reassess the policy on halting new oil refinery licenses to ensure alignment with agricultural production capacity, especially in oilseed supply.
    - Promote integrated planning between the Ministry of Industry and the Ministry of Agriculture to avoid supply bottlenecks.

REFERENCES

ACLED. 2024. “Foreign Meddling and Fragmentation Fuel the War in Sudan.” Conflict Watchlist 2025 | Sudan, 12 December 2024. Armed Conflict Location & Event Data (ACLED) Project. https://acleddata.com/conflict-watchlist-2025/sudan/

CBOS. 2025. *Foreign Trade Statistical Digest, January- December 2024*, 60 (1). Port Sudan: Central Bank of Sudan (CBOS): https://cbos.gov.sd/en/content/jan-dec-2024

DTM Sudan. 2025. *Sudan Mobility Update (21) August Monthly Report*. Geneva: Displacement Tracking Matrix (DTM) Sudan, International Organization for Migration (IOM). https://reliefweb.int/report/sudan/dtm-sudan-mobility-update-21-monthly-report-14-september-2025

FAO. 2022.“Food Balance Sheets: Sudan 2021”. *FAOSTAT*. Rome: Food and Agriculture Organization of the United Nations (FAO). https://www.fao.org/faostat/en/#data/FBS

FAO. 2024a. *Special report − 2023 FAO Crop and Food Supply Assessment Mission (CFSAM) to the Republic of the Sudan*. CFSAMs Special Reports, 01/2024. Rome. Food and Agriculture Organization of the United Nations (FAO). https://doi.org/10.4060/cd0053en

FAO. 2024b. “Preliminary Food Balance Sheets: Sudan 2023.” *FAOSTAT*. Rome: Food and Agriculture Organization of the United Nations (FAO). https://www.fao.org/faostat/en/#data/FBS

FAOSTAT. 2025. “Food and Agriculture Data.” *FAOSTAT*. Rome: Food and Agriculture Organization of the United Nations (FAO). https://www.fao.org/faostat/en/#home

FSD Africa. 2023. *Rapid Assessment of Food and Payment Systems in Sudan for a Coordinated Food Security Emergency*. Nairobi: FSD Africa. https://fsdafrica.org/wp-content/uploads/2023/12/23-11-24-Sudan-Emergency-Response-rapid-assessment-External.pdf

Kirui, O.K.; K. Siddig, H. Abushama, and A.S. Taffesse. 2023. *Armed Conflict and Business Operations in Sudan: Survey Evidence from Agri-Food Processing Firms*. Sudan SSP Working Paper 11. Khartoum: International Food Policy Research Institute (IFPRI). https://doi.org/10.2499/p15738coll2.136835

Statista. 2025. “Edible oils – Sudan.” *Statista*. https://www.statista.com/outlook/emo/food/oils-fats/edible-oils/sudan

UN. 2023. “UN Comtrade Database.” *United Nations (UN) Comtrade*. https://comtrade.un.org/

USDA. 2025. *Sudan Wheat Production Summary*. Washington, DC: U.S. Department of Agriculture (USDA), Foreign Agricultural Service. https://ipad.fas.usda.gov/countrysummary/default.aspx?id=SU&crop=Wheat

WFP. 2024. *Sudan Emergency Food Security Update*. Rome: World Food Programme (WFP). https://www.wfp.org/countries/sudan

ANNEXES

Annex 1: Guidance for filling site visits forms

Annex Table 1: Machinery condition assessment

Scope	Handling, cleaning, and preparation of oilseed Oil refining Solvent extraction Cooking oil filling and packaging
Part of the plant.	Pressing Machine Elevator Extractor
Cause of damage	Fire Looting and theft Hazards
Description of damage	Examples: Pressing machine wiring disconnected; Elevator motor burned Extractor recycling pumps damaged
Condition or status	Basically intact (0-5% damaged) Slightly damaged (6-16%) Medium damage (17-45%) Replace (serious (46-80%) Collapse (81-100%)
Repairs or replacement needed	Pressing machine wiring to be repaired and reconnected Elevator motor to be replaced Extractor pumps to be replaced
Estimated repairing time	Pressing wiring—4 days Elevator motor—5 days Extractor recycle pumps—3 months
Estimated damage repair costs	Pressing wiring—USD 1,500 Elevator motor—USD 2,500 Extractor recycle pumps—USD 15,000

Source: Compiled by authors.

Annex Table 2: Building condition assessment

Scope	**Administrative offices** **Factory building, including building trusses** **Store** **Kitchen and cafeteria** **Laboratory** **Other buildings**
Part of building	Foundation Walls Roof Windows and doors Plastering and painting Infrastructure facilities—water supply, electrical supply, road accessibility HVAC, telephone connectivity, internet connectivity, lighting Tables, chairs, computers
Cause of damage	Missile or mortar Looting Hazards, e.g., presence of in explosive bombs and missiles, fuel spill, chemical-spills, water flooding
Description of damage	Fire Looting and theft Hazard
Condition or status	Basically intact (0-5% damaged) Slightly damaged (6-16%) Medium damage (17-45%) Replace (serious (46-80%) Collapse (81-100%)
Estimated repairing time	Record
Estimated damage repair cost	Record (in USD)

Source: Compiled by authors.

Annex 2: Safety and security guidelines

The Security and Safety Team requests everyone to adhere to the following guidelines during field visits:

Security Procedures:

- Do not carry valuable items or anything that may raise suspicion, e.g., laptop, expensive phone, camera, etc.
- Ensure you are carrying your permit at all times while moving.
- Take all necessary precautions to ensure returning home before sunset and commit to this regardless of circumstances.
- Avoid wearing clothing that may raise suspicion, e.g., khaki or clothes resembling Rapid Support Forces uniforms.
- Avoid behaviors and words commonly used by members of the Rapid Support Forces, even jokingly, such as words like "Ashawis," "Two only," "Ready," etc.
- Do not carry items that could be interpreted as military equipment.
- Do not publicly discuss political or military matters.
- Do not post any information about the project on social media or elsewhere.
- Maintain confidentiality regarding any information obtained from this project.
- Gain the cooperation of the targeted government entities, facilitators, and assisting entities during movement, and avoid debates and arguments.

Safety Procedures:

- Avoid any area of land where the soil appears to be loose or seems to have been previously dug up, whether by vehicle or on foot, as there is a risk of mines.
- Ensure good ventilation in any building the team wishes to enter.
- Stay away from any hole that seems to have been caused by an explosive projectile.
- If there is a hole in the ceiling, make sure there are no foreign objects inside the building before entering, as unexploded ordnance may still be inside and could detonate while inside the building. If you see a foreign object, do not enter the building at all. The same applies if there is a hole in the wall.
- Never approach any kind of ammunition, regardless of its size, even if it appears to be empty.
- Under no circumstances is it allowed to start a fire.

Annex 3 List of key informant interviews

Annex Table 3: Factory owners and senior management interviewed

Interviewee	Industry	Position
K.1	Wheat flour milling	Senior management
K.2	Wheat flour milling	Factory shareholder
K.3	Wheat flour milling	Senior management
K.4	Wheat flour milling	Factory shareholder
K.5	Wheat flour milling	Senior management
K.6	Edible oil	Factory owner
K.7	Edible oil	Factory owner
K.8	Edible oil	Senior management
K.9	Edible oil	Factory shareholder
K.10	Edible oil	Factory shareholder
K.11	Edible oil	Senior management
K.12	Edible oil	Senior management
K.13	Edible oil	Factory shareholder
K.14	Edible oil	Senior management
K.15	Edible oil	Senior management
K.16	Edible oil	Senior management
K.17	Packaging materials	Factory shareholder
K.18	Packaging materials	Senior management
K.19	Packaging materials	Senior management

Source: Compiled by authors.

Annex Table 4: Officers interviewed at government agencies

Interviewee	Government agency	Position
K.20	Ministry of Industry	Senior official
K.21	Ministry of Industry	Senior official
K.22	Ministry of Industry	Senior official
K.23	Ministry of Industry	Senior official (Retired)
K.24	Ministry of Industry	Senior official (Retired)
K.25	Ministry of Industry	Senior official (Retired)
K.26	Ministry of Industry	Senior official (Retired)
K.27	Ministry of Commerce	Senior official
K.28	Ministry of Commerce	Senior official (Retired)
K.29	Ministry of Commerce	Senior official (Retired)
K.30	Ministry of Energy and Electricity	Senior official
K.31	Ministry of Energy and Electricity	Senior official
K.32	Ministry of Energy and Electricity	Senior official (Retired)
K.33	Ministry of Finance	
K.34	Ministry of Finance	
K.35	Cities Water Supply Authority	Senior official
K.36	Cities Water Supply Authority	Senior official
K.37	Cities Water Supply Authority	Senior official (Retired)
K.38	Ministry of Roads and Bridges, Khartoum state	Senior official
K.39	Ministry of Roads and Bridges, Khartoum state	Senior official

Source: Compiled by authors.

Annex Table 5: Others in the agro-industrial sector of Sudan that were interviewed

Interviewee	Position
K.40	Edible oil expert
K.41	Edible oil expert
K.42	Wheat flour milling expert
K.43	Marketing expert
K.44	Stock market expert
K.45	Supply chain expert
K.45	Supply chain expert

Source: Compiled by authors.

Annex 4: Study implementation team

Annex Table 6: Members of the study implementation team

No.	Name	Responsibility
1	Dr. Ammar M.E. Ibrahim	Project manager
2	Eng. Mohammed El-Nasir A. Abdelkarim	Senior consultant
3	Eng. Moaz Ali Hassan Hamid	Senior consultant
4	Elsheikh A. Abdelkarim Mohamed	Senior consultant
5	Mr. Osman Mohamed Dafaala	Consultant
6	Mr. Elhassan Alsanosy Abdelbari	Consultant
7	Mr. Mustafa Awad Alkarim	Consultants
8	Lt-Gen. Shakir Bakhiet Abdallah	Security team leader
9	Ahmed Ali Musa	Logistics officer
10	Dr. Alwaleed Ali Ahmed	Communication officer
11	Eng. Esraa Babikir Mustafa	Communication officer
12	Eng. Almoez Sir Alkhatim Mohamed	Field engineer
13	Eng. Anas Idrees Badri	Field engineer
14	Eng. Hatim Mubarak Abdelaa	Planning engineer
15	Eng. Mohamed Abbas Hamdan	Field engineer
16	Eng. Khalid Taj Elsir	Field engineer
17	Eng. Omar Aboud Nagd Allah	Field engineer
18	Eng. Eltyeb Adam Mohamed Musa	Field engineer
19	Eng. Khalid Elsiddig Ahmed	Field engineer

Source: Compiled by authors.

ABOUT THE AUTHORS

Ammar Ibrahim is a project manager at Renaissance Centre for Consultancy, Capacity Building, and Development (RCCBD) & Arabian Institution for Consultancy Training (AINFCT) Consultancy and a consultant to IFPRI-Sudan. **Shima Mohamed** is a Research Analyst in IFPRI's Sudan Strategy Support Program (SSSP) in the Development Strategy and Governance (DSG) Unit, based in Cairo, Egypt. **Mohamed Abdel-Karim** is a senior consultant at RCCBD & AINFCT Consultancy and a consultant to IFPRI-Sudan. **Khalid Siddig** is Senior Research Fellow in IFPRI's DSG Unit and the Leader of IFPRI's SSSP, based in Nairobi, Kenya. He is also an Associate Professor at Khartoum University, Sudan.

ACKNOWLEDGMENTS

This research was supported by the International Maize and Wheat Improvement Center (CIMMYT) through its Sustainable Agrifood Systems Approach for Sudan (SASAS) program. The authors are grateful to Brian D'Silva (former CIMMYT consultant) for his extensive brainstorming on the idea, the importance of the analysis, and the structure of the data collection team. We are also thankful to Abdelhafiz Mohamed Adam (IFPRI-Sudan consultant based in Port Sudan) for his valuable feedback and suggestions.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

A world free of hunger and malnutrition

IFPRI is a CGIAR Research Center

IFPRI Sudan, Arab Organization for Agricultural Development (AOAD), 7th Amarat Street | P.O. Box 474 – 11111 | Khartoum, Sudan

Email: ifpri-sudan@cgiar.org | https://sudan.ifpri.info/