Food and Agriculture Organization of the United Nations

Agricultural value chain study in Iraq

Dates, grapes, tomatoes and wheat

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ABBREVIATIONS AND ACRONYMS

AEZ	Agro-ecological Zone
CPF	Country Programming Framework
FAO	Food and Agriculture Organization
FGDs	Focus group discussions
FSC	Food Security Cluster
GoI	Government of Iraq
IIs	Individual Interviews
IDPR	Iraqi Date Processing and Marketing Company
IPM	Integrated pesticide management
IS	Islamic State
KIIs	Key informant interviews
KRI	Kurdistan Region of Iraq
MBPD	Million barrels per day
MoA	Ministry of Agriculture
MoH	Ministry of Health
MoP	Ministry of Planning
PPP	Public-Private Partnership
SDGs	Sustainable Development Goals
SDR	Secondary Data Review
SSFS	Small Scale Farming System
SWOT	Strengths, Weaknesses, Opportunities, and Threats
ToR	Terms of Reference
VC/VCA	Value Chain/Value Chain Analysis
OIV	International Organization of Vine and Wine

EXECUTIVE SUMMARY

The Iraqi agriculture sector employs roughly 20 percent of the country's workforce and is the second largest contributor to the gross domestic product (GDP) after the oil sector, accounting for 5 percent of the GDP. Thus, agriculture development is critical to allow Iraq to achieve their vision of a more diversified economy, in addition to generating employment and boosting private sector engagement. Approximately 22 percent (9.5 million ha) of Iraq is suitable for agriculture production, yet only about 5 million ha are currently cultivated. Crop production is the major source of income for the majority of farmers (about 75 percent), while the rest depend on livestock or mixed crop and livestock production systems. Small-scale farming systems dominate the sector and are typically characterized by traditional methods and minimal capital investments, resulting in low productivity. There is also limited social capital and positive outcomes from group interactions, causing poor integration along the supply chain.

Iraq has transitioned from a being a smallholder-driven, food-producing country that can cover its needs to becoming a major food importer. Several decades of sanctions, violent conflict, ineffective government policies, extreme weather events, water scarcity and competition from cheap imports, disrupting value chains and distorting linkages between producers and markets. Furthermore, the so-called Islamic State of Iraq and the Levant (ISIL) crisis that began in 2014 spurred displacement of entire communities, limited access to inputs and markets and resulted in the targeted destruction of agricultural infrastructure by armed groups. The Ministry of Agriculture (MoA) estimates that Iraq lost approximately 40 percent of its agricultural production in the wake of the ISIL crisis, and the sector has yet to fully recover.

To address the challenges facing agriculture and improve farmers' outcomes, a study has been conducted for wheat, tomato, date and grape value chains. The four commodities were selected based on their (i) potential market growth and unmet demand; (ii) level of support available from public, private, and non-governmental actors; (iii) environmental impact; and (iv) contribution to food security and food sovereignty. Wheat and tomatoes have been analysed across all three agro-ecological zones (i.e. the north, centre, and south), while grapes focused only the north and centre and dates in the centre and south. The study adopted a mixed-methods approach with a secondary data review (SDR) and primary data collection period, that consisted of individual interviews (IIs), Focus group discussions (FGDs) with farmers and Key informant interviews (KIIs) with actors and experts along each value chain. The analysis identified market linkages, bottlenecks and priority needs and interventions, allowing decision makers to make informed choices to improve the long-term competitiveness of Iraq's agricultural sector.

Primary data collection faced numerous challenges, including increased political tensions, military threats and the COVID-19 pandemic. Important crop producing areas were not accessible for a long period, even before the pandemic, making it difficult to organize meetings with key informants. Thus, some interviews were conducted remotely and secondary data filled any gaps.

The wheat value chain is characterized by high involvement of the Ministries of Agriculture and Trade to ensure domestic wheat needs are met. Wheat is the dominant cereal, particularly in the nothern governorates, and is classified as a strategic crop for the country's food security as domestic production is primarily fed into the Public Distribution System (PDS), a food basket distributed to all Iraqis. The majority of wheat production (70 percent of the cultivated area) occurs on irrigated land, yielding 75 percent of the total national production, while 25 percent is cultivated on rainfed areas (30 percent of cultivated

area). As a winter crop, wheat is sown between October-November and harvested between March-April. The government supports "ideal farmers" by providing inputs and pruchasing harvested wheat grain at a premium price (above the regular market price). Government-purchased wheat is milled by companies with government contracts, although these mills do not function efficiently. Despite efforts to support domestic production, wheat flour is still Iraq's second-highest import and, due to its higher quality than domestic wheat, is normally bound for private bakeries and other processors.

The tomato value chain is affected by the lack of physical infrastructure and weak enabling environment. Government support is lacking, although MoA extension services promote greenhouse production and provide support to control nematodes. A certain level of investment is evident as interviewed farmers reported purchasing greenhouses, wells and irrigation systems; however, tomato farming is still mostly a family business and access to financial services is limited. Farmers lack knowledge about Good Agricultural Practices (GAPs), negatively affecting both yield and quality. Post-harvest management, such as sorting and grading, is practically absent and the lack of proper packaging, cold chain instracture, storage facilities and processing plants increases losses, issues that also apply to other perishable commodities. Beyond losses, the lack of a cold chain forces farmers to sell immediately, negatively impacting prices and limiting the season of locally available product. In the peak season, 10 kg of local tomatoes costs IQD 1 000, while a one kg of Iranian tomatoes is sold in the off-season for the same price.

Grapes are one of the most profitable crops in Iraq, with the leaves and fruits harvestsed for consumption. Although the per capita consumption of the fruit is the lowest in the region (2.5 kg compared to 19.3 kg in the Islamic Republic of Iran, 6.4 in Jordan and 23 in the Republic of Turkey), grapes are some of the most important fresh fruits cultivated, particularly in the north. According to FAO, 5 869 ha of grapes were cultivated in 2018, yielding 95 725 tonnes (approximately 16.3 tonnes per ha). Unfortunately, yield per hectare is declining; over the past five years, production has dropped 11 percent. Grape farmers mainly buy imported inputs from agro-dealers, although the government also provides inputs and new plants to producers. Grapes are either sold to traders and aggregators or directly transported to the market (wholesaler and retail). There are substantial differences between the central and northern regions, particularly in the application of the GAPs and use of inputs. Losses occur all along the value chain, stemming from an inefficient integrated pest management system and poor infrastructure, particularly the lack of cold storage facilities. Similar to tomatoes, the grape value chain offers value-added opportunities through processing to produce a wide array of food and products.

Dates are a major cash and food crop in Iraq. Access to good practices, technologies, and markets are key factors to accelerate the recovery of the date sector that, prior to the Gulf War, was booming and produced three-quarters of the dates consumed globally. Date palm orchards are often inter-cropped with fruit trees, with 300 000 ha permanently cultivated with fruit trees (i.e. olives, grapes, oranges, apples, and other fruits). Small-scale farming continues to dominate the sector, and these farmers have limited access to financial credit and knowledge required to introduce modern agricultural practices, introduce irrigation and fertilization systems, apply improved pest management approaches and adopt mechanized systems. Acute shortages of skilled labour and increasing minimum wage requirements have incentivized farmers to streamline their production and, if granted access to financial resources, could promote mechanisation. The government is making a concerted effort to rehabilitate the date value chain and support farmers. For example, they are investing in thousands of new, commercial palm trees varieties. Increasing the

number of producing palms by planning new plants and replacing mature palms, particularly with economically profitable varieties such as Mejdool and Barhi, will bolster the sector. Beyond production, there is also room to updgrade date packaging and value-added processing. A market-oriented strategy for the sector would boost the rehabilitation of the date processing industry, with the possibility to revitalize exports. Thus, cooperation between farmers, processors, and distributors is required, in addition to government support and facilitation.

As the agriculture and food sector in Iraq recovers, it must adopt sustainable systems and practices to adapt to future insecurities, including political uncertainties, unstable markets and climate change. Iraq must rebuild social capital, agriculture infrastructure, market linkages and extension services in a way that engages all relevant actors and increases resilience. Social capital is defined as a blend of trust, spirit, and capacity of cooperation. Trust is the crucial foundation of social capital. It also constitutes a necessary condition for economic efficiency. A balance between government intervention and the market forces is needed for sustainable development of the sector. State-based incentives and policies have distorted the agricultural value chain, increasing farmer dependency on government assistance and slowing recovery.

A multi-stakeholder stakeholder consultation will be organized as soon as possible to validate the findings and conclusions of the survey and provide concrete recommendations for each of the four value chains. Main stakeholders concerned include the Government of Iraq, donors, Food Security Cluster partners, private sector. All stakeholders, i.e. suppliers, farmers, traders, and processors, should be actively involved in agricultural planning, implementation and monitoring. If all actors are committed to a common vision that prioritizes efficiency, effectiveness, good governance, participation, accountability, and equity, then inclusive and sustainable agriculture development can be achieved. There are several entry points for close coordination and implementation. They include:

- the Ministries of Planning, Agriculture, Health, Environment, and Water Resources and FAO have established a multi-sectoral partnership for planning, implementation and monitoring for agriculture, water, and environment programmes and policies to improve coordination and outcomes for farmers;

- the Food Security and Emergency Livelihoods Humanitarian Clusters – and its members, and in particular the newly established Agricultural Working Group; and

- the Donor Coordination Group on Agriculture and Water – a forum where joint action can be considered supporting priority investment opportunities, closely coordinated with the Government of Iraq.

1. INTRODUCTION

1.1 BACKGROUND OF THE STUDY AND OBJECTIVES

The agricultural sector represents a vital component of Iraq's economy. It is the second largest contributor to the GDP after the oil sector, accounting for 5 percent of the GDP. The agricultural sector is strategic for food security and is a source of employment and income for millions of Iraqi families. Based on data from 2018, it employs 18.7 percent of the active workforce, 23.3 percent of whom are women (World Bank, 2019). Despite the government's commitment to revive the sector, agriculture has been affected by distortionary and ineffective policies, mismanagement and conflict-related destruction. Although the study has been conducted by interviewing existing farmers, it should be noted that there are 1.4 million IDPs (OCHA, 2020) in Iraq who worked in agriculture before their displacement; however, they cannot return and rebuild their farming and animal husbandry businesses without considerable assistance to make the land safe and productive again.

On behalf of the Food Security Cluster (FSC), FAO commissioned the value chain (VC) analysis of four commodities (wheat, tomatoes, dates, and grapes) to identify major challenges and potential areas for interventions. The selected value chains were identified in consultation with high level stakeholders, with the intension to select commodities that were indicative of the whole agricultural sector and included examples of cereals, vegetables, and fruits. By analysing the market linkages and bottlenecks, the study provides information to policymakers to allow them to design appropriate measures that will increase production, income and employment opportunities. The study also aimed to highlight differences and similarities among the three agro-ecological zones and the selected value chains.

To achieve these goals, the research team designed the following research questions:

1. What is the current value chain structure (activities, agents, enabling environment, and support services) for each of the agricultural commodities in the corresponding geographic areas?
    a) How does the structure of the value chain for some commodities vary between the north, centre, and south?
    b) Where are there gaps or redundancies in the value chain structure?
2. What is the socio-economic context of each of the value chains in Iraq (including import/export relationships with other countries; the contribution of each commodity to agricultural production and income in Iraq; current policies and strategies affecting the value chain, etc.)?
    a) How have these value chains been impacted by conflict, and what are the implications for non-displaced and returnee farmers?
    b) What is the current level of demand for each commodity locally, nationally, and internationally?
3. How does the value of each commodity change throughout the respective value chain?
    a) What are the costs, revenues, and margins (value-added and net benefits) associated with each segment of each value chain, disaggregated by region?

b) Which is the bargaining power and linkages of the different actors along the value chains by region measuring costs, revenues, and margins (value-added and net benefits)?

c) What is the competitive advantage of each commodity in the context of international markets (parity price, etc.)?

4. What are the key interventions along the value chain (activities, agents, and enabling environment and support services) that will increase farmers' profits?

- What challenges do farmers face in accessing agricultural inputs (seeds, fertilizers, tools, water, etc.)?
- Which agricultural practices are farmers currently using (planting, irrigation, fertilizer, harvest methods, etc.), and to what extent do these align with best practice (e.g., the Climate Smart Agriculture approach)?
- Which factors are causing the most post-harvest losses, and how can these factors be modified?
- To what extent are there opportunities to add value in storage, processing, marketing, and packaging, transportation, wholesale and retail marketing, and distribution systems for each of the four commodities?

1.2 METHODOLOGY

FAO defines a value chain analysis as **"an assessment of a portion of an economic system where upstream agents in production and distribution processes are linked to downstream partners by technical, economic, territorial, institutional and social relationships"** (FAO, 2014). This assessment is the result of an in-depth analysis of market linkages in high-producing locations.

The study aimed to provide a detailed understanding of key stakeholders, market actors and means of value addition to identify constraints, bottlenecks, gaps and opportunities to generate competitive and comparative advantages in the country, while also capturing differences and disparities between areas. The study adopted a mixed-methods approach: first, to inform the research design, a Secondary Data Review (SDR) was conducted to analyse the context and provide an overview on the current status and trends of the agricultural sector in Iraq and the region. Following the desk review, Key informant interviews (KIIs) were conducted for seven value chains to identify the most suitable and relevant ones for the present study. Seven value chains were short-listed, assessing two products from different food groups, including barley vs. wheat, potatoes vs. tomatoes, and citrus vs. grapes. Dates were also included as an important crop, both traditionally and economically. The seven crops were analysed against the following six criteria that addressed economic, environmental, social and institutional issues:

- impact and relevance on the Small-Scale Farming System (SSFS);
- potential growth versus the unmet market demand as a clear indicator that the market should or will grow in the future;

Table 1. *Reference Crops against Selection Criteria (Elaborated by the VC's team based on secondary data and KIIs)*

AREA	Wheat	Barley	Tomatoes	Potatoes	Grapes	Citrus	Dates
North	1. H	1. L	1. H	1. H	1. H	1. L	1. M
	2. H	2. M	2. H	2. H	2. H	2. L	2. L
	3. H	3. H	3. H	3. H	3. H	3. L	3. L
	4. H	4.M	4. H	4. H	4. H	4. L	4. L
Centre	1. H	1. L	1. H	1. M	1. M	1. H	1. H
	2. H	2. M	2. H	2. M	2. L	2. H	2. M
	3. H	3. H	3. H	3. M	3. L	3. H	3. M
	4. H	4. H	4. H	4. M	4. L	4. H	4. M
South	1. H	1. L	1. H	1. M	1. M	1. L	1. H
	2. H	2. M	2. H	2. M	2. L	2. L	2. H
	3. H	3. H	3. H	3. M	3. L	3. L	3. H
	4. H	4. M	4. H	4. M	4. L	4. L	4. H

- potential scaling up of target groups to participate in the value chain (in particular smallholder farmers);
- level of support that the public sector, the donor community, and other actors (i.e. NGOs, consulting companies and researchers) can or are providing to the subsector;
- environmental impact if the subsector grows after the interventions (in particular water availability, consumption, and related soil salinity); and
- role of the value chain in achieving food security and food sovereignty.

Based on the aforementioned criteria, the study selected wheat, tomatoes, grapes and dates. The rationale for the selection is outlined in Table 1, where each value chain was assessed as high, medium and low relevance/impact for four criteria in the three major agro-ecological zones:

1. Potential market growth and unmet demand.
2. Level of support available from public, private, and non-governmental actors.
3. Environmental impact.
4. Contribution to food security and food sovereignty.

Wheat was selected as a strategic crop for analysis given its prevalence across the three AEZs, the production and environmental challenges and the potential forthcoming policy changes. Barley was considered as it is an important crop for Iraq, but it mostly used for animal fodder and it is thus an important component of livestock value chain analyses, which is outside the scope of this present study. In addition, the country is close to self-sufficiency for barley, while large quantities of wheat are still imported to meet domestic demand.

Tomatoes were selected due to their widespread production, unlike potatoes where production is concentrated in specific areas. By studying the wheat and tomato value chains in the three agro-ecological regions, national analysis of cereals and vegetables were possible.

Grapes were selected due to their importance in Iraq's agriculture economy. They study focused on production in the northern and centre AEZs. Dates were selected and, although production is relevant in the central agro-ecological zone, the research team concentrated research on the south where the majority of production occurs. Focusing on dates in only one region would ensure that one fruit value chain was analysed in each AEZ, thus maximising limited resources.

Primary data collection was conducted through structured individual interviews (IIs), semi-structured Focus group discussions (FGDs) with farmers, structured key informant interviews (KIIs) with actors along the value chain and semi-structured KIIs with value chains experts and representatives of relevant organizations. This study employed a purposive sampling strategy. Findings should be seen as indicative and not statistically representative for value chain actors and farmers across Iraq. The data collection methodology and tools were designed to capture regionally disaggregated data among the VCs in the three zones.

The deteriorating security situation between October 2019 to February 2020 and the subsequent COVID-19 pandemic disrupted primary data collection. Due to access restrictions in pre-selected locations, interviews and FGDs were only conducted in the following localities: Balad, Baquba, Falluja, Suwaira in the central agro-ecological zone (AEZ); Duhok, Erbil, Hawiga, Makhmur, Mosul, Samarra, Telafar in the northern AEZ; and Amara in the southern AEZ. In total, the team conducted 164 interviews (Table 2). 66 percent of the IIs for farmers, 54 percent of the interviews with other value chain actors and 90 percent of the FGDs were completed in person, while some key informants were interviewed via Skype.

Interviews concentrated on farmers and wholesale traders. As several interviewees were active in multiple segments of the value chain, the number of business activities (as seen in Table 3) is higher than the total number of interviews conducted. In particular, some farmers were also active as wholesalers and/or importers.

Table 2. *Interviews by governorate*

Governorate	Value Chain				
	Dates	Grapes	Tomatoes	Wheat	Total
Anbar	0	0	0	17	17
Duhok	0	12	3	0	15
Diyala	23	0	0	1	24
Erbil	0	0	12	5	17
Kirkuk	0	0	0	23	23
Missan	0	0	0	8	8
Ninewa	0	0	0	13	13
Salah Al-Din	0	25	14	0	39
Wassit	0	0	0	8	8
Total	23	37	29	75	164

Table 3. *Detailed record of interviews.*

View of the business activities	Centre				North			South				
	Dates	Grapes	Tomatoes	Wheat	Grapes	Tomatoes	Wheat	Dates	Grapes	Tomatoes	Wheat	TOTAL
Farmer	11	10	0	16	7	9	18	0	0	0	6	77
Importer of seeds	2	1	0	0	1	3	4	0	0	0	0	11
Importer of inputs	1	0	0	3	0	1	4	0	0	0	0	9
Producer of inputs	2	2	0	1	0	5	2	0	0	0	0	12
Import of equipment	0	1	0	1	0	3	0	0	0	0	1	6
Dealer of equipment	2	0	0	2	0	3	0	0	0	0	0	7
Rental of Equipment	0	0	0	2	0	4	4	0	0	0	1	11
Storage facility	2	0	0	1	0	0	1	0	0	0	0	4
Aggregator	0	0	0	0	0	2	2	0	0	0	0	4
Processor	0	0	0	0	1	0	1	0	0	0	0	2
Packaging and Sorting	1	0	0	0	0	1	1	0	0	0	0	3
Importer of crops	0	0	0	0	2	1	2	0	0	0	0	5
Exporter	0	0	0	0	0	0	0	0	0	0	0	0
Local trader	0	0	0	0	0	0	3	0	0	0	0	3
Wholesale trader	0	9	0	0	0	1	2	0	0	0	0	12
Retailer	0	1	0	0	0	0	0	0	0	0	0	1
Transporter	2	1	0	0	4	3	3	0	0	0	0	13
TOTAL	23	25	0	26	15	36	47	0	0	0	8	180

Eighteen FGDs were held in different localities and between six and eight farmers participated in each FGD, discussing opportunities and challenges in their specific value chains. Around 120 farmers were interviewed via Skype.

Table 4. *Location and gender of FDGs*

Governorate	District	Zone	Male	Male	Male	Female	Male
Anbar	Falluja	Centre					2
Duhok	Duhok	North		2			
Diyala	Baquba	Centre	2				
Erbil	Erbil	North			1	1	1
Kirkuk	Hawiga	North					1
Missan	Amara	South					3
Ninewa	Telafar	North					2
Salah Al-Din	Balad	Centre		2			
Salah Al-Din	Samarra	North			1		
		TOTAL	2	4	2	1	9

Of the 22 planned Key informant interviews (KIIs) with relevant actors along the value chains, eight interviews occurred with the Agricultural Research Centre in Erbil, one with the manager of a new wholesale centre built by UNIDO and two with farmer association leaders. As a mitigation measure, two of the eight public official interviews were done remotely in April 2020 to cover missing information on date, grape, and wheat policies.

1.3 LIMITATIONS OF THE STUDY

The quality of the data was the strength of this report, with detailed and rich questionnaires targeting different audiences. A major weakness; however, was the limited number of interviews with farmers and other actors due to restrictions set for accessing the field. **Findings thus should be seen as indicative and not statistically representative** for farmers and value chain actors in Iraq. The data offered interesting insights into the dynamics, challenges, opportunities, expectations, yields, and production costs of the four value chains. Additionally, the four crops analysed in in this study can serve as an approximation for the type of crop: wheat for cereals, grapes and, dates for fruit and tomatoes for vegetables. Thus, the information provided a broad overview of differences and commonalities exist between the different crops and AEZs.

1.4 BRIEF OVERVIEW OF THE AGRICULTURAL SECTOR IN IRAQ

As major military operations against the Islamic State in Iraq and Levant (ISIL) concluded in late 2017, the situation in Iraq entered a new stage. National and regional authorities, as well as UN agencies and their partners, began focusing on rebuilding the economy and destroyed infrastructure to facilitate returns of internally displaced persons (IDPs) to their areas of origin. Although over 4.7 million Iraqis have returned home as of April 2020, 1.39 million Iraqis are still internally displaced (IOM, 2020) and significant challenges remain. Rebuilding infrastructure and supporting livelihoods are key priorities for both national and international actors. This is particularly true in the most conflict-affected governorates and districts, many of which were core agricultural areas before the conflict.

Iraq's GDP growth slowed to 1.1 percent in 2017, a marked decline compared to the previous two years as domestic consumption and investment fell because of civil violence and a sluggish oil market (see Figure 1). In 2018, the GDP further declined by 1 percent. In 2019, the GDP grew at 4.8percent in the first half of 2019, reversing the contraction of 2017-18. Growth is mainly attributed to a rise in crude oil production (up 6.3percent) and a rebound in non-oil economic activity (+5.6 percent). In 2018, only 0.1 percent of the 97.25 million USD of exports (78.5M USD) were attributed to goods and services outside of the oil industry (WB, 2020).

The agricultural sector in Iraq is the second largest contributor to the GDP, bested only by the oil. In 2017, agriculture contributed 4.8 percent to Iraq's GDP and employed 19 percent of the workforce (WB, 2020). The improvement of the non-oil sector was linked to the sufficient rainfall, the positive outlook for new, planned agriculture policies, the improvement in electricity distribution, and the rehabilitation of relevant infrastructures (roads, storage facilities, more efficient wholesales markets, and improvement of the irrigation system).

Approximately 30 percent of Iraq's population lives in rural areas. These populations are usually more vulnerable to food insecurity than urban households. According to the 2016 Comprehensive Food Security and Vulnerability Analysis (CFSVA) (WFP, 2012), 80 percent of the poorest quintile in rural areas were classified as either food insecure or vulnerable to food insecurity compared to 67 percent of those in the poorest quintile in urban areas. According to FAO, agriculture is the largest source of employment for those living in rural areas (FAO, 2017). Agriculture is also an important sector for female employment; 23 percent of women working in Iraq are employed in the sector (WB, 2020).

Figure 1. *Fluctuation of the contribution of the primary sector to GDP and variation of GDP growth by year (Elab. of World Bank data)*

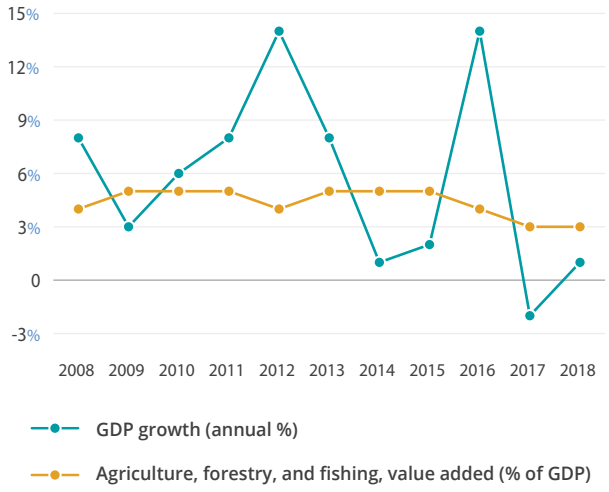
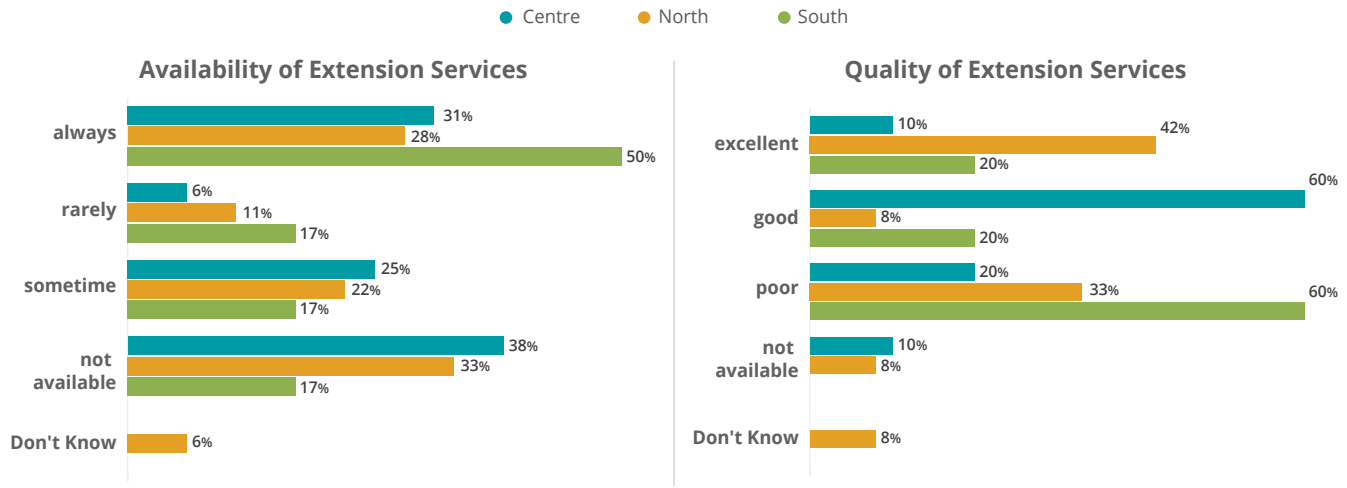


Figure 2. *Availability and quality of extension Services*



Crop production is the major source of income for the majority of farmers (about 75 percent), while the rest depend on livestock or mixed crop and livestock production systems. With approximately 93 000 square km[1] of agricultural land, roughly 21 percent of total land area, Iraq has potential to expand crop and livestock production. Previous studies found that the average farm size is less than 100 dunums or 25 hectares (80 percent of the establishments), with low levels of peer interaction and cooperation. Most farms are considered small with only a few commercial farms, several of which are state-owned.

Most of the interviewed farmers (81 percent) along the four value chains studied are not satisfied about the government policies or technical support, particularly the extension services (see Figure 2). With some differences among the three areas, availability and quality of the service provided are not considered sufficient and effective (Figure 2) The weak extension service hinders farmers' ability to effectively manage pests and diseases, like Sunn pest[2] and Fusarium head blight (FHB) and Fusarium crown rot (FCR). In the FGDs, farmers highlighted the need for training and information on the use of fertilizers and pesticides.

Based on the interviews and the data analysis, a trend emerged – there is a disconnect between farmers and the governmental organizations that produce and disseminate knowledge and information. Advisory services and research play a crucial role in boosting agricultural productivity, increasing food security, improving rural livelihoods, and promoting agriculture as an engine of inclusive economic growth.

1 Including rangeland/pasture land for livestock.

2 Sunn pest (Eurygaster integriceps Put.) is the main pest in whole Iraq and causes severe damage to wheat and barley.

Conflict and displacement of entire communities, together with lack of access to knowledge and inputs, has led to a decreased agricultural productivity. As a result of the so-called ISIL crisis, MoA estimates that Iraq has lost approximately 40 percent of its agricultural production. Widespread displacement, targeting of agricultural infrastructure by armed groups, limited access to inputs and market disruption negatively impacted the sector. Households affected by the conflict still face significant obstacles to resume agricultural livelihoods and improve their quality of life. The reconstruction of infrastructure, i.e. irrigation systems, storage and processing facilities, roads, and markets, have begun, but requires time. Furthermore, increased soil salinity, prolonged droughts, flooding incidences and siltation have decreased the efficiency of existing irrigation systems. More proactive interactions between government and stakeholders could accelerate recovery. Engagement of the private sector, civil society and farmers in short-, mid- and long-term participatory planning and implementation processes is required to address these challenges effectively.

2. END-MARKETS

2.1 NATIONAL MARKET

Iraq's stagnating agricultural sector has made the country heavily reliant on food imports. The regional MoA in the Kurdistan Region of Iraq (KR-I) estimates that approximately 90 percent of consumed food is imported (Rudaw, 2015). This trade imbalance burdens not only the country's finances, but also hinders its food security and distorts the production supply chain. Political or trade disruptions in neighbouring countries and beyond could severely impact Iraq's food supply and food prices.

2.2 EXPORT MARKETS

Exports from Iraq registered 95.3 billion USD in 2018, an increase compared to the 88.1 billion USD in 2014 (pre-ISIL) and 49.8 percent in 2017 (63.604 Billion USD) (WTO, 2020). Based on the latest available country-specific data from 2015, 89.7 percent of products exported from Iraq were bought by importers in China (23.9 percent of the global total), India (21.4 percent), the Republic of Korea (11.8 percent), the United States of America (8.6 percent), Italy (7.1 percent), Greece (6.5 percent), Netherlands (3.5 percent), Taiwan (2.6 percent), Spain (2.4 percent) and Singapore (1.9 percent). Crude oil accounts for roughly 94 percent of Iraq's exports and dominates Iraq's economy. As of 2018, oil accounted for over 65 percent of GDP and 90 percent of government revenue.

Given Iraq's population of 39.2 million people, its total 2018 exports translates to roughly 2 400 USD for every resident in the country. In macroeconomic terms, Iraq's total exported goods represent 14.5 percent of its overall Gross domestic product (GDP) for 2018. After the contraction in 2017-18, Iraq's economy registered a growth of the GDP at 4.8 percent in the first half of 2019.

In the absence of structural reforms and accelerated reconstruction, future growth is at serious risk. This is mostly due to the oil market's outlook, as both prices and exports are expected to weaken given lower global demand and the uncertainty of the OPEC+ deal. Non-oil growth is expected to remain positive due to improved security conditions, but investments to rebuild required infrastructure continues to be undermined by the weakened socio-economic fabric of Iraqi society. Higher spending coupled with lower oil prices and increased imports may result in a fiscal deficit. Additionally, with the COVID-19 pandemic and the global collapse of oil prices, there are growing concerns about the economic situation of Iraq in the coming months and years.

3. VALUE CHAIN ANALYSIS

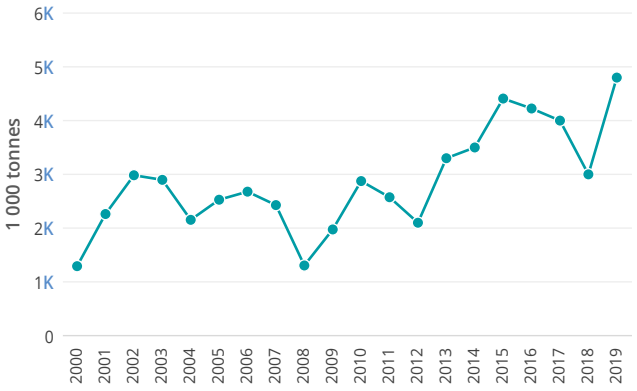
3.1 WHEAT

3.1.1 VC MAP

Iraq accounts for 0.4 percent of global wheat production and is ranked the 31st producer in the world. Wheat is the main cereal produced in Iraq followed by barley, with the bulk of cultivation concentrated in the northern governorates (Ninewah, Kirkuk and Salah Al Din). It is a winter crop, with the growing season between October-November and March-April. The harvest generally begins in April, but can extend into June in the northern governorates.

Wheat accounts for roughly 70 percent of total cereal production in the country, but this amount only satisfies 60 percent of Iraq's average internal demand (UNESCO, 2019). Current internal consumption averages at 6 million tonnes annually, while the national production capacity is about two-thirds of that demand. 70 percent of the area cultivated with wheat is irrigated, yielding 75 percent of the total national production, while only 25 percent of the production occurs in rainfed systems (UNESCO, 2019). The area harvested every year is around 2 million ha (GAIN, 2019). Over the past twenty years, production has generally increased, though there have been several fluctuations (Figure 3). The yield per dunum is lower compared to other neighbouring countries, varying between 2 tonnes for irrigated land and 0.33 tonnes on non-irrigated farms. In the Republic of Turkey (USDA, 2018), the average yield for irrigated and non-irrigated land is between 7-8 million tonnes per ha and 1-1.5 million tonnes per ha respectively. Yield depends on various factors, including land suitability, seed quality, use of fertilizers, pest management, adoption of modern technologies, and irrigation.

Figure 3. *Wheat production in Iraq, 2000-2019* (FAOSTAT, *"Data," accessed June 2019*)



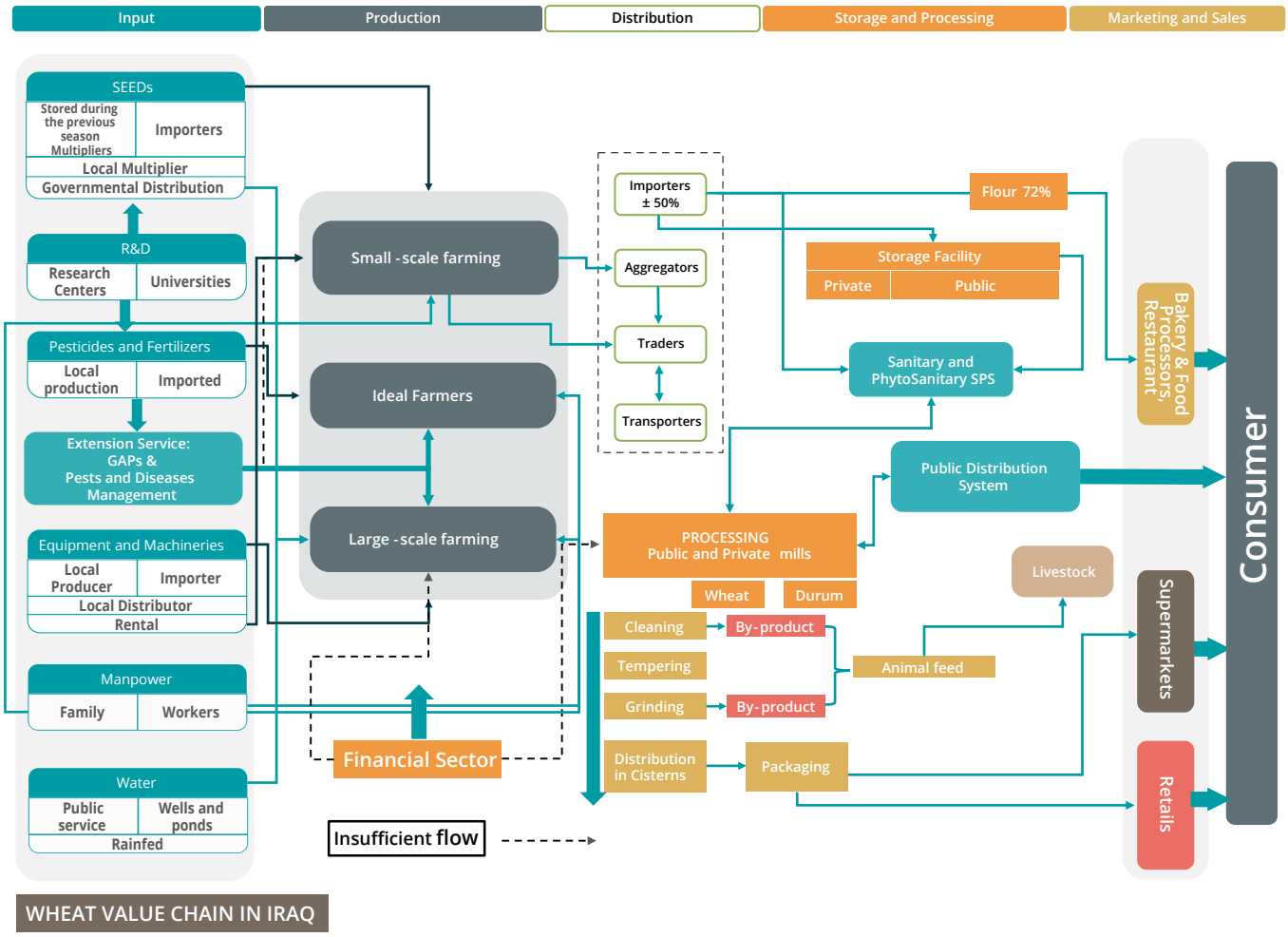
The government is the main economic actor in this value chain since wheat is a critical component of the government's Public Distribution System (PDS); however, there are other value chain actors, such as input suppliers and distributors, farmers, importers of wheat, shippers, storehouse administrators, mill operators, wheat-based merchandise makers, transport services, retailers, and customers. The government has invested considerable resources to incentivize the production of strategic crops to improve self-sufficiency. Wheat, rice, and corn receive direct support from the MoA in the form of subsidized inputs and direct purchase of harvests, at prices higher than the international market (FAO/WB, 2012).

Due to high government involvement, wheat production and distribution is not regulated by demand and supply, but also by the National Annual Agricultural Plan (NAAP), which establishes the target and production areas. Each governorate has to submit an annual agriculture plan to MoA annually. Failing to submit means that that area will not be included in the national plan. MoA can also decide to favour an area more than another with prejudice for the farmers and their investments (USDA, 2019). Thus, this policy may not be helping the Kurdistan region or farmers in other areas. Farmers cultivating wheat outside the plan must procure their inputs at full market value and can only sell their wheat as feed grade at a reduced price.

Wheat produced in areas identified in the NAAP is generally bought by the government under a direct purchasing programme. The public wheat storage silos grade the wheat into three classes based on gluten content, cleaning of seeds and other factors. The wheat not purchased by the government is sold at a lower price to traders. Farmers producing in areas outside of the national agricultural plan market their crop as animal feed or sell it to traders. It is a common practice that traders buy and transfer the wheat in other districts for selling to the storage facilities and getting the premium price offered by the government. “When farmers find themselves making a healthy profit from selling their products to the government, their production is expected to increase. This helps the country achieve self-sufficiency and export to neighbouring countries. The agricultural policies that support local production encourage farmers to plant more so long as they have access to water." (Almonitor, 2019)

Stakeholders have indicated that changing the centralized and government-controlled supply and demand system could boost quality and productivity. Indeed, wheat flour is Iraq’s second-highest import despite government efforts (UNESCO, 2019). Government subsidies aimed to improve self-sufficiency for strategic crops has not always had a positive, if not negative, effect on productivity. If the sector was market driven, more attention would be given to quality of the supply chain and on the needs of the end-users. That being said, the current system needs to be carefully revised, as any change in the subsidized purchasing prices by the Grain Board of Iraq, if not adequately supported, could generate unpredictable shocks and risk market failure (GAIN, 2017).

Figure 4. *Map of the wheat value chain*



WHEAT VALUE CHAIN IN IRAQ

3.1.2 TECHNOLOGY

The main factor influencing productivity is the seed. Improved seed can bred to be resistant to pests, climate change and extreme weather events (drought or flooding), in addition to requiring less fertilizer. The effectiveness of other technologies and inputs (i.e. irrigation, fertilizers and pesticides) is dependent upon the varieties ability to efficiently use those resources, and thus the use of these improved seeds.

In nature, plants incrementally adapt over time; however, advanced techniques have allowed breeders to combine beneficial traits (i.e. abiotic stress tolerance) from a wide range of variants more efficiently. Breeders can exploit available genetic variation to optimize future yield potential in more sustainable production systems. Some breeding efforts have been made nationwide and, in the KR-I. The Research Centre in Erbil is producing and disseminating two improved seed varieties (KR1 and KR4) that are suitable for local conditions. Once a variety is selected, multiplication is another important aspect of the development of the value chain.

Interviewed stakeholders identified various constraints that hamper the improvement of seed production. Standards must be established for the production, registration and dissemination of seeds to improve farmers' access to improved varieties. The lack of research on seed improvement, low participation of private companies in seed multiplication and weak control systems are also challenges that need to be addressed. Developing clear procedures for seed certification and multiplication, in addition to improving the State Board of Seed Testing and Certification (SBST) regulatory framework that promotes and controls private sector competition and innovation, would be a good start. Nevertheless, the government is making strides in the sector by developing improved seeds and establishing partnerships with farmers for multiplication. For example, the government has selected Erbil2 and Erbil4 strains. Local and efficient production of certified seeds can decrease prices, satisfy demand and disrupt local seed markets. Incentives for farmers to use certified seeds can be provided through subsidies to the seed producers and distributors, and support the shift from an informal to formal system. (Seedquest, 2001)

The introduction of efficient irrigation technologies should also be a priority. Wheat has a significant impact on water resources; up to 70 percent of the total production depends upon irrigated water, placing stress on the environment (MDPI, 2019). Figure 5 summarizes the irrigation water sources in the three ecological zones. In the past, water supply was stable and sufficient, albeit highly dependent on the Euphrates and Tigris Rivers and rainfall; however, upstream dam construction, increased salinity, reduced precipitation, limited groundwater recharge and decreased river discharge has resulted in water scarcity challenges (ESA, 2016), (MDPI, 2019). Thus, water resources in Iraq need to be managed more efficiently, particularly in the agricultural sector. For example, farmers in the north are dependent on groundwater for wheat irrigation, resulting over-abstraction and causing salinization issues.

A water footprint study of wheat in Iraq identified opportunities to optimize water usage, such as shifting production to more appropriate agro-ecological zones, adopting improved growing techniques (i.e. water-efficient irrigation) (MDPI, 2019). 58 percent of the wheat farmers still use surface irrigation, while 23 percent use sprinkler irrigation, 6 percent manual, and 2 percent of localised and drip irrigation. The use of the surface irrigation is less efficient than other modern techniques. Drip irrigation increases wheat yield by 28 percent compared with surface irrigation and 52 percent compared to full irrigation, thus saving 59 percent of water (HAL, 2011).

Only 10 percent of farmers stock water (mostly artificial ponds), and diesel and electrical are the most common systems for pumping water. During the FGDs, water management and water authority-enforced restrictions on drilling wells was raised as a serious concern. In particular, farmers highlighted the rule that new wells must be at least 600 meters away from the nearest pre-existing well. Farmers mentioned that due to the small-farming areas, it is difficult to manage such a limitation among the neighbouring farmers.

Figure 5. *Source of water for the wheat farmers in each agro ecological zone (Elab. on primary data)*

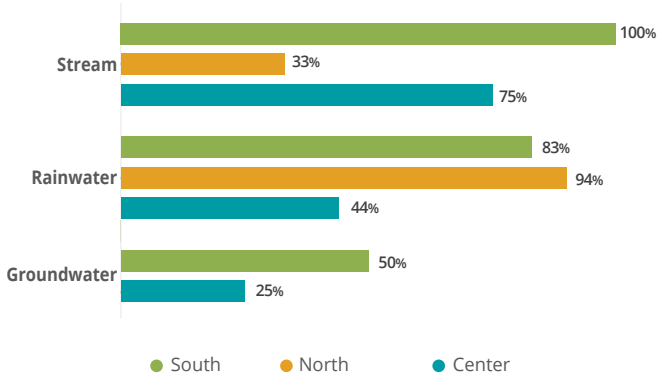
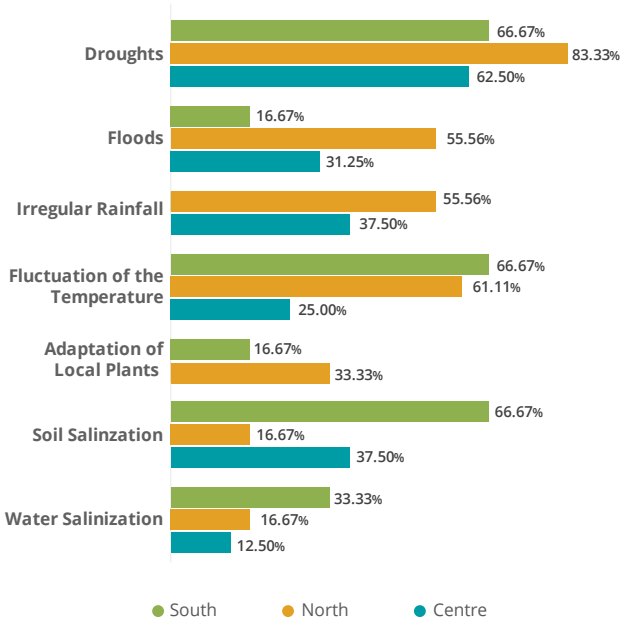


Figure 6. *Climate change affecting wheat producers*



The data collected in the three AEZs shows the relevance of water management and the value chain sensitivity to climate change. In the three AEZs, drought is considered the main concern (Figure 6), while floods are more relevant in the north. Soil and water salinity are a concern in the centre and south, while they have less relevance in the north. Thus, the introduction of technologies to address these concerns should be contextualized for the given area.

Farm machinery is important to increase farm efficiency, particularly for land preparation, harvesting and threshing. Most of the planting and harvesting activities are mechanised. Mechanization is mostly provided by the government and, where is not available, supplemented by the private sector. Only a few large farms own the machinery required for production and most of those farms are state-owned. Due to the weak social capital, there is no evidence of farmers' organizations being able to provide such services and/or purchase and sell in bulk. Private business entities located either at zonal or district level offer machinery rental services to farmers. The contractual agreement is often based on hours of use, with no relation to the farmland size and quantity of wheat being harvested. This aspect has been reported by farmers as a serious concern as those services account for a large portion of their costs (30 percent). It is related to the cost of the externalization of the mechanized procedures. At the same time, many farmers in different localities complained during the FGDs about the quality of the spare parts as most of these components are imported from China and the Islamic Republic of Iran, and the quality of the repair services.

Due to poor connectivity between farmers and the financial sector, producers have difficulty investing in technology, equipment and machinery. Only 7 percent of the interviewees applied for loans, of which only 2 percent were successful. As a result, micro and small farms chronically lack capital, and thus are unable to invest in the equipment and inputs that would improve efficiency. Farmers' and other actors' lack of financial literacy and business management experience, cultural and religious customs regarding loans and interest, perceptions of the financial sector (i.e. high interest rates) and the high level of security risk associated with banks prevents farmers from accessing capital.

Weak social capital also hampers to cooperate both vertically (i.e. with government) and horizontally (i.e. with fellow farmers. Only 5.6 percent of farmers participate in associations or cooperatives. Normally, these types of groups are able to provide cheaper services, i.e. labor or equipment rentals, by using economies of scale. Thus, most of Iraqi farmers buy services (i.e. ploughing, threshing, and harvesting) as individuals from specialized service companies. Although these private sector services are available during peak seasons, most farmers consider them to be expensive. Support provided by the government is not sufficient to cover the needs at different stages of the production cycle. Only a few farmers can manage all the phases internally, and those farmers are mostly localized in the central agro-ecological zone.

Figure 7. *Productive assets owned, and investments needed and planned by farmers in the wheat value chain.*

	South	North	Centre
OWNED			
Tractor	50%	66.67%	31.25%
Truck	16.67%	11.11%	6.25%
Trailer	16.67%	55.56%	25.00%
Chopper	0.00%	5.56%	6.25%
Harvester	16.67%	0.00%	6.25%
Well	0.00%	50.00%	100%
Watering /Irrigation system	83.33%	66.67%	81.25%
Storage Facility/Area	0.00%	11.11%	6.25%
Processing plant	100%	11.11%	0.00%
Administrative Office	16.67%	0.00%	12.50%
NEEDED			
Tractor	100%	100%	68.75%
Truck	33.33%	77.78%	100%
Trailer	100%	94.44%	68.75%
Chopper	0.00%	38.89%	37.50%
Harvester	33.33%	94.44%	68.75%
Nursery	0.00%	38.89%	12.50%
Well	0.00%	72.22%	12.50%
Irrigation	33.33%	100%	62.50%
Storage	0.00%	33.33%	25.00%
Processing plant	16.67%	38.89%	0.00%
Sales area	0.00%	22.22%	0.00%
Administrative office	16.67%	11.11%	12.50%
Planned to Purchase			
Tractor	83.33%	61.11%	37.50%
Truck	33.33%	5.56%	37.50%
Trailer	66.67%	44.44%	18.75%
Chopper	0.00%	11.11%	0.00%
Harvester	16.67%	27.78%	25.00%
Nursery	0.00%	5.56%	0.00%
Well	0.00%	11.11%	12.50%
Irrigation	16.67%	16.67%	12.50%
Storage	0.00%	11.11%	0.00%
Processing plant	0.00%	16.67%	0.00%
Sales area	0.00%	0.00%	0.00%
Administrative office	0.00%	0.00%	0.00%

3.1.3 INPUT SUPPLY AND DEMAND

In the last twenty years, farmers in Iraq's agricultural sector have suffered from low production. Wheat, like most of the other crops, has registered productivity fluctuations and decline compared to other Arab countries. The government has invested resources and efforts to stimulate nationwide wheat production by providing seeds and other inputs to ideal, in addition to purchasing the harvested crop at a subsidized price. This approach has generated various market distortions.

Seeds, fertilizers, and chemicals are distributed both by the government and the private sector. Seeds from the government are generally perceived as higher quality compared to the market; however, the quantity of government-procured seeds are not sufficient to meet demand. This can be considered as a blatant market inequality. Government seed distributions are concentrated in the north and the south; about 50 percent of the farmers interviewed in the north and south receive all or partial quantities of inputs, while only 18 percent of the farmers interviewed in the central agro-ecological zone receive inputs from the government. MoA and its affiliated departments (the General Company for agricultural supplies, and Mesopotamia company for seeds, etc.), in addition to the private sector (i.e. the Alawrad Group), conduct the distributions. In addition to geographic disparities, only "Ideal farmers" receive subsidized seeds from the government. Currently, the government distributes wheat seeds at a 70 percent discount (120kg per ha), while offering fertilizers at half their market price. Additionally, these farmers receive free pesticides and discounted laser levelling of wheat field. According to FGD participants, "ideal farmers" are those with experience and resources to maximize productivity.

Most farmers have to procure the cheaper, poorer quality seeds available on the market or rely on the seeds stored from the previous production cycle. Farmers that preserve and use the seeds from the previous season save money and avoid seed quality issues; however, these seeds are also not improved, high yielding varieties. That being said, the local seed varieties could have specific nutritional qualities, which could be capitalized upon if a marketing differentiation strategy was in place.

In Iraq, the formal seed system is not sufficient to meet the national wheat seed demand, so seeds are imported from the Republic of Turkey (at the local price of 450 000 IQD per tonne) and other countries. Local seeds are generally cheaper (400 000 IQD per tonne) than imported varieties, but community-based seed production (CBSP) systems are not available and as a result, there is an engagement of importers, intermediary and informal seed producers and suppliers. Traders and specialized shops are the main sources of inputs for the farmers that have no access to the ones distributed by the government. The quality and availability of the seeds, fertilizers, and pesticides are considered satisfactory, but the price of high quality/improved seeds and pesticides are perceived as less affordable than the other inputs. One of the issues raised during the FGDs was the kind of insurance that the dealers could provide about the seed's resistance and productivity.

Table 5. *Use of land for wheat cultivation*

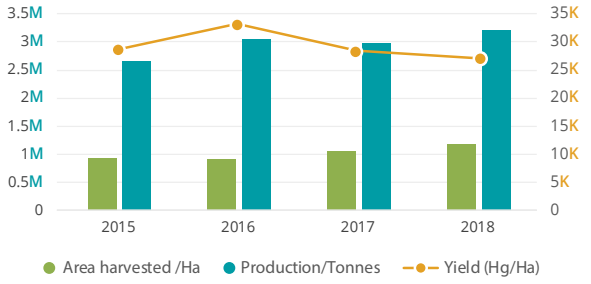
USE of LAND for WHEAT in the last season		Centre	North	South	Percent
	No	0	4	2	15 percent
	Yes	16	14	4	85 percent
	Percent of not used all land	0 percent	22 percent	33 percent	100 percent
Reason for not cultivating	Lack of resources to access inputs	0	3	3	42,9 percent
	Used for grazing land	0	1	0	14,3 percent

3.1.4 PRODUCTION

Table 6. *Land Ownership*

Land Ownership	Wheat				
	Centre	North	South	Total	Percent
RENTED	5	2	3	**10**	24 percent
OWNED	12	17	3	**32**	76 percent
Total	**17**	**19**	**6**	**42**	**100 percent**
Percent Rented	29 percent	11 percent	50 percent		
Percent Owned	71 percent	89 percent	50 percent		

Figure 8. *Wheat - area harvested, production and yield 2015-2018, -FAO Data*



According to the study, most farmers own their land and possess a certified land certificate (Table 6). Farmers in the north and centre are generally own the land they work on and are more willing to make investments for improving productivity. That being said, some farmers in the rent land to produce wheat.

Numerous factors influence farmers' yields and profits, including seeds, fertilizers, pesticides, agricultural machines (seed and fertilizers dispersing), irrigation systems, soil fertility, water availability and knowledge of good agriculture practices (GAPs). Most farms are cultivated by the owners and their families, who often do not receive a direct salary (95 percent of the interviewed farmers) as their part of the manpower cost is not calculated in the financial analyses and is not registered as family work. There are cases where hired labour is required at the peak of the season, such as planting, weeding, and harvesting. Agricultural wages continue to rise in response to high demand. The monthly salary can vary between 250 000 IQD and 450 000 IQD, with a significant difference in the north, where the minimum salary reported is 90 000 IQD. The data showed no evidence of a substantial difference between male and female workers monthly salaries in the wheat value chain, and it also showed no evidence of labour scarcity during the peak season.

Figure 9. *Application of GAPs for wheat production.*

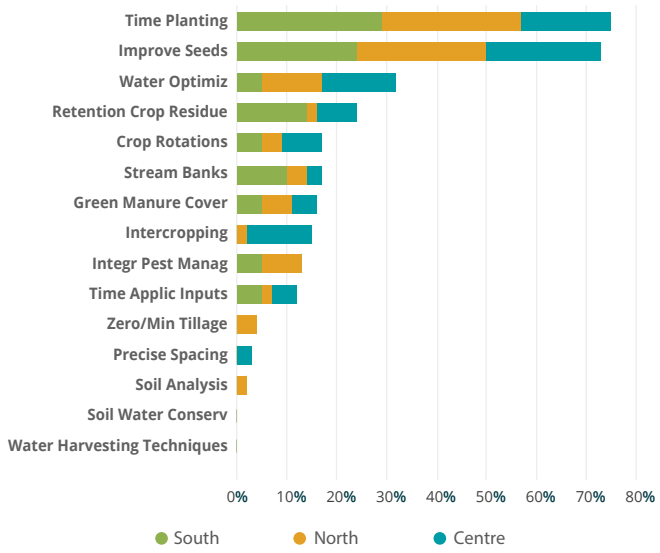
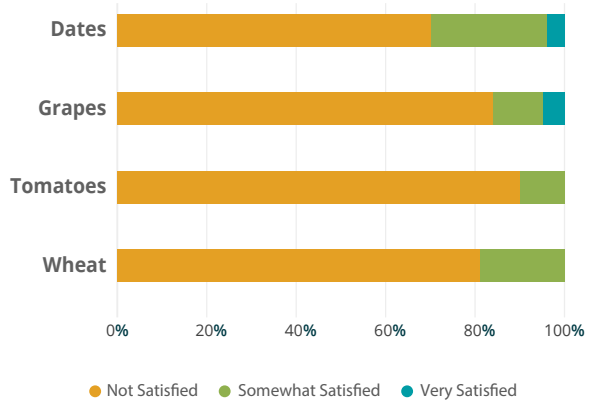


Figure 10. *Satisfaction of the government support*



Wheat management practices include appropriate ploughing frequency, seed rate, weeding, crop rotation, intercropping and water optimization practices to increase productivity and ensure sustainable land management. Only 25 percent of the interviewees applied the right seed rate during planting and only 5 percent rotate crops or intercrop their fields (Figure 9). Good agricultural practices (GAPs) are a set of procedures and sustainable methods that, if implemented, generate better food for consumers, plus higher and more stable yields and profits for the farmers. Knowledge and correct application of GAPs is particularly desirable when there is chronic misuse of agricultural inputs. The application of sustainable techniques along the whole production process (from the land preparation to the post harvesting procedures) can dramatically increase the added value for the farmers and final consumers. The adoption of better sowing techniques and timing, improved seeds, optimized spacing and fertilization, improved pest and disease control, crop rotation and intercropping (i.e. introducing pulses) are some of the possible improvements that can contribute to increase quality, production and income for the farmers.

The absence of basic infrastructure for research and extension is still the main constraint to improving farmer knowledge. Additionally, farmers expressed concerns about the lack of technical support, like seed certification and quality control for fertilizers and pesticides.

In 2019, the production of wheat was around 4.3 million tonnes. Despite the economic constraints, increased conflict and localized flooding, wheat production increased 30 percent thanks to exceptionally favourable weather conditions that prevailed since the start of the season. The annual national demand is around 6 million tonnes, which implies that Iraq will need to continue to import flour and other products to provide sufficient quantities to processors and the final consumers.

3.1.5 WHOLESALE AND RETAIL DISTRIBUTION

The Grain Board, which falls under the Ministry of Trade, buys up nearly all the locally produced wheat and regularly imports wheat for the PDS programme. Locally purchased wheat is destined for the PDS, which distributes subsidized basic food rations to the population. The Grain Board of Iraq wheat prices have remained unchanged since 2017, when they dropped significantly due to lower international oil prices. In 2018, a tonne of first-class grain was purchased at IQD 500 000 per tonne, B class at 480 000, and C class at 420 000. According to information obtained from farmers, the market price was between IQD 350 000 and 380 000 per tonne, so there was a premium when they could sell to the government silo. Production in the Kurdistan region spiked from 517 000 tonnes to 1 006 000 tonnes in the period 2012–2016. In 2019, prices ranged from IQD 420 000 (at the beginning of the purchasing season in April 2019) to IQD 560 000 per tonne, depending on the quality of the grain. The Free on Board (FOB) cost on the international market, in the same period, ranged between IQD 240 000-300 000 per tonne.

The FGDs highlighted that the government wheat classifications and prices distort the market. Standards are also not consistently applied among the state-owned silos; for example, FGDs identified differences between silos in Erbil and Mosul. Additionally, farmers with connections are sometimes able to circumvent the system and get a better classification for their product.

Table 7. *Price of wheat by grade in 2019 and 2018.*

Grade	IQD per tonne 2019	IQD per tonne 2018
First	560 000	500 000
Second	480 000	480 000
Third	420 000	420 000

Farmers deliver their wheat to the central government silos, receiving a cash advance and voucher for future payment. The Iraqi government has paid the farmers in full for 2017 but, still, as of October 2019, farmers have not received 2015 and 2016 payments. The KRG Ministry of Agriculture calculated that farmers in the region are waiting to receive payments for a total of IQD 902 billion. The delay in payment is related to a dispute between the KRG and the central government. The central government states that the silo had a higher intake than agreed and part of it was not local, but imported from the Syrian Arab Republic and sold at a profit to the silo. To avoid this dispute, some farmers in KRI prefer selling their product to traders of Mosul for a lower price, but with full payment.[3]

3 Explorative Study Agricultural Development in Iraq and the federal Kurdistan Autonomous Region at *www.mdpi.com/2071-1050/11/21/5874/pdf* and **MDPI**, 2019. The Politics of Agricultural Development in Iraq and the Kurdistan Region in Iraq (KRI) at *https://www.agroberichtenbuitenland.nl/binaries/agroberichtenbuitenland/documenten/rapporten/2018/11/09/wageningen-iraq-agri-development-report-2018/Wageningen+Iraq+Agri+Development+Report+2018.pdf*

3.1.6 PROCESSING

Locally purchased and imported wheat is transferred to the state-owned silos and bunkers, assessed in terms of quality and purity and cleaned. All wheat must comply with the Iraqi standards, although interviewees highlighted that the quality of the wheat is questionable; imported wheat from the U.S. or Australia is normally high quality, but imports from Ukraine are of lower quality. Wheat can only be imported through the Umm Qasr port on the Gulf in Basra governorate. The government has introduced a new 5 to 10 percent wheat tariff, excluding imports from member countries of the Gulf Cooperation Council. The wheat is then transported in 35 to 40 tonne bulk trucks to government silos around the country, where the mills then send their own trucks to pick up their grain allocations. Private millers need to store relatively small volumes, although the government has offered to lease its silos to the private sector for storage of their wheat imports.

The milling companies transform wheat into flour and bran. Bran is used both for human and animal consumption. Mills collect a certain amount of wheat, in accordance with a government assigned quota, process the grain, and deliver the wheat back to PDS storage facilities. In Iraq, there are around 300 privately owned mills. Although the total processing capacity is 50,000 tonnes per day (15 million tonnes per year) and there is sufficient capacity to process the annual 6 million tonnes of domestic wheat, new mills continue to be built. Due to the large number of mills, none of the mills work at the full capacity. The milling industry is almost entirely privately owned, but depends on the government for all wheat deliveries and flour off take. Mill revenues are generated from fees and bran sales as they do not sell the flour – the government is the client. The government pays mills 10 USD per processed tonne and they are allowed to sell 87 percent of the bran for animal feed. The remaining 13 percent of bran is sold by the government in a public auction. The price of bran can go as high as 270 USD - 280 USD per tonne or, as seen in 2019, fall below 200 USD.

Based on the government standards, mills produce only one type of flour. The specifications are as follows: 80 percent flour and 20 percent bran; no gluten or protein specification; moisture 14.5 percent and ash at maximum 1 percent (World Grain, 2019). In 2019, only nine flour mills were authorized to begin milling 72 percent extraction flour (USDA, 2019) to compete with imports from the Republic of Turkey, the Islamic Republic of Iran, and Jordan. Previously, Iraqi mills had only been allowed to produce 80 percent extraction. The Ministry of Industry has approved the same nine mills to import 735,000 tonnes of wheat for the production of this fine flour.

The choice to invest in the milling industry is not strictly related to demand as competition is absent. Being controlled by the government, milling factories cannot brand the flour and the by-products. This has a significant impact on the possibility to raise the quality of flour consumed in Iraq, but also means that milling businesses do not spend any money on marketing. In Iraq, there is no differentiation for the local produced flour as the government controls the market. Without differentiation and branding, consumers cannot choose among different products, reducing price and quality competition. As almost all private mills must operate within the government system, they are prevented from buying wheat to produce higher quality flour needed by private bakeries and food processors. Private companies import higher quality flour, with the majority of that flour originating from the Republic of Turkey -- around 100 Turkish mills produce only for the Iraqi market (USDA, 2019).

Overall, the milling industry in Iraq requires an update. Innovation and technology updates have stopped since the invasion in 2003. In addition to technology investments, works' capacity and knowledge should be improved in order to increase the quality of products and ensure business profitability.

3.1.7 TARGET GROUP CONSIDERATIONS

Wheat is considered a strategic crop and the government regulates all aspects of the value chain in an attempt to guarantee wheat for the population. The government invests in resources and subsidies in an attempt to achieve grain self-sufficiency, but is still only partially achieving this goal. Stimulating the production of wheat by involving and benefitting only certain farmers distorts competition, while offering a premium price for the grains produced motivates farmers with marginal lands to produce the crop. This policy has an impact on the yield and the quality, thus negatively affecting resource use efficiency. It reduces the yield per hectare as cultivation occurs in marginal areas and farmers are not incentived to modernize their agricultural practices. Furthermore, the production of flour at 80 percent extraction, without considering the demand of higher quality flour, obliges companies to import value added flour even when it could be sourced domestically.

The role of the government is to design mechanisms that ensure agriculture production is sustainable for long-term food security. Thus, It is crucial to determine the role of the MoA in the wheat value chain and assess which policies would allow the government to reach their targets. Is distribution of seeds and inputs to selected farmers the best way to create the conditions to encourage investment and improve production? Is this policy making farmers more resilient or more dependent on public aid? Most farmers are hoping that subsidized grain production continues; however, this appears to be cognitive dissonance as a result of short-sightedness. Farmers need support to accelerate the process of mechanization and modernization of their agricultural practices and the government has a fundamental role in producing such public goods for wheat and other grains producers. Additionally, research in improved seeds and seeds multiplication are a strategic aspect of the process, while innovation in wheat processing and marketing (in an open market) is needed to serve as a market lever to stimulate competition.

3.2 TOMATOES

3.2.1 VC MAP

Table 8. *Distribution of the actors interviewed along the tomatoes value chain*

Number and Typology of interviewed					
AEZ North	Dahuk	Erbil	Makhmur	Salah Al-Din Samarra	Total
Farmer	0	3	1	5	9
Importer of seeds	0	1	0	2	3
Importer of inputs	0	1	0	0	1
Producer of inputs	1	3	0	1	5
Import of equipment	1	1	0	1	3
Dealer of equipment	1	1	0	1	3
Rental of Equipment	0	2	0	2	4
Aggregator	0	1	0	1	2
Packaging and Sorting	0	1	0	0	1
Importer of crops	0	1	0	0	1
Wholesale trader	0	1	0	0	1
Transporter	0	2	0	1	3
Total	2	18	1	14	35

Table 9. *Geographic distribution of land (dunums) cultivated in the tomato value chain*

Distribution of Dunams in Tomatoes	Erbil	Makhmur	Samarra
Dunams cultivated in a greenhouse			
6	1	0	0
25	0	0	1
40	0	0	1
50	0	0	2
60	0	0	1
Dunams cultivated in an open field			
6	1	0	0
10	1	0	0
20	1	0	0
27	0	1	0
TOTAL	4	1	5

In addition, three FGDs took place, two in Erbil and one in Samarra, and an interview with the Director of the Agriculture Directorate in Shamamk.

A total of 33 interviews were conducted along the tomato value chain. The panel was composed of nine producers and 24 actors along the value chain (Table 8). Two interviewees were engaged in more than one business activity.

Three farmers in Erbil cultivate between 10 and 40 dunums each. In Salah Al-Din, five farmers had 21-40 dunums. While the farmers in Salah Al-Din produce tomatoes in greenhouses, only one in Erbil produces both in the open field (10 dunums) and greenhouses (6 dunums) while the remaining produce tomatoes in the open field.

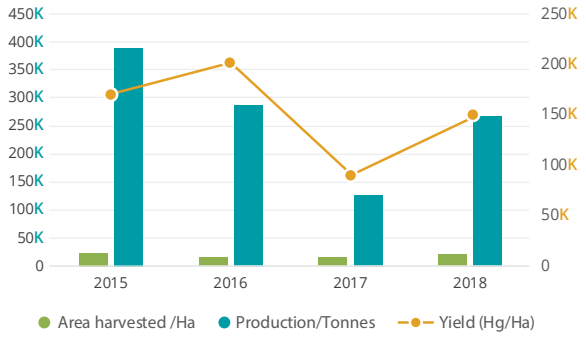
Tomatoes are the most commonly grown vegetable in Iraq. According to MoA, around 771 000 tonnes are produced nationwide, with high production in Karbala, Basra and Najaf. Tomatoes can be successfully cultivated in a range of soils, including sand and even heavy clay, although the soil must be well drained and sufficient water must be available to have an optimal yield.

The value chain actors are input suppliers, producers, collectors, traders, middlemen/brokers, processors, wholesalers, retailers and consumers. Researchers and extension officers support the development of the value chain with breeding improvement and dissemination of GAPs, respectively. Infrastructure, the regulatory environment and the financial sector all play an important role in stimulating or hampering the capacity of the actors to interact and generate value.

The government does not consider tomatoes a strategic crop. Thus, the actors in the value chain are mostly private entities, except for the extension services provided by MoA that, in the last few seasons, have focused greenhouse production and fighting the nematode pest. Farmers buy inputs from dealers and sell the harvested product to wholesalers or, in some cases, to retailers and aggregators. The lack of storage facilities is a serious concern, as well as the lack of processing plants. Loss and waste along the value chain are closely related to the limited storage facilities and processing plants in key producing areas. During stakeholder consultations, individuals indicated that there were many firms producing tomato paste, but other processing facilities needed rehabilitation due to conflict-related damage. There has been movement to improve processing facilities; for example, the Ministry of Industry has plans to construct a tomato processing facility in Duhok. The government-owned tomato processing facility will be 10 000 square meters and cost 4 million USD. The facility will create 50 new jobs, potentially stimulating the national and local non-oil sector of the economy.[4]

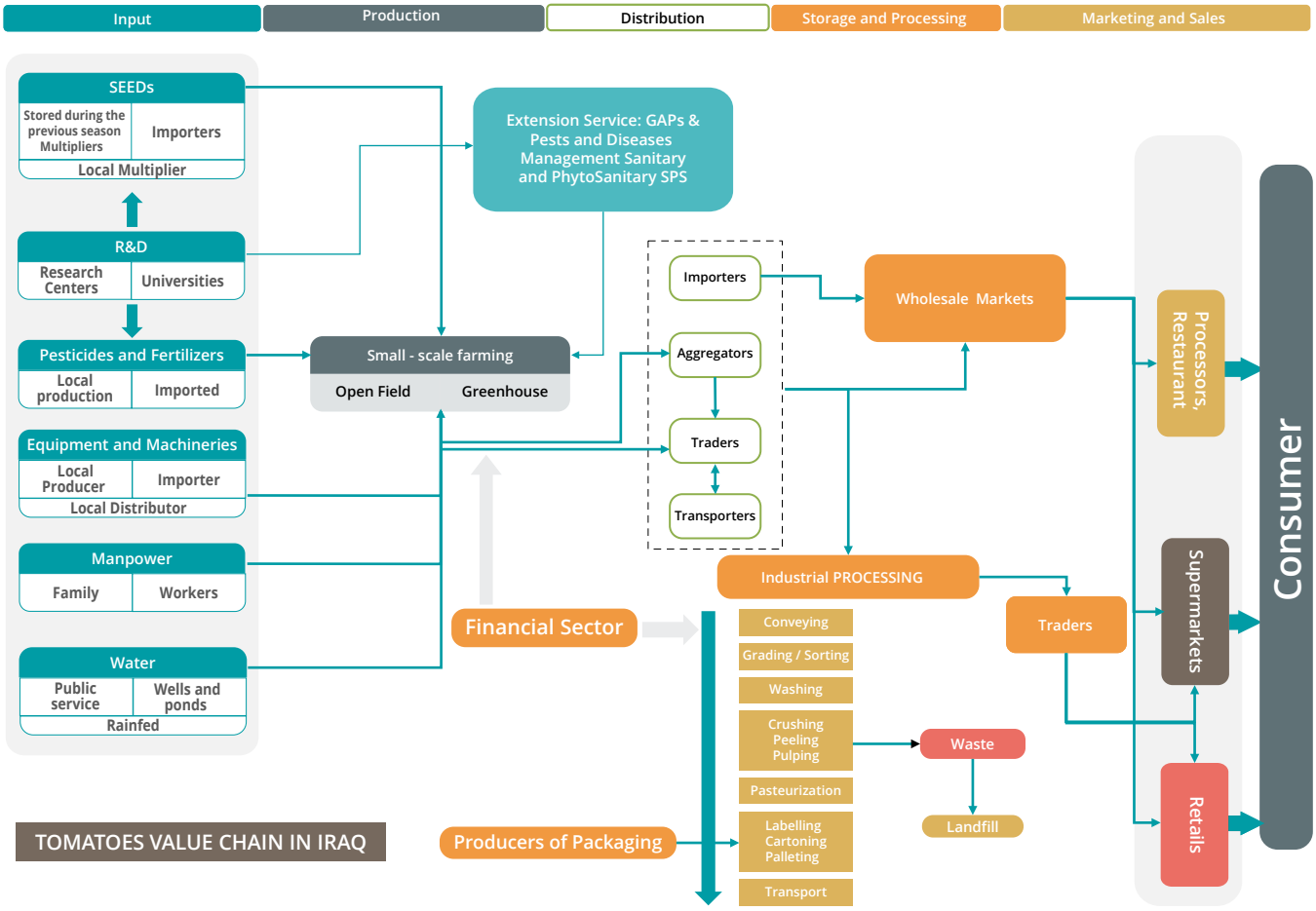
The government has also shown support for tomato production through trade policies. In 2017, government imposed an import ban on tomatoes to protect local producers. Iraq imported 98.5 million USD worth of tomatoes in 2014, 82.8 million USD in 2015, and 88 million USD in 2016. The 2017 ban generated an increase in the prices on the local markets, and allowed local production to thrive without competition from the Islamic Republic of Iran, the Republic of Turkey and Jordan.

Figure 11. *Tomatoes - area harvested, production and yield 2015-2018, -FAO Data*



4 Iraq's Reconstruction and Development Framework

Figure 12. *Tomatoes value chain map*



3.2.2 TECHNOLOGY

Tomato breeding is a way to improve and develop the tomato value chain. Improvements may include breeding for disease resistance, higher yields, early maturity, drought resistance, large fruit size and better flavour, among dozens of other traits. Crossing different varieties of tomato (called parental lines) is a basic way of generating new genotypes. Effective and efficient selection strategies can be adopted to breed varieties with the desired traits. While investments in wheat breeding are evident, there is not clear evidence that local tomato producers have access to high quality local seeds, or that policies and mechanisms are effective at certifying imported seeds.

Tomatoes are produced both in open fields and in greenhouses. The investment required to build a greenhouse is expensive and often, due to external conditions (i.e. infrastructure and economic environment), is not deemed profitable. Nevertheless, greenhouse farming is becoming a more common approach. Greenhouse farming became a popular form of production starting in 2008 when a group of Kurdish agricultural engineers ran a successful greenhouse experiment. Since then, the production of tomatoes and fresh vegetables is slowly shifting to greenhouses. Farmers recognise the profitability of greenhouses; however, it requires large upfront investments and more intensive management. Given the labour and capital investments, it is essential that farmers have the knowledge and quality inputs to optimize their production.

All tomato harvesting is done by hand, whether in open field or greenhouse systems; however, the storage differs. For open field production, tomatoes are stacked in baskets, while tomatoes cultivated in greenhouses are normally packaged carefully in cartons before being transported to the wholesale markets. The post harvest management for greenhouse production decreases damage and losses. That being said, losses can still occur in transit due to bad road conditions and delays at checkpoints, increasing physical damage and exposure to high temperatures. None of the actors interviewed perform post-harvest activities like washing and sorting, with only 19 percent recognizing that these practices could increase the value of their tomatoes.

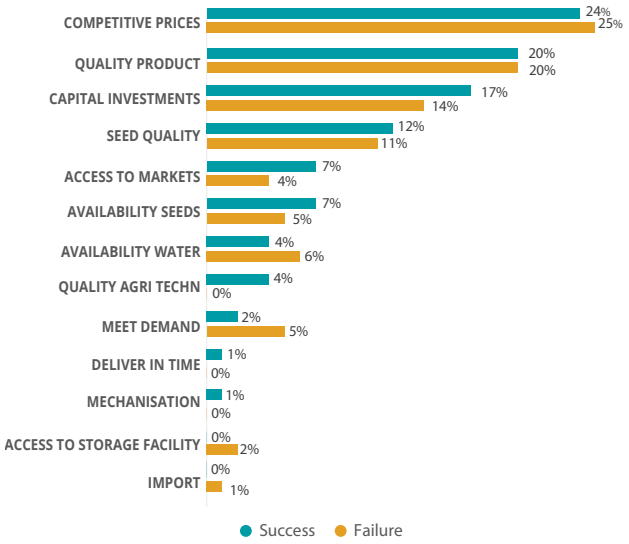
Water management is another relevant aspect of the applied technologies. The inefficient use of the resources increases costs and impacts the environment. Tomato production is hampered due to lack of water resources and high salinity of some irrigation water. Studies and research on suitable breeds and water technologies should be considered. The most inefficient form of irrigation, surface irrigation, is used by 23 percent of interviewed tomato farmers. Surface irrigation requires distributing water over the soil surface by gravity. Greenhouse production requires more efficient irrigation schemes (i.e. drip irrigation), so as farmers adopt greenhouse production systems, water use efficiency may improve.

Farmers and other tomato value chain actors identified key factors that result in the failure or success in production. The majority of respondents identified the economic environment, poor security, lack of local inputs and poor infrastructure undermine the competitiveness of local tomatoes compared to the imported tomatoes.

Table 10. *Irrigation techniques for tomatoes*

Irrigation Technology	# of farmers reporting irrigation technology	Percent
Localised	0	0
Surface	5	23
Drip	7	32
Sprinkler	3	14
Centre Pivot	5	23
Lateral Move	2	9
Manual	0	0
Total	22	100

Figure 13. *Key factors for success or failure in the tomato value chain according to survey respondents.*



3.2.3 INPUT SUPPLY AND DEMAND

Tomato farmers suffer from rising costs of core inputs, an issue exacerbated by the declining price of tomatoes on the market. Many inputs are imported and are relatively expensive as they are subject to fluctuating market prices and taxes. This is especially true for the wooden crates; these crates used to be imported from the Syrian Arab Republic, but the conflict increased prices. Those crates have been substituted with 10kg plastic boxes that cost IQD 500-750 each. These boxes cannot be reused due to new phytosanitary rules, and farmers complained that this increased their costs. Additionally, most of the interviewed farmers invested in irrigation, greenhouses and high-quality seeds, fertilizers, and pesticides. However, farmers raised complaints about the absence of input quality control and certification, affecting quality of the production and the yield. "Fake seeds and other low-quality inputs....are difficult to distinguish them from the higher quality inputs" stated a farmer during an FGD. Farmers also highlighted that the quality of spare parts, water pumps and other equipment available on the market, mainly imported from China and the Islamic Republic of Iran, is poor.

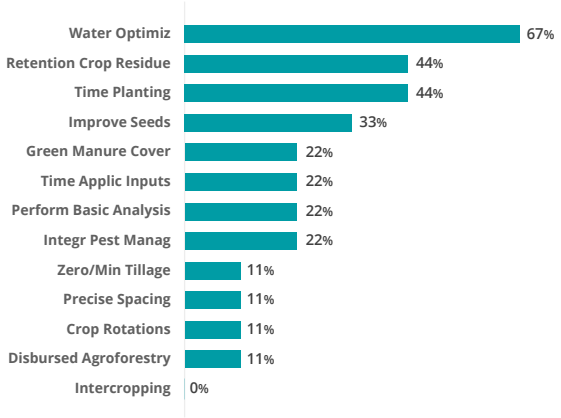
3.2.4 PRODUCTION

Most of the farmers interviewed are investing in greenhouses, in addition to wells, irrigation systems and higher quality inputs. That being said, there is still a lack of knowledge about management, particularly the correct use of pesticides for common pests and diseases. Although a certain level of investment is evident, farming is still mainly a family business and access to knowledge and financial services is rare. This often means that the investment is made with limited resources, resulting in inadequate returns for both quantity and quality.

Additionally, efforts to increase production are only contributing to a further over-supply and, in some cases, increasing losses for farmers. Losses and inefficiencies can be considered as an effect of the systemic deficiency in the value chain. Most of the farmers stated that their losses are between 20 and 40 percent of their total production.

Tomato growers have a long experience of planting and growing in Iraq. However, solely relying on this traditional knowledge potentially limits the possibility to transition from traditional methods and varieties to modern and efficient techniques and inputs. Farmers reported that there is room to improve the performance of production with an intensive application of the GAPs, requiring information dissemination, capacity building, technical assistance, applied research on new breeding and multiplication of suitable varieties. For example, Farmers in FGDs continually highlighted the importance of extension services and prompt response to disease and pest outbreaks. In particular, measures should be taken against the Root-knot nematode, a pest that has infested several areas. Thrips, whitefly, tomato fruit worm, leaf miner, leafhopper, aphid, mites, and mealy bug, among other diseases, also require control. Producers require training and capacity building on how to apply appropriate pesticides and other technologies during an outbreak. In order to increase the adoption of GAPs, investments should be made in extension and research services, in addition to financial support to allow farmers to purchase the required inputs and equipment needed to apply such practices. Decision-making through imitation of their peers (Duinen, Rianne et Filatova, 2012) is common in rural environments as it mitigates risks, so model farmers and other demonstration plot interventions could result in a multiplier effect.

Figure 14. *Applied GAPs in tomato production (Elab. on primary data)*



To ascribe the agri-food sector's low productivity to the small size of the farms with out-dated farming practices, a lack of farmers' skills and competences, lack of entrepreneurial skills and reluctance of farmers to invest is not wholly accurate – there are larger market issues at play. The challenge is how to generate economies of scale within the existing framework. To govern the production in a sector composed of small-scale farms requires investments in public goods and infrastructure. If a farmer must fund their own rural road to access the farm, well to irrigate and access to the electricity grid, they will never be able to be competitive. If a small-scale farmer has to invest resources to access knowledge, technical assistance, and the market, transaction costs increase; however, where public goods are available and there is a certain level of cooperation among farmers, small-scale farming can be sustainable.

In northern governorates, several farms producing tomatoes reported transitioning to other products when faced with high tomato losses. If a farmer can transition to low capital-intensive crop, shifting among different crops can be realized with minimal efforts. These behaviours can generate, in a context like Iraq, significant fluctuation in crop production.

Competitiveness is the result of internal advantages (knowledge, experience, and investments made) and external factors (business environment). In the Iraqi tomato value chain, the internal advantages are not well defined and the external environment is risky and unstable. Considering the lack of suitable processing facilities in the areas assessed for this study, increasing production will not be a suitable solution to increase profitability of the tomato value chain. Data have not shown any differentiation on this factor in different localities. With a deeper investigation it can be possible to identify niche markets for certain tomato varieties where consumers would be willing to pay a premium price. For instance, the international demand of sundried tomatoes is growing and could be an opportunity for value-added products, particularly for women. Small groups could be supported and assisted to develop this or other value-added goods. Globally, there is also a high demand for organic tomatoes, for which accessing export channels could be a possibility for Iraqi farmers. Certification initiatives should be launched for tomatoes and other crops, possibly through farmers' associations under the international standards and control board. Pilots and demonstration models should be launched to test new varieties, but also to optimise the use of inputs by introducing them to farmers in practical ways and by supporting farmers in making investments for improving quality and yield of tomatoes.

3.2.5 PROCESSING

Table 11. *Percentage of losses in the tomatoes value chain (Elab. on primary data)*

Percentage of losses	Farmer	Aggregator	Transporter	Packaging and Sorting	Wholesale trader
ALL (100 percent)	11 percent	0 percent	0 percent	0 percent	0 percent
Very High (61-99 percent)	11 percent	0 percent	0 percent	0 percent	0 percent
High (41-60 percent)	0 percent	0 percent	0 percent	0 percent	0 percent
Medium (21-40 percent)	22 percent	50 percent	33 percent	0 percent	100 percent
Low (1-20 percent)	56 percent	0 percent	33 percent	0 percent	0 percent
No losses	0 percent	50 percent	33 percent	100 percent	0 percent

Harvest and post-harvest management aims to reduce losses and maintain the quality of the tomatoes until they reach the consumer. Post-harvest losses are attributed to harvesting methods, inappropriate packing, packaging, poor storage and transport conditions, all of which damage the product. Thus, investments in capacity building and technologies in picking, grading, packaging, cold storage and equipment are needed. Although transportation is not considered an issue, post-harvest management is poor. Basic services are available and evaluated as good, but the handling of the tomato and activities like grading and quality control are almost absent. While losses in production can reach 100 percent, the percentage of losses as reported by the interviewed value chain actors indicates that tomato and other fresh vegetable losses are a common problem along the value chain (Table 11).

The limited availability of cold storage facilities is one of the key problems in all area due to the destruction of the physical infrastructure, the unreliability of the energy supply and poor social capital along the value chain. Not all farmers are members of associations, cooperatives, and other organizations and, if they do exist, are considered weak. Their main, and in many cases only, activity is the collection of the annual farmer registration fee of 10 000 IQD.

Beyond the cold chain, tomato-processing facilities are important assets for the value chain. Before the Gulf War and economic sanctions, the tomato processing industry was functioning and efficient; however, Iraqis now mostly rely on tomato paste imported from the Republic of Turkey and the Islamic Republic of Iran. Iraqi tomato processors are small and undercapitalized, and the quality of the product is unreliable. There are nine plants able to process tomatoes, of which only four are operational (Table 12). Most are located in Baghdad while there is a plan to develop a new plant in Salah Al-Din.

The tomato processing industry requires a different variety compared to the fresh tomato chain, and the corresponding price differs as well. Processors prefer varieties with high soluble solids fruits that contain less water, which require less energy for evaporation. A competitive price for such a tomato is around one-sixth of the price of a tomato for fresh consumption. To be able to produce this kind of tomato profitably wfor this price, mechanization and economies of scale are required.

Table 12. *Establishments of tomato processing (Source: Gain Report, March 2011, Iraq Food Processing Sector)*

No	Factory /Brand Name	Factory daily Capacity Level					
		Fruit	Date	Tomato	Fruit and Vegetable	Location	Status
		Jam	Syrup	Paste			
1	Kerbala Canning Factory	50 tonnes	50 tonnes	300 tonnes	50 tonnes	Kerbala	Not Operational
2	Diyala canning factory	50 tonnes	50 tonnes	300 tonnes	50 tonnes	Diyala	Not Operational
3	Balad Canning Factory	50 tonnes	50 tonnes	300 tonnes	50 tonnes	Salah Al-Din	Not Operational
4	Duhok Canning Factory	50 tonnes	50 tonnes	300 tonnes	50 tonnes	Duhok	Partially Operational
5	AL Bustan means			200 tonnes		Baghdad	Partially Operational
6	ALKanz means			200 tonnes		Baghdad	Partially Operational
7	AL Baraka for tomato paste and Hello brand for the fruit jams			200 tonnes		Baghdad	Partially Operational
8	Al Shams			50 tonnes		Baghdad	Not Operational
9	Al Ameer			50 tonnes		Baghdad	Not Operational

According to some interviewed entrepreneurs, a competitive food processing industry in Iraq is absent. There are several private initiatives to establish modern processing plants; however, they face serious challenges to access technologies and raw materials. The construction of modern processing plants requires active involvement of foreign suppliers for equipment. Security and other constraints add significant costs to the investment. It is also worth to mention that the human capital needs to be updated both at management and operational level. Combined with out dated farming practices, inefficiencies between the farm and market (bribes, checkpoints, long wait for documents check), weak infrastructure and limited storage facilities available at the wholesale markets, and the lack of factories for tomato processing decrease the competitiveness of the tomato processing value chain.

3.2.6 WHOLESALE AND RETAIL DISTRIBUTION

Farmers sell tomatoes to wholesalers or directly to retailers. In certain cases, the farmer brings the produce directly to the wholesale market. It is worth noting that farmers, independent of the quantity or number of successful sales, have to pay a fee upfront at the entrance of the wholesale market in the form of a percentage of the estimated value of profit. Rarely, there are contracts that are agreed upon in advance. Most of the transactions are conducted in cash. The price is determined based on the market and negotiated based on the quality. The cost of transportation is paid by farmers and, although it depends on the location, ranging from IQD 30-40 000 per truck.

Iraqi tomatoes are not competitive with the imported or smuggled products from the Islamic Republic of Iran and the Republic of Turkey, where farmers receive subsidies and technical support; however, consumers prefer Iraqi tomatoes thanks to the taste. Quality is considered a key factor for marketing and this is obtainable if quality inputs are available and affordable. During the peak season, prices drop and the only option for farmers and traders is to sell as soon as possible in order to reduce losses and waste. For instance, in July 2019 the price for a box of tomatoes was IQD 1 000 in Erbil, while in October, a kilogram of tomato imported from the Islamic Republic of Iran had the same price. As a consequence of the lack of storage, fresh tomatoes have to be picked, packed, transported, sold, and consumed in a short period of time to avoid high losses in product and money. In some cases, between 40 and 60 percent of the total production is lost between the farm and consumer. This reduces farmers' bargaining capacity, potential income, investment potential, and other market actors are unable to increase their profit margins. A more efficient, coordinated, and integrated market could result in price security and stimulate investments by ensuring a stable, extended supply.

Losses are also high in the other steps of the supply chain.

Farmers, wholesalers and trading and processing companies contest the view that low farm productivity is the main problem. They consider the supply chain and marketing the main problem. Farmers argue that the government may want them to produce more, but they see no possibility to sell the products if they do so, particularly with competition of imported from the Islamic Republic of Iran and the Republic of Turkey.[5] For a better balance between supply and demand of tomatoes and vegetables, infrastructure and technology need to be available. Tomatoes need to be stored in controlled temperatures as they are highly perishable; however, a cold chain infrastructure is almost absent in the main markets.

The establishment of storage facilities would also extend the period of tomatoes on the market, benefitting farmers, distributors and ultimately consumers. Without systemic rehabilitation and improvements, increasing production only contributes to a price drops and increased costs. This affects the tomato value chain, in addition to other fresh vegetables.

Additionally, farmers should be supported to form cooperatives or producer groups amongst themselves and with other value chain actors to improve social capital and market linkages. The need for improved social capital was evident when the research team visited a new wholesale market under construction in Erbil that will serve agriculture and meat producers and traders by providing cold chain and post-harvesting value addition (packaging and sorting); however, the market management team is facing resistance from farmers and traders, who are not keen to assume responsibilities and the risks associated with the new establishment. In particular, the market management team highlighted an initiative undertaken in cooperation with the Dutch consulate which offered them the possibility to make a study; however, farmers and retailers reportedly focused on problems related to the government, without demonstrating the capacity or wiliness to find solutions.

5 This policy of financial support for tomato producers in the Republic of Turkey and the Islamic Republic of Iran aligns with their countries' national strategy to accumulate foreign currency.

3.2.7 TARGET GROUP CONSIDERATIONS

Numerous challenges hamper the tomato value chain. The lack of sufficient knowledge about GAPs and post-harvest management all contribute to market deterioration, further exacerbated by limited water availability, high water salinity, limited technical assistance and a lack of financial credit. Producers also have little influence over wholesale traders, who have strong bargaining powers. Processing initiatives, construction of storage facilities and stimulation of cooperation among producers would be a positive beginning for the development and sustainability of the value chain. There is also room for value-adding processing initiatives at the individual farmer level. Tomato farmers, along with the whole farming system in Iraq, need to discover the importance of cooperation and collective action in marketing, branding, packaging, and procurement.

The level of technology and efforts required to improve the tomato value chain will vary by locale, distance to markets, climate, intended use (fresh versus processed) and the end-market. If fresh products are marketed nearby, careful harvesting and handling and proper sanitation practices may be sufficient for assuring the quality of tomato and in general of all the other vegetables. As the distance increases, handling, packaging, and refrigeration are essential to reduce losses and extend the shelf life of the fresh product. Investments to improve the practices and flow of the product can increase the revenue for farmers and traders, while also reducing the market price for consumers.

3.3 GRAPES

3.3.1 VC MAP

Grapes are cultivated in about 100 countries in the world; in 2014, grapes were grown on an estimated 7.5 million hectares with an approximate global production of 75.1 million tonnes globally (FAO/OIV, 2016). Grapes are consumed as both fresh and processed products, such as wine, jam, juice, jelly, grape seed extract, dried grapes, vinegar, and grape seed oil. Grapes are appreciated for their sweet taste and high nutritional value. Varieties of the genus Vitus Vinifera (European grape) are the most widely grown grapes in Iraq. Grapes in Iraq mature in the north in September, but can are also be harvested in the south by July. Grapes are divided into three broad segments: dessert, wine, and raisin grape. Grapes are technology and labor intensive, requiring cooling, sulfidation, packing, cold storage and hand-picking. Thus, grapes have the one of the highest production value.

Grape leaves can also be processed for use in a popular, traditional Middle Eastern dish. Processors for this product are either small or large factories or the farmer and members of the family themselves. Vine leaves can be stored for 4-6 days in the shade, but if refrigerated (2 to - 1.5 C°) the product can last up to 45 days.

The team collected data from 37 individuals, of whom 17 were farmers and nine were traders (Table 13). Some actors were engaged in more than one activity. Additionally, two FGDs were conducted in Balad and two in Duhok with the participation of producers of grapes. Collectively, the interviewees cultivated more than 350 000 grape vines.

Table 13. *Composition of the panel for the value chain of grapes*

Composition of the panel	Duhok	Salah Al-Din (Balad)	Total
Farmer	7	10	17
Importer of seeds	1	1	2
Producer of inputs	0	2	2
Importer of equipment	0	1	1
Processor	1	0	1
Importer of crops	2	0	2
Wholesale trader	0	9	9
Retailer	0	1	1
Transporter	4	1	5
Total	15	25	40

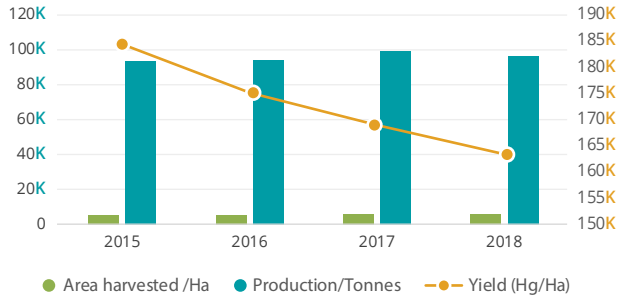
Table 14. *Consumption and production of grapes Iraq and World (2016)*

The reference year 2016	World HA/Ton/ percent	Iraq HA/Ton/ percent
Area harvested HA	7,453,532	5,373
Production	75,524,194	94,103
Fresh Grapes	27,639,358	
Table Grapes	27,639,358	89,868
Raisin	1,397,553	Imported 2,171
Table Grapes	36,9 percent	
Raisin	8,0 percent	
Transformed	63,1 percent	
Pressed	78.3 percent	
Wine	91,0 percent	
Juice and moisture	9 percent	

According to FAO data, 5 869 hectares were cultivated in 2018, with a total production of 95.7 tonnes and estimated yield of 16.3 tonnes per hectare (Figure 15). Although productivity is declining, Iraq still remains competitive in the region. FAO data shows that in 2018, and in previous years, grape yields in Iraq are 43 percent higher than those in the Republic of Turkey. That being said, only 5 percent of the actors stated that business had improved; 75 percent said the situation became worse (Figure 16).

In Iraq, although the per capita consumption is the lowest in the region, 2.5 kg compared to 19.3 kg in the Islamic Republic of Iran, 6.4 in Jordan and 23 Kg in the Republic of Turkey, grapes are one of the most important fresh fruits cultivated in the country, particularly in the north.

Figure 15. *Grapes - area harvested, production and yield 2015-2018, FAO Data*



The grape value chain can be delineated into producers, research, and development (R&D) actors, inputs suppliers, packaging and cold storage providers, processing, distribution, marketing and sales stakeholders. The R&D segment of the value chain is primarily focused on improving existing varieties and developing new ones according to the soil composition, location and microclimate. They also identify GAPs, such as the efficient use of inputs (i.e. fertilizers, pesticides, and water). Farmers buy inputs from dealers, which are often imported. The government also provides inputs and new plants, to support farmers directly. Grapes are either sold to traders and aggregators, or they are directly transported to the market (wholesaler and retail).

Figure 16. *Perception of grapes VC's actors about the status of business compared to the previous year*

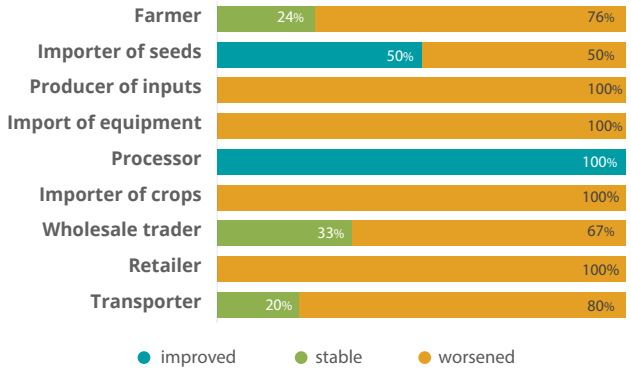
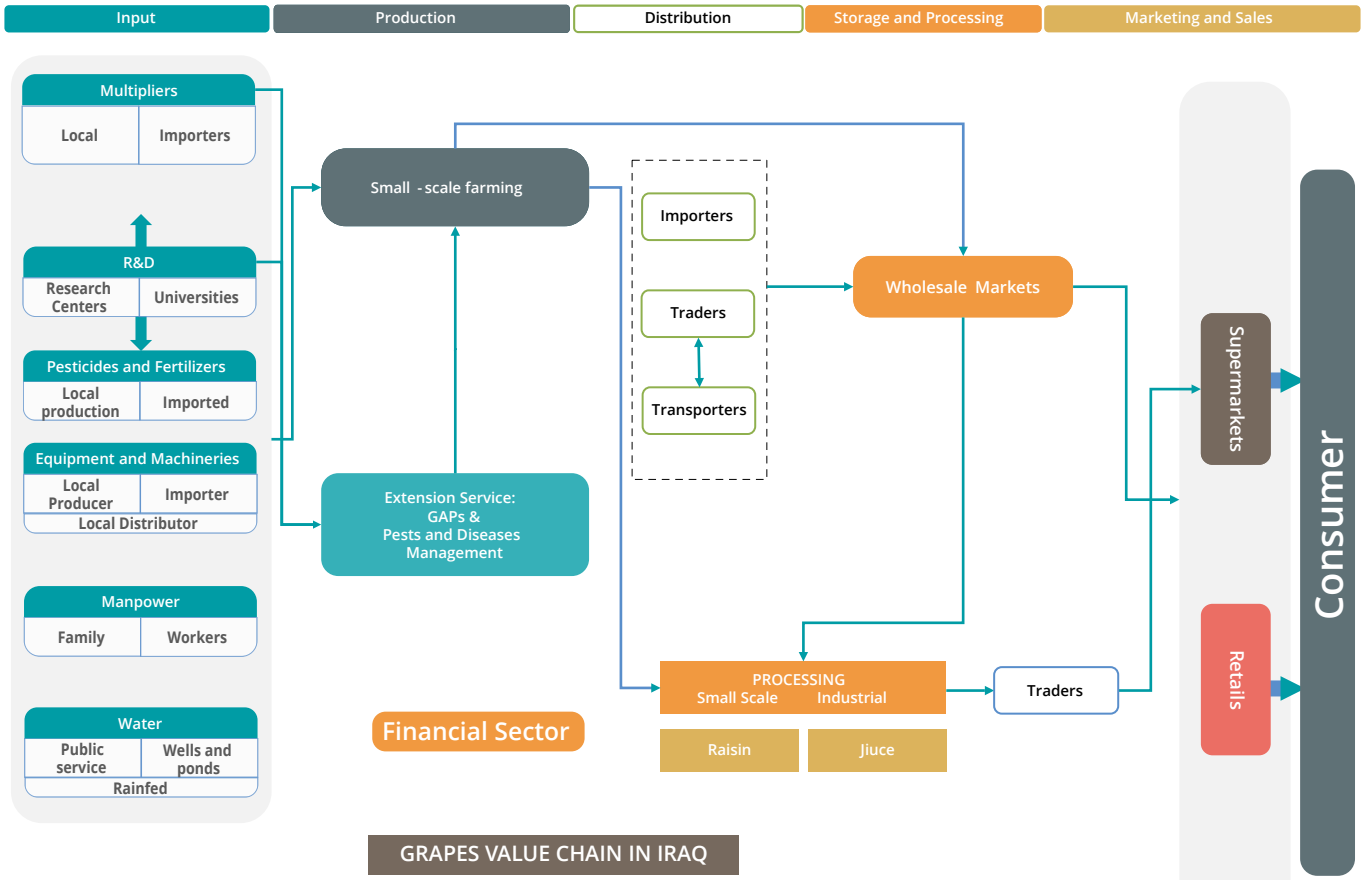


Figure 17. *Value chain map of grapes*



3.3.2 TECHNOLOGY GENERATION

Grapes grow best in deep and fertile soil, but can also thrive in a range of soils, from heavy clay to sandy soils with a high proportion of stones. It can grow well in limestone soils with a high proportion of calcium and is tolerant against moderate salinity. Temperature is one of the most important climatic factors in grape cultivation. Chilling points must be reached to break winter dormancy, but temperatures below zero can damage the plant. Most varieties need mild to high temperatures to grow and ripen. Grapes need water, and several irrigation techniques are suitable. The precise quantity and timing of water delivery depends on the climate, soil characteristics, variety and age of the vines under cultivation. Accurate fertilization is important for balancing the foliage and the ripeness of the fruit. Excess of nitrogen can generate heavy foliage to the detriment of the ripening of the berries; however, nitrogen deficiency causes weak vegetative growth and smaller clusters (i.e. poor yield).

Figure 18. *Used GAPs in grapes value chain*

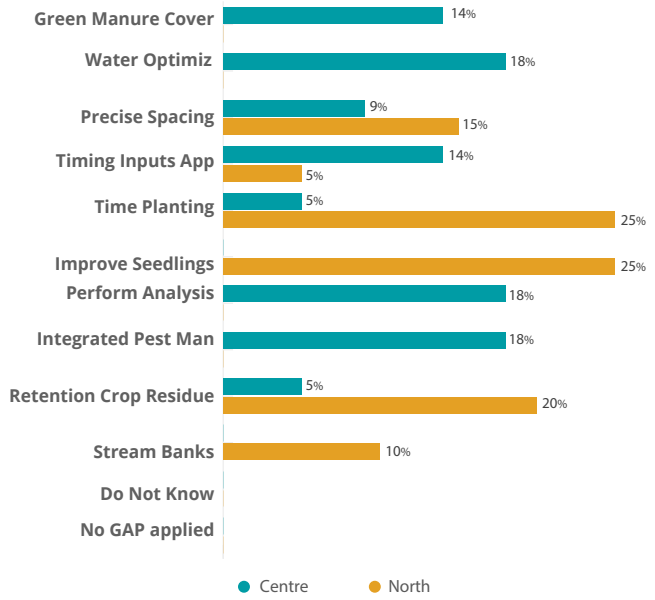


Table 15. *Source of water and Irrigation technologies in grapes production*

Source of Water	Centre	North
Rainwater	0	6
Groundwater	10	2
Artificial pond or lake	0	5
Natural pond	0	2
Lake	0	1
Stream	10	0
Irrigation Technology	**Centre**	**North**
Localised	0	4
Surface	9	0
Drip	3	1

The data shows substantial differences between the centre and northern regions, particularly in regards to the application of technologies and use of inputs. Figure 18 highlights the most commonly adopted good agricultural practices in the two agro-ecological zones. It is worth highlighting the complete absence of soil analysis and Integrated Pesticide Management by the interviewed farmers in the north, where new varieties have been introduced in the recent past. Additionally, in the centre farmers rely mostly on wells and use pumps to access water, while farmers in the north access water in various ways and use more sustainable water application techniques.

3.3.3 INPUT SUPPLY AND DEMAND

Inputs are mostly purchased in cash at the local shops. There are cases of in kind payment, but farmers do not consider this a good deal. Similar to other value chains under consideration, most of the farmers complained about the quality of the inputs sold on the market and requested that authorities intervene and certify fertilizers and pesticides. Expired inputs are often sold, affecting not only the farmer, but also the rest of the production chain as the application of poor quality inputs causes losses and pest multiplication. In Balad, a district known for its sweet black grapes, pests were the primary cause of losses due to a lack of high quality pesticides and storage facilities. In the north, farmers reportedly have more experience and knowledge in the use of inputs compared to the centre. Ten years ago, the government and other organizations conducted trainings on input use, and that information has been retained. In the north, there is a strong interest in establishing nurseries to boost production and diversify varieties. Additionally, most of the farmers stated that they need tractors and irrigation rehabilitation support.

3.3.4 PRODUCTION

Grapes are the most profitable crop in the target areas, although other fruit trees, such as citrus, peach, apricot, apples, persimmons and olives, are also part of the landscape. The soil, altitude and climate of the target areas favour grape production; however, farmers must invest in soil fertility maintenance, water use efficiency, higher quality inputs and integrated pest and general land management to improve productivity and profitability. Production is also affected by the quality and correct use of the fertilizers and pesticides, requiring government regulation. Additionally, calls for technical assistance and training from the government, for instance through partnerships with FAO and NGOs, to increase the knowledge of the farmers and establish an Early Warning Mechanism and Intervention (EWMI) for contrasting pests and diseases were made during the interviews. Services and human resources appear to be sufficient and are not a critical issue; pruning and transportation are available and deemed satisfactory

Losses along the grapes value chain are high and mainly attributed to a lack of pesticides and storage facilities (Table 16). Financial resources and cooperation are necessary to establish storage facilities. Harvest occurs in August in Balad and in September in Duhok, and the yield must be sold as soon as possible. Due to the excess of supply in that period, prices drop to the detriment of the producer. If storage facilities were available, the season could be extended and the prices could remain steady throughout the harvest season. Another critical juncture where losses are high is in transit due to poor temperature control and delays along the way, so investment is required to improve transportation infrastructure.

Table 16. *Percentage of losses along the supply chain of the product as reported by the interviewed value chain actors.*

Percentage of losses	Farmer	Processor	Transporter	Wholesale trader	Retailer
ALL (100 percent)	6 percent	0 percent	0 percent	0 percent	0 percent
Very High (61-99 percent)	24 percent	0 percent	0 percent	0 percent	0 percent
High (41-60 percent)	41 percent	0 percent	20 percent	0 percent	0 percent
Medium (21-40 percent)	29 percent	0 percent	60 percent	100 percent	100 percent
Low (1-20 percent)	0 percent	100 percent	20 percent	0 percent	0 percent
No losses	0 percent	0 percent	0 percent		

3.3.5 PROCESSING

Processing grapes is a way to make grape production more profitable. Active factories to process fruits (i.e. grape juice factories) exist in Iraq and are mostly located in Baghdad (Table 13). There is no direct connection between farmers and processors. The team interviewed a 27-year-old male entrepreneur in Duhok who produces raisins using locally producd black sweet grapes. His suppliers are wholesalers, not the farmers themselves, highlighting farmers' weak marketing capacity and lack of a direct link between local farmers and local processors. If rectified, this could be an important source of revenue for farmers and reduce transportation time and costs. In the recent past, he was also able to export to the Republic of Turkey; however, the volume produced compared to the export costs make export economically unviable.

Processing grapes (i.e. wine or juice) offers opportunities for small-scale businesses, particularly for women. Interviews with wine producers were not conducted; however, based on secondary data, wine production is a marginal activity within the Christian community and for personal consumption. That being said, the production of jam, syrup, and the processing of grape leaves are prevalent and increase households' income and provide economic opportunities for women. The team did not conduct an economic feasibility study, but the sector warrants attention.

3.3.6 WHOLESALE AND RETAIL DISTRIBUTION

The farm gate price for a kilogram of grapes varies between 250 and 700 IQD, depending on the quality, including the sugar content, colour, dimension, and shape of the bunch and berries; however, it can also reach a premium price of IQD 1 250 per kg. Imported grapes are more expensive, but preferred by consumers. No formal agreement is established between sellers and buyers, and most of the payments are made in cash. Farmers generally sell their grapes to wholesalers, who distribute to retailers or processors. The government has imposed an import ban from March until September until the growing season ends, thus protecting local grape production. Few farmers sell the product directly to retailers.

3.3.7 TARGET GROUP CONSIDERATIONS

Smallholder farmers dominate the grape value chain in Iraq. Most locally produced grapes are sold and consumed fresh, with minimal processing. Although investments have been made to restore vines destroyed during decades of conflict, the increase in production has not been accompanied by an improvement in yield and quality. High quality grape production can be improved by reclaiming land, supporting strategic infrastructure investments, such as irrigation, transport and storage. Additionally, building the viticulture capacity for actors engaged in the grape industry, including scientists, advisors, extension officers and growers, is essential for the industry's growth.

On the marketing side, greater integration along the supply chain can contribute to increasing the value of locally produced grapes. Similar to the other value chains under review, there is a low level of interaction between stakeholders. Supply and demand actors should find ways to communicate and interact to ensure higher quality products and increase product availability in the appropriate place and time, benefitting consumers and value chain actors. There is room to increase per capita consumption of fresh grapes[6]; however, increasing processing the fruits and leaves can also have positive outcome. Industrial juice, grape seed oil for cosmetics[7], jam and raisin processing can diversify the economy and reduce unemployment. Networking of small-scale processing groups can be a way forward to increase the income of rural communities, particularly for women. Raisin production, for example, is a product where women can engage since it is culturally acceptable.

6 According to **OIV** data, the per capita consumption of grapes passed from 10.6 Kg to 2.5 Kg. The growth of the population (2.3 percent of annual growth in 2018) and the rise in the per capita consumption to previous levels indicate a high probable growth of the demand.

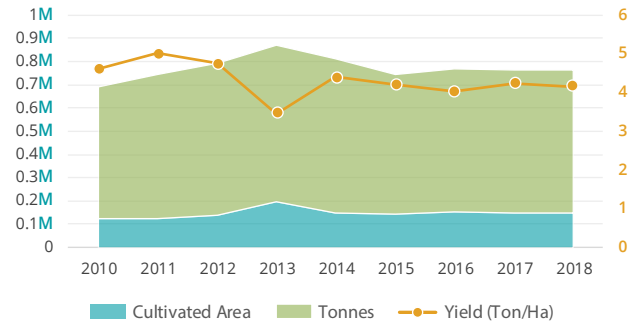
7 The moisture is extracted from grapes seeds used in many beauty products as it is a powerful antioxidant.

3.4 DATES

3.4.1 VC MAP

Date palm production is a strategic sector in most Arab countries, including Iraq. Before the Gulf war, Iraq provided three-quarters of the world's dates and grew 629 different varieties (CSIS, 2010). By 2018, Iraq's production accounted for a mere 7.2 percent of global production due to a shifting focus to the oil sector and decades of conflict that devastated the farming system.[8] About 4 percent of the cultivated land in Iraq is utilized for date production, which is approximately 147 900 ha. The 2012 FAO Agriculture Sector Report identified dates as a key cash crop. Dates can be processed into different materials, including sugar, ethanol, syrup, animal feed, jam, etc. Dates have also been an important export; in 2011, it was estimated that dates accounted for approximately 80 percent of Iraq's agricultural exports. However, as illustrated in Figure 19, date production and quality has fluctuated over the last ten years, and has lost its export capacity due to lower yields and poorer quality, despite global demand for the product.

Figure 19. *Dates production and yields in Iraq, 2000-2017 – FAO DATA*



World production of dates is rising exponentially, at a rate greater than world demand. Globally, in the last forty years supply rose 7.5 percent per year, consistently outstripping demand by 4.8 percent per year (CBI, 2020). Major European consumers (Germany, UK, France) are already supplied with competitive imports, mainly from Tunisia, Algeria and Israel. If the global demand is to be saturated, then the competition shifts to quality. Thus, developing policies and operationalizing certification, traceability is required along the whole supply chain.

In the last 50 years, due to extensive exploitation resulting from the increase in the human and domestic animals' population, date palm plantations in Iraq have been degraded. This degradation has been exacerbated by the conflicts: thousands of palm trees have been destroyed, which reduced production. All governorates where dates are produced have been affected, albeit to different extents, including Babylon, Karbala, Anbar, Thi Qar, Muthanna, and Missan.

Three national governmental actors are committed to providing support to the farming system in order to expand production capacity and improve services required for the sector, which is where the date value chain differs from the other value chains under review. At the MoA there is the General Board for the Date Palm (GBDP) that supports farmers with extension services, training and soft loans for implementing drip irrigation schemes. The GBDP aims to develop and extend the planting of date palms into the most suitable regions using modern techniques, as well as to improve existing orchards in all 14 governorates (Annales Universitatis Mariae Curie, 2012). The Ministry of Trade (MoT) has established the Date Processing and Marketing Company (IDPMC), which certifies the quality of the dates exported by private companies and the government.

8 Based on **FAO** data elaboration

Additionally, the Date Palm Research Institute (IDPRI) is engaged in research and innovation, including offshoot propagation projects and the implementation of a national Integrated pest management programme. The IDPRI also prints and distributes publications to the farmers. These services are very important and need to be accompanied with initiatives to facilitate the access to credit for the acquisition of appropriate technologies.

In 2018, Iraqi authorities facilitated the planting of 70 000 new palm trees south of Baghdad to revitalize the sector. In addition to increasing the plantation areas, additional measures are required to make Iraqi dates competitive on the domestic and global market (Reuters, 2018).

Figure 20. *Dates value chain map*

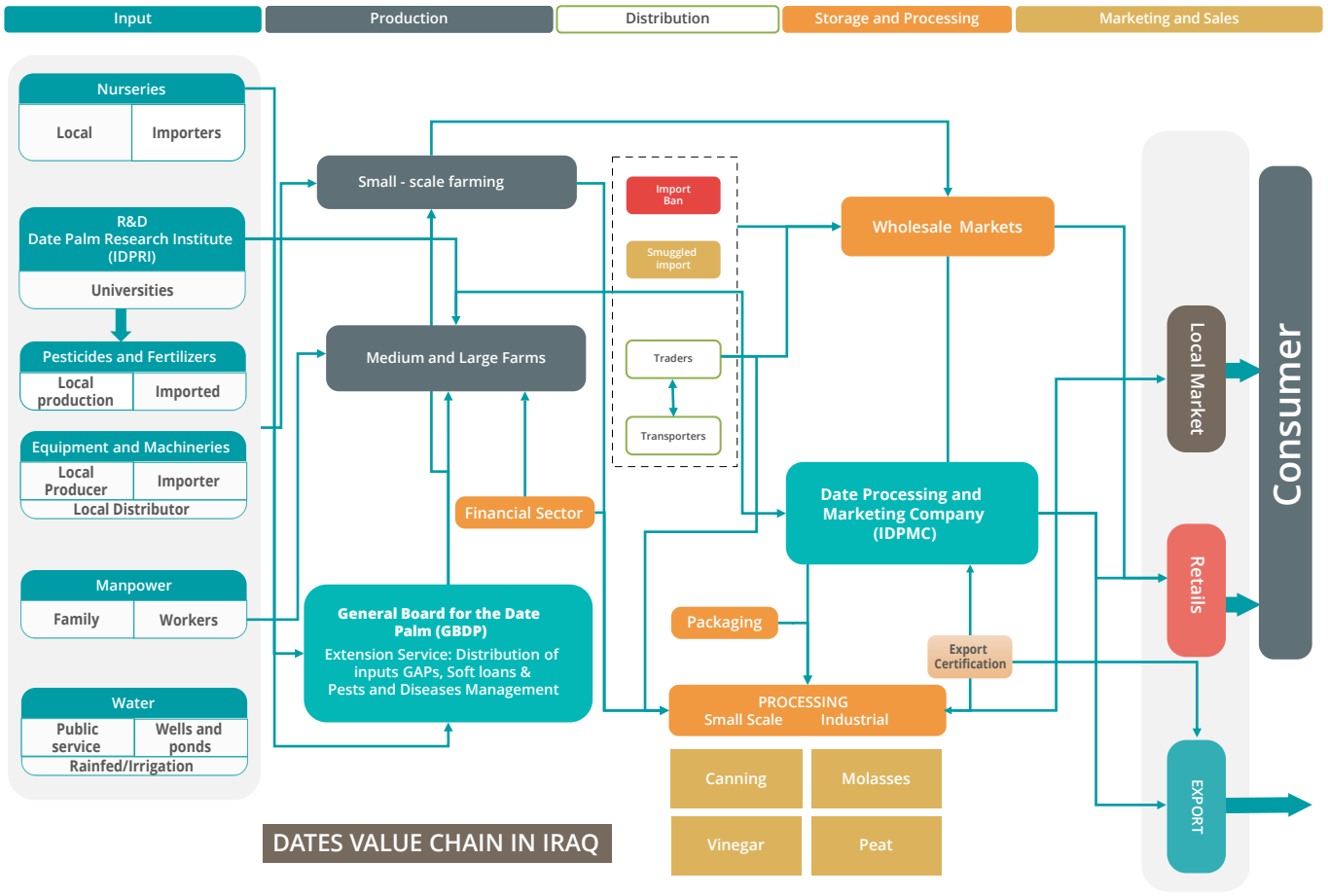


Table 17. *Distribution of the interviewed in the dates VC)*

Distribution of the interviewed	Diyala BAQUBA
Farmer	11
Importer of seeds	2
Importer of inputs	1
Producer of inputs	2
Dealer of equipment	2
Storage facility	2
Packaging and Sorting	1
Transporter	2
Total	23

The main economic actors are farmers. Farmers establish date orchards either by purchasing seedlings from nurseries or generating their own seedling from existing palms. A palm tree bears fruits approximately 4 to 8 years after planting, and will only start producing viable yields after 7 to 10 years. Mature date palms can produce 70–130 kg per season. Inputs like fertilizers and pesticides are mostly imported and purchased from the local market, but the government does distribute some inputs at subsidized prices. Farmers mostly manage the production cycle internally, but also hire external private service suppliers for sowing, pruning, and harvesting. The product is sold to wholesalers or local retailers, mostly to the IDPMC for processing and export. The following figure presents the dates' value chain map in Iraq, which was generated from data gathered through interviews with 23 actors, two FGDs in (Baquba) and a KII with a manager of the National Date Palm Centre (Table 17).

3.4.2 TECHNOLOGY

Despite the importance of the date palm in Iraq, and the number of uses, the sector has not received adequate research and development efforts. Most of the orchards are cultivated using traditional methods that do not fit with the possibility of using modern technologies. It is the only value chain of this study in which 45 percent of the interviewed farmers do not apply any GAP.

Table 18. *Applied GAPs in the dates value chain*

Applied GAPs	Percent
Green Manure Cover	9 percent
Water Optimization	18 percent
Precise Spacing	9 percent
Timely Application of Inputs	9 percent
Time Planting	18 percent
Intercropping	9 percent
Integrated pest management	9 percent
No GAP applied	45 percent

Farmers face difficulties accessing modern agricultural practices and innovative irrigation, fertilization, and mechanization systems. For a modern farmer, water source, soil type, type of variety, orchard preparation (i.e. high yielding cultivars) and selection of proper offshoots propagation influence the success of a plantation.[9] Date palm nurseries that use modern and efficient practices to ensure effective and efficient propagation are essential to re-establish orchards, substitute old palm trees, and improve date palm quality. Nurseries have to be located close to the new orchards and have sufficient access to water. Beyond the nurseries, modern techniques should be disseminated widely and farmers should receive financial resources and technical assistance to adopt those practices.

9 Offshoot propagation, also called asexual or vegetative propagation offers several advantages. Date palm is a dioecious species with progeny half males and half females with no possibility to discover the sex in advance; date palm is heterozygous with high possibility to have heavy variation within the progeny with possible loss of desirable characteristics; female plants originating from seedlings usually produce late maturing fruits of variable and generally inferior quality compared to established clonal palms, in a seedling plantation it is rare that more than 10 percent of the palms produce fruit of satisfactory quality; the result is a mix of different qualities and different time of maturation in the same orchard. Offshoot plants are true to type to the parent palm and develop from axillary buds on the trunk of the mother plant and consequently the fruit produced will be of the same quality as the mother palm and ensures uniformity of produce. Sourced at *www.fao.org/3/Y4360E/y4360e09.htm*

Interviewed date farmers expressed the need for information about effective farm and business management. In order to develop the sector, access to knowledge, technology and finances are required.

Iraq has traditionally cultivated date palms and the plant has served as a source of staple food, with almost all parts of the palm used. The most commonly used and commercial parts of the date palm are its fruits, bark and leaves. While the fruit is edible, bark and leaves can be used for different purposes, including essences and medical applications. It is recognized that the fruit, sap and other parts can treat intestinal issues, serve as an emollient and antibacterial product (Various, 2014). The terminal leaf bud is eaten raw or cooked as a vegetable. From the fresh spathes, an aromatic liquid is obtained by steam distillation and used for making sherbet. Leaves can be used for thatching, making mats, baskets, ropes and other items. Pruned leaves and fruit stalks are also used as compost. Fatty oil can be extracted from the dried pollen; the non-saponifiable fraction of the fatty oil yielded an estrogenic substance.

The processing industry that generates these products requires an upgrade in techniques and technologies. Alcohol, vinegar, liquid sugar, bread yeast and citric acid, essences, and other by-products are some examples of how processing dates could increase the internal demand and export opportunities for value added products. Before the war, Iraq had about 250 pressing factories, but similar to the tomato value chain, conflict damaged the date processing industrial assets. The general reduction of the investments is the result of the chronic instability and of the additional costs and externalities that every investor has to include in their investment plan.

Research gaps and weak extension services, coupled with a lack of resources available to farmers to improve their orchards, have caused an overall drop in production and productivity over the years. The government is expressing interest in date palm investments; the Ministry of Agriculture recently supported the establishment of special laboratories to manufacture peat from palm fronds. This is an indication that efforts in this direction can have positive multiplier outcomes.

Germplasm Banks and Genetic Conservation Efforts

Iraqi date palm resources have been exposed to dramatic deterioration, especially during the last 30 years. However, a project to establish new mother date palm orchards and offshoot nurseries in the 14 governorates which grow date palm has been proposed by the General Board of Date Palm (GBDP) and approved by the Ministry of Agriculture in an effort to stop the deterioration in date palm sector and overcome the decline in date palm productivity (Husein et al. 2009). Each governorate will collect the cultivars grown within their respective areas, while Thi Qar, Al-Samawah, and Al-Najaf will conserve both local and international cultivars at their date palm stations.

Date palm offshoots will be grown in orchards at a spacing of 5x5 meters. The initial plant spacing of 5x5 m will be modified after eight years to 10 x 10 m by mechanically removing planted offshoots. These offshoots will be used to establish new mother date palms. Each orchard will contain 80 percent commercial cultivars, 16 percent rare varieties, and 4 percent male trees that will be maintained under drip irrigation and modern agriculture practices. The project began in the spring 2004 in two stages; the first stage was finished in 2011, while the second will continue until 2021. Technical teams are instructed to investigate the offshoot sources within each governorate and maintain records at each date palm station about the origin and management of cultivars.

The labs of GBDP are mapping the genetics of date palm cultivars to classify and establish standard names of the cultivars. The objectives of the project are to maintain local and international cultivars and to provide researchers known cultivar collections to work with, as well as for agricultural extension objectives.

In total, 30 mother date palm orchards have been established so far in 13 governorates, with a total area of 4 594 Iraqi dunam. More than 497 cultivars had been collected up to January 2009 and efforts are continuing to collect all the cultivars grown in the various regions of Iraq.

Sourced at Jameel M. Al-Khayri, Shri Mohan Jain Dennis V. Johnson, 2015. Date Palm Genetic Resources and Utilization: Volume 2: Asia and Europe. Springer

3.4.3 INPUT SUPPLY AND DEMAND

Until 2013, government used to distribute inputs (i.e. fertilizers and pesticides) to date farmers. Before 2013, the agricultural departments provided a helicopter to spray pesticides on the palm trees once a year, which helped farmers control pests and diseases.

Currently, there is no visible cooperation between farmers and their suppliers as both are bound to the prices of imported materials, such as water pumps and pesticides. Farmers have highlighted the risk of fake inputs on the market and about the quality of the components and spare parts for their activities. Public support and subsidized distribution of inputs, which are accessible to all farmers, could offer support. Smart incentives and demonstration farms could be a catalyst for committing farmers to increase investments to improve their yields.

3.4.4 PRODUCTION

The date palm thrives in sand, sandy loam, clay and other heavy soils. It needs good drainage and aeration. It is tolerant at alkaline soils and salinity; however, increasing both of these stunts growth and lowers the quality of the fruit. There are about 400 date varieties cultivated in Iraq. They can be identified by their characteristic fruit appearance and texture. There are three types: soft, semi-dry, and dry. The type of fruit depends on the glucose, fructose, and sucrose content. This division is based on the texture or consistency of fruit under normal conditions of ripening.

Soft dates with soft flesh, high moisture (> 30 percent), and high sugar content. The main cultivars of soft dates are: 'Khastawi', 'Barhee', 'Halawy', 'Hayany', and 'Khadrawy'.

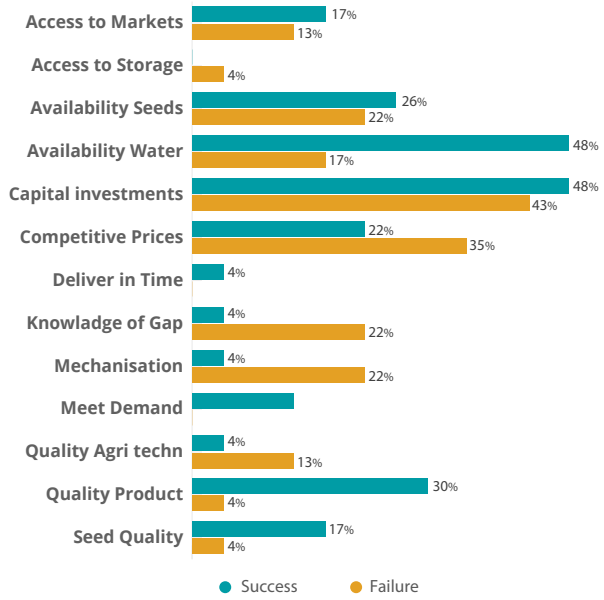
Semi-dry dates with a still flesh, fairly low moisture (20–30 percent), and high sugar content. This type includes: 'Halawi', 'Dayri', and 'Khadrawy'.

Dry dates with high sugar and low moisture (< 20 percent) content, their flesh is dry and hard. This type includes cultivars 'Zahdi' and 'Sayer'.

Dates ripen in five stages:

- **Hababouk stage** – the earliest stage of fruit development; it begins when the fruits set and continues for 4–5 weeks. At this time, the moisture content of the fruit is 85 to 90 percent.
- **Kimri stage** – characterized by a rapid increase in fruit size, weight, sugars, and increased acidity; the moisture content decreases to between 80 to 85 percent. This stage finishes when the fruits start to turn yellow or red, depending on cultivar. At this point the date seed can already germinate and the fruit is botanically mature.
- **Khalal stage** – fruit starts to turn from green to yellow (or red, according to cultivar). Weight gain is slow, but sucrose content increases, moisture content drops down to 50–55 percent, and tannins start to precipitate and lose their astringency. In some cultivars this latter process evolves rapidly, which makes them already palatable.
- **Rutab stage** – dates become half-ripe, soft and turn to a light brown colour. The sucrose turns into invert sugars, they contain less tannin than in the Khalal stage and the moisture content is about 35 to 40 percent.
- **Tamar stage** – dates become soft and sugar is mostly inverted; at this stage of development semi-dry and dry dates contain about 50 percent sucrose and invert sugar and the fruit moisture is 20–25 percent (Ahmed F. Zabar, Andrzej Borowy, 2012).

Figure 21. *Key factors for the development of the dates value chain*

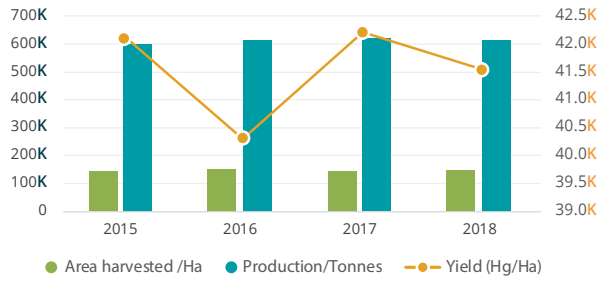


The most relevant problem is the lack of awareness among farmers that they must adapt practices if conditions change. The application of appropriate methods for propagation, irrigation, pollination, pests, and disease control, harvesting and post-harvesting can dramatically increase yield and palm health. Due to the date value chain's economic and cultural importance, the challenge is the acceptance and promotion of innovative practices. The process of selecting and introducing suitable innovations requires the contribution and commitment of all the actors involved, including the private sector and government to respectively improve the market and coordinate the design and implementation of date development programs. The date value chain actors interviewed have identified the key factors required for value chain development, including water availability and financial capital (Figure 21).

Overall, actors are aware that date quality is important to increase marketing and export opportunities, a goal that can be achieved by improving the production factors (i.e. water and inputs) and applying modern techniques. The interviewed actors identified various factors that influence the performance of their business. The capacity of the individual to compete was identified as a critical factor for success, while interviewees identified many external variables are attributed to failure.

Substituting existing palm trees with more profitable and higher quality varieties will take several years. To determine what varieties should be promoted, a market analysis should be conducted to assess demand and identify niches. Different institutions, ministerial departments and private sector will need to cooperate and coordinate efforts to have a harmonized approach to date development in Iraq. All relevant actors involved in production, processing, and marketing should be engaged in a multisectoral strategy.

Figure 22. *Dates - area harvested, production and yield 2015-2018, -FAO Data*



In addition to the damage done to date palm plantations during the conflict, orchards suffer from soil degradation. Overgrazing and overharvesting of wood for fuel has reduced vegetation cover, resulting in soil erosion, dust storms and increased wind velocity that negatively impacts dates palm plantations. Land degradation reduces the capacity of the soil to absorb rainwater, resulting in decreased groundwater recharge, increased salinity and more frequent floods. Although most actors stated that water availability was stable (Figure 23), as on going anthropogenic activities, upstream riparian development and climate changes continues to degrade the land, there is a need to prepare for potential water shortages.

Figure 23. *Challenges, irrigation technologies, source, quality, and availability of water in dates value chain in Baquba*

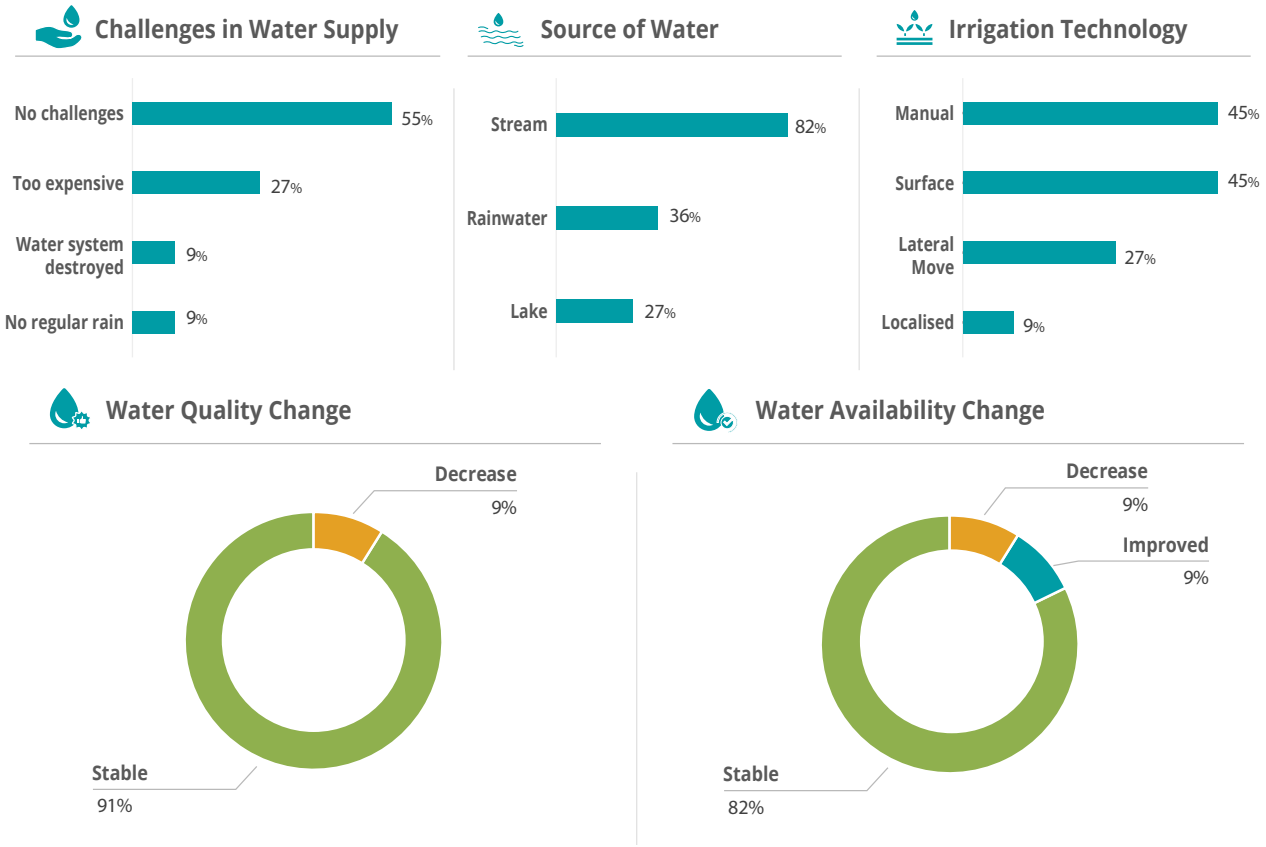


Table 19. *Percentage of losses in the dates value chain*

Percentage of losses	Farmer	Storage facility	Transporter	Packaging and Sorting
ALL (100 percent)	0 percent	0 percent	0 percent	0 percent
Very High (61-99 percent)	0 percent	0 percent	0 percent	0 percent
High (41-60 percent)	0 percent	0 percent	0 percent	0 percent
Medium (21-40 percent)	0 percent	0 percent	0 percent	0 percent
Low (1-20 percent)	64 percent	0 percent	0 percent	0 percent
No losses	36 percent	100 percent	100 percent	100 percent

Data shows that losses are not a major concern along the supply chain 64 percent of the farmers reported less than 20 percent of losses, while the rest did not report any losses (Table 19) The cause of losses are insufficient storage facilities, lack of pesticides, drought, flooding, and disease. Farmers in the FGDs frequently attributed the loss of palm trees to flooding and drought.

Acute skilled labour shortages, combined with demands for increased wages, push farmers to reduce maintenance in their orchards. Decreased interventions favours the resurgence of pests and diseases, causing serious and significant reductions in date palm productivity and quality.

The major pests of dates palm trees in Iraq are the Dubas bug, the Lesser date moth, and the Frond borer. The Dubas bug is endemic and has existed in Iraq for over a century. Infestation intensity varies based on the location, season, date variety, cultural practices, farm management and environmental factors. Central Iraq is periodically hit severely by this pest, while the provinces of the Middle Euphrates and south (Najaf, Diwaniyah, Samawah) suffer from only low to moderate infestations. This insect has two generations per year, in spring and fall, and depletes the sap of the infected palm trees, weakening the tree and leading to a significant reduction in yield quality and quantity. The Lesser date moth larvae attack the florescence and fruit at all stages of development. The infested fruits become dry and drop, resulting in high losses. The infestation intensity varies according to the region, mostly coinciding with the developmental stages of fruits. Therefore, infestation is likely to begin in the south where date fruits mature earlier, and shift later to the north. The Frond borer causes serious damage to palm trees and stem borers lead to the destruction of stems and the collapse of trees. Infestation debilitates the trees and reduces their productivity and yield. The date palm tree are also affected by various diseases, such as fungi and phytoplasmas.

The most common way to control the spread of diseases include sanitation practices, use of clean off-shoots, quarantine of infected orchards and adoption of correct irrigation practices (Emirates Journal, 2016). It is important to design and implement a national IPM plan that empowers farmers and extension service providers to fight against pests and disease.

3.4.5 PROCESSING

Currently, Iraq does not process date fruits using modern techniques. Even though date fruit processing could be very profitable, Iraqis are still using old-fashioned tools and methodologies. As mentioned above, various date processing opportunities are available. Vinegar, alcohol, syrup, fructose, bread yeast, and citric acid are some products derived from dates. Before the conflicts, Iraq installed a large number of processing factories for date fruits and its various products. In 1990, the number of pressing factories was around 250. Since 2003, this sector collapsed and many facilities closed or destroyed, with only a few rehabilitated. While the research team did not have the opportunity to interview some of these processors, secondary data shows that most of them are undercapitalized and their personnel are under-skilled. There are efforts to change this; a date value chain development project trained staff in processing factories on GMP, HACCP, storage, packing and processing best practices. According to an independent review by (UNIDO, 2011) , this type of training was necessary and successful.

Government institutions' capacity to be date palm promoters and facilitators also requires attention. Based on KIIs, the public administration is affected by a lack of commitment and accountability. Results-based management is not common, negatively affecting the sector's performance. KIIs highlighted that personal and elite connections were prioritized.

Small-scale and inefficient processing units do exist and are operational. Some governorates have processors producing molasses, while other governorates have processors who are specialized in canning. Specific cultivars are required for these different products, so environmental conditions drive what processing occurs in each region. Small-scale processing at the family level can help develop the value chain particularly for the local market. If family level processing can adhere to quality standards and adopt effective marketing, it can be an effective way to reach niche markets. Regardless, matching demand and supply and selecting right date variety for a given pedoclimatic condition are key factors for the date business.

3.4.6 WHOLESALE AND RETAIL DISTRIBUTION

Interviewed farmers reported that their main client is the wholesale market; only some farmers produce low-quality dates that they sell to the date factory in Baquba at a lower price. 45 percent of the interviewed farmers sell their dates to the government for processing, packaging and export. The low-quality dates are also destined for feed livestock. There is no direct evidence about the use of the other parts of the plant as either raw material or further processing.

The price per kilo at the farm gate is in the range of IQD 500 and 1 000, depending on the variety, size, and quality of the yield. Similar to the other reviewed value chains, there is no evidence of contract farming or other types of agreements between farmers, factories, and traders. Thus, there is an opportunity to increase the integration of the value chain and adopt a more market-oriented approach.

Iraq production is concentrated on Zehdi variety. The MoA is investing in Hillawi, Khadrawi, Sayer, Maktoom, Derrie, Ashrasi, and Barhee varieties, which align with market demand. The improved cultivar list will enable the country to increase its current low export price (360 USD/tonne compared to a world average of 760 USD per tonne). Almost half of Iraq's dates are exported in bulk to UAE, fetching an average price of only 310 USD per tonne. They are then packed and re-exported at a higher price. Farmers have now returned to the areas liberated from ISIL and are restarting their orchards. Part of the palm trees planted in the period 2013-17 are beginning to produce, with overall average yields set to rise rapidly over the next years. Iraq's dates palm inventory could go up to 40 million trees in 10 years, with many trees being more marketable varieties. This should provide significant opportunities to increase exports and value-added products, provided work on improved varieties continues, knowledge is adequately disseminated to small producers and investment in post-harvest management and technology is increased (World Bank, 2019).

3.4.7 TARGET GROUP CONSIDERATIONS

Dates produced in Iraq could regain a competitive advantage in the international markets; however, it will require a newfound focus on high quality cultivars, improved management and enforcement of international standards as the international date market is focused on quality. Additionally, investments are needed to increase the number of productive palms, substituting mature palms with economically profitable varieties such as Medjool and Barhi. Farmers, processors and distributors, with support from the government nurseries and research institutions, will be required to procure new plants using the offshoot methodology. In order to promote best practices and disseminate knowledge, Farmer Field Schools and demonstration sites should be introduced in Iraq. The government should also engage the private sector in the production, import and distribution of certified fertilizers and pesticides sold on the market, in addition to postharvest inputs and infrastructure. Building market linkages and cooperation among the economic actors along the dates value chains will increase efficiency and resilience of the market system. The MoI with the international partners alone cannot solve many of the complex problems that the sector is currently facing. To promote interactions between actors and to enhance collective and coordinated action multi-actor partnerships, territorial partnerships, alliances, public–private partnerships (PPPs), and communities of practice can be adopted, coordinated by the government authorities to guarantee quality control at all stages of the date value chain.

4. SYSTEMIC CONSTRAINTS AND UPGRADING OPPORTUNITIES

Inclusive and sustainable development can only occur in a context where there is a common vision of development that integrates principles of efficiency, effectiveness, good governance, participation, accountability, and equity. Without a holistic vision and integrated interventions, restoring the fabric of Iraq's agricultural sector cannot be achieved; results will be always partial and not durable. The goal is not to restore the previous conditions, but to build back better by designing a modern, dynamic, and sustainable agricultural sector.

Key stakeholders agreed to revive and create a robust agricultural sector using a systemic value chain approach that pulls together farmers, experts, investors, and entrepreneurs. These goals align with government strategies, including the Ministry of Planning National Development Plan (2018 – 2022) and the Private Sector Development Strategy (2014 – 2030). The establishment of a multi-sectoral partnership for planning, implementation and follow up in agriculture, water, and environment programmes and policies shows concrete advancement of the vision outlined in those plans. Established in February 2020, the platform engages the Ministries of Planning, Agriculture, Health, Environment, and Water Resources and FAO and engages stakeholders in policy development and awareness building, increasing accountability and ensuring that programmes targeting farming communities are effective. The Ministry of Planning also launched the National Food Security Project (2020-2022) this year, aiming to achieve self-sufficiency in crops and animal products by 2030. This roadmap will help government, national stakeholders (relevant authorities in the public and private sectors), and international partners identify what is required to achieve food security, energy security and environmental conservation. Sustainable agriculture can be achieved if structural problems, such as poor and damaged infrastructures, limited agriculture and livestock support services and low technical capacities of farmers are addressed.

There are incumbent challenges that the sector will only be able to overcome by re-building relations and capabilities. Insecurity, political instability, market competition, climate change, and possible intensification of violence are risks, but also opportunities. People in rural areas are among the most severely affected by violence, lack of economic opportunities, and appropriate infrastructure. Returnees still struggle to resume their agricultural livelihoods (IDMC, 2019). In March 2020, around 4.6 million of IDPs returned to their areas of origin, of which 11 percent are living in highly severe conditions and the 40 percent at medium severity (IOM, 2020). For those returning to rural areas, agriculture activities should be prioritized.

Based on the results of the study, several common challenges have been identified along the value chain:

1.a. **Input supply** is the first weakness of the supply chain, affecting the capacity of the farmers to optimize production. Accessing and using seeds, seedlings, fertilizers, and pesticides represents a challenge for most farmers, who often do not have sufficient information about the quality and best practices for using the inputs. The volume of seeds and seedlings available are insufficient, plus they lack adequate certification. The utilization of non-certified/improved seeds significantly reduces the productivity of cereals and vegetables, while the lack of qualified nurseries for the supply of seedlings hampers growth in the fruit tree sector. The application of

ineffective or inappropriate pesticides favours the spread of pests and diseases, affecting the yield (at times in its entirety) and reduces the quality of the product. The inefficient use of fertilizers adds costs to the production cycle without generating a visible return to the farmers. The quality of equipment, repair services and spare parts has also been a constant complaint among interviewed farmers that, when combined with a lack of access to finance, farmers are unable to scale-up mechanization, instead continuing to rely on labour-intensive practices.

Subsidized inputs and final wheat prices distort the market and creates unfair competition amongst farmers. Only selected farmers benefit from subsidized inputs (i.e. seeds and fertilizers) and the government wheat purchasing programme. These subsidies favour farmers as individuals, but undermine the system as a whole by creating an artificial supply that does not match the real demand. When wheat production is subsidized, farmers will rationally decide to produce in areas that are unsuitable and incentive the adoption of poor land management practices (i.e. no crop rotation, intercropping, etc.), negatively impacting wheat quality and quantity. Despite subsidies for domestically produced wheat, more than two million tonnes of flour are still imported, mostly from the Republic of Turkey, to satisfy the demand. Thus, the funds allocated to wheat subsidies could be invested in more effective programmes, such as the rehabilitation of public infrastructure, the provision of public goods (social and health services) and expansion of extension services, and a system to enforce traceability, certification and quality control of the inputs and commodities. Smart incentives and investments should be considered to leverage the "multiplier effect" and achieve economies of scale. Merely subsidizing inputs and government purchases above the market price is not a winning long-term policy.

Water availability and access is a key challenge for the Iraq agriculture sector. 92 percent of the available water in Iraq is used for agriculture and, although the water available per capita in Iraq is about 2 400 m3 per capita compared to 1 876 in the Islamic Republic of Iran and the 152 in Jordan, the quality of water used for drinking and agriculture is poor, violating Iraq National Standards and WHO guidelines. Much of the groundwater along the developed central plain is unusable due to high salinity and pollution. Additionally, water tariffs in Iraq are extremely low compared to other countries that, combined with the lack of awareness of water scarcity, leads to a daily consumption of 392 litres per capita per day, exceeding the international standard of 200 litres. As a consequence, water revenues cover only 2 to 5 percent of the costs of operation and maintenance of the water system. Similarly, metering is not common and the independence of water bills from use translates to excessive consumption (Relief-web, 2013). The adoption of a coherent water regulation system and modern technologies, both for purification and efficient irrigation, can decrease Iraq's agriculture water footprint. Water and its management needs to be prioritised by the government since it plays a key role in the sustainable development and is fundamental to eradicating poverty (SDG1) and hunger (SDG2), reducing child mortality (SDG3), ensuring availability and sustainable management of water (SDG6) and improving the infrastructures and promoting innovation (SDG9). As the availability of surface water and groundwater decreases due to upstream riparian development, destruction of the infrastructures during the conflicts, changing weather pattern (i.e. more frequent droughts and flooding) and soil erosion (i.e. siltation of dams), effective regulations, rehabilitation of key infrastructure and adoption of effective technologies and practices will be required.

1.b. Support Services

Extension services are a fundamental component to develop the agricultural sector, particularly in a system dominated by small-scale farms. In FGDs, famers stated that extension services are not only about physical and economic support, but also engagement with rural communities. Extension agents play an important role in improving social capital and instigating change, which then help farmers access resources and boost their farm's productivity. Farmers have a lot of knowledge about their environment and their farming system, but extension services can introduce new innovations and GAPs, particularly for fertilizer, pesticide and water management. Despite government efforts, particularly in the wheat and dates value chains, farmers expressed general dissatisfaction about the services provided by the government. Many farmers complained that they did not receive adequate support in the last years, especially for grapes and tomatoes. 69 percent of interviewed date farmers expressed dissatisfaction, as did 89 percent of tomato farmers. If extension services could be improved and farmers' knowledge and capacity to apply GAPs improved, productivity and commodity quality could increase while reducing the costs. In particular, the use of pesticides and water has a wide margin of improvement.

Research centres lack adequate equipment, facilities and trained professionals specialized in research. An efficient technology transfer system is not in place to link knowledge generation to value chain actors. There is a weak connection between research, extension services, upstream suppliers and technology users.

Minimal or no access to formal credit for most of the actors engaged in the examined value chains is a severe constraint, particularly for accessing inputs and machinery, and farmers rely on family for credit. Only 7 percent of the interviewees requested a loan in the last three years and only 30 percent of these 7 percent were granted a loan (2 percent of all interviewees). Religious and cultural barriers, coupled with the high-interest rates (around 9 percent) and lack of records and financial education, are the main barriers. Financial offers are also not aligned with the needs of the farmers and there is no evidence of microfinance institutions and insurance schemes available.

4.1 TRADE

Losses along the supply chain are high at all stages due to various factors. Products are lost due to poor handling, inadequate post-harvest management and a chronic lack of storage and processing facilities. The problem is especially evident in the tomatoes and grapes value chain. The lack of cooperation and communication negatively affects integration of the supply chain and exacerbates losses, negatively affecting income and competitiveness of the value chains. Technical interventions should consider the necessary economies of scale for avoiding that the cost is higher than the loss of production. In other words, cooperation mechanisms and forms of horizontal partnership supported by the government (vertical linkages) are necessary. Centralized storage facilities can be economically sustainable, while supporting on-farm storage can be socially viable. Balancing and integrating economic sustainability with social and environmental viability should be the approach for solving the infrastructural problems, while providing the farmers with services, technologies, and knowledge of harvesting and post-harvesting practices needs to be paired with improved access to markets. Government investments in capacity building, infrastructure rehabilitation and policy support to facilitate market access for farmers and enable private sector investment are non-negotiable factors to reduce food losses in Iraq. The processing industry has accumulated a technological gap that needs to be filled for becoming competitive and efficient again.

Formal contractual agreements along the supply chain are not utilized. Most of the transactions are extemporary, without application of formal negotiations or standards. Many farmers only deal with one or a few clients, and agree to the generally known market price. Furthermore, the lack of coordination among producers negatively affects their bargaining power and increases marketing costs (e.g. fee just for entering the wholesale market).

Wheat subsidy policies have assured farmers a higher return compared to the global market price, which has decreased productivity, diversification and investment in high value crops. In the region there are countries with a more structured food crop and processed food products sector that export to Iraq at competitive prices. The temporary ban on agricultural imports during harvesting season is a frequent measure to support the local economy. Most farmers welcomed the move as a measure of concrete aid, but that can negatively affect consumers and have other side effects. Bans should be temporary initiatives accompanied by measures to increase the competitive advantages of the agricultural sector.

4.2 VALUE CHAINS' GOVERNANCE

Social capital in the agricultural sector is low. Social capital is a measure of the relationships, participation, and associations in a social group or community and appears when cooperatives and participative institutions emerge and contribute to "public goods". Only 5 percent of the farmers interviewed are part of a service cooperative, and the existing organizations are not well structured and mostly focus on collecting licence fees from farmers (IQD 10 000), distributing subsidized inputs by the government and collecting wheat for the public purchase. There is no evidence of forms of mutual support and common initiatives, not just among farmers but also other value chain actors. Farming contracts and postponed payment of inputs are lacking, evidence that socio-economic capital is weak. Insufficient coordination among farmers, suppliers, and traders negatively affects farmer bargaining power and increases marketing costs as producers must conduct transactions individually.

Building social capital requires zero-tolerance for corruption and bribes. Corruption has a disproportionate impact on the vulnerable people, increasing costs and reducing access to services. Participants of the FGDs have indicated these dynamics pose a serious challenge. In order to address corruption, both governments and businesses will have to make a concerted effort to change behaviour and adopt the latest advanced technologies to capture, analyse, and share data to prevent, detect, and deter corrupt behaviour (World Bank). Commitment against corruption increases social capital and the perception of the economic actors toward the government support.

Lack of synergy between the public and the private sector affect the efficiency and competitiveness of the value chains. Government's policies and interventions increase dependency on external support and do not encourage the participation of the private sector, which could help remove constraints and bottlenecks. For example, instead of having the government establish new dates palm orchards, a financial scheme (grants and/or soft loans) for existing and new farmers could be established to allow them to invest in their orchards. A similar scheme could be introduced for the agro-processing industry. If the Iraqi government could define their goals and vision for the sector, the state could create the conditions for a vibrant private sector, rather than only creating public companies.

Physical and social infrastructure require an upgrade to meet the needs of the economic actors active in the agricultural valu*89e chains. Road conditions often contribute to losses and obstruct physical access to markets. The wholesale markets are not in good enough condition to provide services like storage, grading, and packaging. Initiatives have been taken to accelerate the reconstruction of the country, and these projects could be accelerated if sufficient financing and Public Private Partnerships (PPPs) are established. PPPs would allow the public sector to leverage resources, market access and expertise from the private sector, while reducing the investment risk for the private sector by having the public sector commit additional resources, thus sharing project risks, responsibilities, and rewards.

Lack of clear **policies for grading, quality, traceability, and certification** exist both up- and downstream of the value chains. This affects the competitiveness of local products against imported goods and often generates a mismatch between supply and demand. Lessons learned from other countries reveal that in order to improve product quality, the private sector must grow and the industry must upgrade. To boost confidence in product quality initially, certification and traceability for the domestic market is key. International markets view these efforts positively, and boosts confidence in the product (World Bank, 2011). Strengthening policies and associations, both for farmers and industry, catalyze private sector investments, increases producers' product quality due to associated incentives and increases export potential.

5. VISION AND STRATEGY FOR IMPROVED COMPETITIVENESS AND GROWTH

5.1 STRATEGIC ISSUES SYNTHESIS

A vision for the sustainable development of Iraq's agricultural sector should be involve all actors and work towards developing modern and efficient value chains. Public and private investments in production, as well as productivity, value addition and marketing will be required and should be driven by market demands. The establishment of a profitable and efficient model of cooperation between farmers, government and private sector can significantly contribute to the development of the agricultural sector, particularly if these initiatives target underprivileged social groups.

Iraq could increase production and productivity by facilitating the dissemination of information and knowledge of natural resource and land management, while also developing market linkages (i.e. supply contracts, contract farming and PPPs) for inputs and outputs at the national, meso and local level. First, the government should map and plan future land and other natural resources use. **Public and private irrigation infrastructures need to be rehabilitated, while also introducing modern and sustainable technologies to face the challenges of water scarcity and the on-going process of salinization.** Producers should also be offered quality agricultural inputs, where all the farmers can benefit from certified inputs at reasonable prices, and mechanization services, storage facilities, markets and credit should be readily accessible to smallholder farmers. **The government, with the financial sector and the donor community, should work towards building a partnership to provide tailored financial schemes and incentivize the aggregation of farmers to achieve economies of scale.** Farm insurance schemes could stimulate farmers to invest in their land and their business. An insurance scheme would redistribute risks between farmers, government, and the private sector. The direct intervention of the government in a preliminary phase could help in the generation of this important market. Once the market will be more mature, the government could continue to regulate and control, but shift management to the private sector. Finally, investing in extension services is required to ensure quality and sufficient coverage, in addition to the establishment of qualified laboratories and personnel to develop an early warning and integrated pest and disease control and management system.

The agricultural sector needs to be more market-oriented. Improving standardization, quality control and traceability can reduce losses, improve food security and open market niches for export. Additionally, the promotion and regulation of business-oriented production by establishing market linkages, such as contract farming, can strengthen the supply chain and favour entrepreneurship among farmers. Together with technical and agronomic skills, farmers also require business support, with a focus on their ability to analyse and mitigate risks (environmental, anthropogenic and economic). Farmers should be informed of the benefits derived from economies of scales, achievable through the vertical and horizontal cooperation among stakeholders. The study recommends identifying opportunities for public-private partnerships (PPPs) that would facilitate the acquisition and use of adequate technologies, equipment, machinery and infrastructure for aggregation, grading, and packaging, storage, and transportation.

A vibrant agro-processing industry is the basis for the economic diversification and the absorption of overproduction during peak agriculture seasons. In the tomato value chain, the processing plant is critical to avoid losses and mitigate risks associated with transporting yield to the market. Improving the quality of Iraq processed goods, i.e. flour, would improve competitiveness with external markets, and also be used to revamp the Iraqi export industry.

Across all value chains, access to finance (grants and loans) is a key aspect to develop the agricultural sector. The Netherlands and FAO have established a partnership that aims to increase investments in small and medium enterprises (SMEs) and small-scale producers operating within the agribusiness sector in developing countries to enable growth small-scale producers, cooperatives and SMEs to grow. This is a first step toward the entrepreneurial development of the farming and agro-business system and its capitalization.

5.2 VALUE CHAIN COMPETITIVENESS STRATEGY

The SWOT[10] table elaborates on the constraints, opportunities and potential interventions for each element of the value chain. The recommendations are based on the four analysed value chains, that the study considers representative of the sector.

Table 20. *SWOT analysis*

Value Chain Function*	Main Constraints	Opportunities	Key Interventions	Potential Responsible
Input supply and demand	Limited access to improved seeds, seedlings, and quality inputs. Multiplication capacity is not sufficient to provide quality seeds to all the farmers. Subsidised seed distribution to certain farmers generates market distortions and unfair competition.	Increase interaction of farmer groups and agro-dealers. Develop or rehabilitate local industry for fertilizers and pesticides to increase availability and improve quality.	Incentivize seed multiplication in partnership with farmers and agro-dealers. Assist agro-dealers to develop a consignment business model that provides in-kind credit to SSFs Develop smart incentives schemes (direct or indirect) to guarantee a fair (subsidized) input price for all farmers Establish PPPs to select and multiply improved seeds and quality supplies of inputs.	MoA in partnership with the private sector and with the support of FAO Research centres, farmers, and dealers' associations/ groups

10 SWOT analysis identify the internal and external factors that are favourable and unfavourable to the achievement of a set of goals

Value Chain Function*	Main Constraints	Opportunities	Key Interventions	Potential Responsible
Production	Weak capacity of the farmers to apply GAPs both because of lack of knowledge and resources to invest. Public subsidies for the wheat value chain reduce productivity, due to use of marginal land, while those outside of the subsidies use poorer quality seeds Low level of mechanisation in smallholder systems High level of losses due to pest and diseases.	High margin of increasing productivity with the adoption of good agricultural practices, including Integrated pest management and efficient use of resources. Availability of soil to expand production to satisfy the internal demand. Dealers and importers can guarantee the supply of quality spare parts and services.	Create maps of soil characteristics and agro-ecological zones to target GAP in particular areas and for certain crops. Provide financial assistance for GAP adoption. Establish a national "smart incentives" programmes to spark innovation and investment in green and efficient use of energy and water resources in agriculture Implement an Early Warning System for pest and disease management. Promote and assist rural industries, particularly for youth and women. Map and prioritize irrigation systems that require rehabilitation	MoA, FAO, NGOs, National, and local partners
Processing	Lack of efficient facilities to produce high-quality products Lack of processing facilities in localities where production is concentrated. Low capacities at the household level to process crops like tomatoes, grapes, and dates	Local products are available, even if most people consume imports	Establish a National Guarantee Scheme for private companies and investors in agriculture technologies Promote value-added activities that favour small farmers, particularly for the economic utilization of agricultural residues.	MoP, MoI and Ministry of Minerals and Iraq's private sector, MoA, UNIDO, FAO, and NGOs
Wholesaling and retailing	Lack of contracts between farmers and distribution agents. Lack of mechanisms of product aggregation, value addition (grading, packaging, and quality control at farm level) and optimization of the logistic. Lack of storage facilities and reliable power supply, which has a great impact on losses, price drop during the peak season.	Linkages between groups of farmers and wholesalers can increase production, productivity, and quality. Opportunities for value addition services	Introduce financial instruments (grant, soft loans, and guarantees) to support farmer aggregations for common investments and linkages with buyers and wholesalers. Stimulate the creation and use of storage facilities, which also promoting more efficient warehouse receipt mechanisms.	MoA with national and international partners

Value Chain Function*	Main Constraints	Opportunities	Key Interventions	Potential Responsible
Output market	Fee paid at the entrance of the wholesale markets affects farmer revenue and bargaining power Inconsistency between supply and market demand in terms of quality and seasonality. Lack of processing facilities in the areas of production. Overexposure in the strategic value chains (wheat) of the government as a buyer with high expectations from the farmers. No evidence of differentiation among products	Horizontal and vertical links among the actors (farmers and traders) can increase the efficiency of the value chain. Restructuring the incentives and governmental direct purchase programme can create a more effective, open market. Availability of storage facilities can stabilize prices, reduce losses and increase the revenue for farmers.	Introduce smart incentives to stimulate partnerships Build business capacity of entrepreneurs, farmers and other actors. Invest in public goods, like roads and storage facilities	MoA, FAO, MoT
Support services	High cost of mechanised services. Weak provision of extension services to farmers. Lack of an integrated pest and diseases management policy. Poor extension services and technical support by value chain actors.	High potential for the of the Iraqi agriculture sector, particularly if proper mechanisation, branding and marketing are adopted Increased public sector staff	Introduce trade agreements to improve quality of equipment imports Develop a national IPM service in partnership with farmers organizations, universities, research centres	MoA and FAO

Value Chain Function*	Main Constraints	Opportunities	Key Interventions	Potential Responsible
Business enabling environment	The "strategic crops" approach only supports certain farmers, distorting the market and leading farmers to focus on short-term gains instead of long-term sustainability The lack of quality control and traceability reduce the incentive to invest in higher quality Weak enforcement of the Consumer Protection Law No. 1 (2010) by the relevant authority. Inadequate access to financing limits the capacity of the agricultural sector to improve yield and quality Weak and damaged physical infrastructure and an insufficient supply of energy increases the costs of irrigation and greenhouses, among others Shortage of qualified human resources, especially skilled labour. Public sector has become a competitor rather than a partner for the agricultural sector, and there is an absence of dialogue between the government, farmers and the private sector. Insufficient knowledge and capacities to compete on global and regional markets. Weak provision of health and education services in rural areas push people, especially youth, to migrate into urban areas.	Public budget is available for investments in the agricultural sector. The agricultural sector can reduce unemployment rates, especially among women, if development focuses smallholder farming Inequality between females and males is improving regarding the Human Development Index, which has an impact on consumption patterns and nutrition. Opportunity to improve the financial and insurance sector in support of the farming system. High commitment from the government regarding potentially exportable crops.	Develop a fair and transparent regulatory framework. Promote public-private cooperation. Improve capacities of agribusiness institutions and extension services. Improve quality and safety assurance of inputs and crops on the market, also through promoting business linkages throughout the value chains. Incentivize product innovation and differentiation (branding). Train workers and youth on agriculture development. Build producer capacities Create incentive schemes for producer organizations and cooperatives. Provide services that support rural development policy (i.e. education and health).	MoA, MoE, and FAO

5.3 PROPOSED STRATEGY COMPONENTS

In order to increase the economic viability of the agriculture sector and accelerate rural development, policy makers should recognize the importance of the sector and recognize the needs of the value chain stakeholders. Currently, the economy is dominated by oil, but there has been recognition of the importance of diversification, particularly given the recent drop in international oil prices. Agriculture can help achieve this vision -- although the loss of infrastructure assets due to conflict (World Bank) and rural-urban migration73 has undermined agriculture's contribution to the economy, it is still the second largest sector after oil. To revitalize the sector and overcome challenges, the government should align its policies and strategies with market dynamics to boost operational capacities, while also improving the potential of the private sector involvement in the farming system.

The ability of a sector to compete in the global marketplace depends on actors' capacity to access critical resources such as finance, technology, and skills. The public sector should focus on improving the macroeconomic, administrative and regulatory framework for private-sector activities, in addition to the logistics infrastructure, public services and education required to stimulate the availability of service providers. The government can act as the facilitator to remove bottlenecks and prevent market failures, particularly when introducing smart incentives for on and off-farm investments. Government support should also be focused on building national capacity and disseminating best practices, both through extension services and the research centres. These efforts will increase value-adding activities, such as the production and utilization of quality inputs, food manufacturing and export. Government can also help support agri-food processing by establishing small grants, credit, and guarantee schemes. Overall, the Government of Iraq should assume the role of a facilitator rather than the dominant player in the sector. The agriculture sector has a lot of potential to help the government achieve its goals of food security and economic diversification, but it will only be unlocked by coordinating public and private actors, with the help of international technical assistance providers.

5.4 NEXT STEPS

A multi-stakeholder stakeholder consultation will be organized as soon as possible to validate the findings and conclusions of the survey and provide concrete recommendations for each of the four value chains. Main stakeholders concerned include the government and non-government stakeholders. All stakeholder groups, i.e. suppliers, farmers, traders, and processors, should be actively involved. If all actors are committed to a common vision that prioritizes efficiency, effectiveness, good governance, participation, accountability, and equity, then inclusive and sustainable agriculture development can be achieved. There are several entry points for close coordination and implementation. They include:

- the Ministries of Planning, Agriculture, Health, Environment, and Water Resources and FAO have established a multi-sectoral partnership for planning, implementation and monitoring for agriculture, water, and environment programmes and policies to improve coordination and outcomes for farmers;
- the Food Security and Emergency Livelihoods Humanitarian Clusters – and its members, and in particular the newly established Agricultural Working Group;
- the Donor Coordination Group on Agriculture and Water – a forum where joint action can be considered supporting priority investment opportunities, closely coordinated with the Government of Iraq;
- initiatives at more local level led by local authorities and (inter-)national partners - offering technical and financial services.

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