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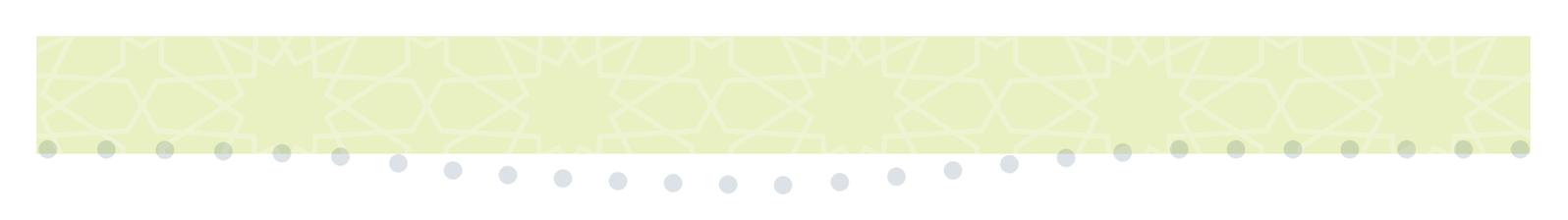
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# Value Chain Analysis for Potato, Tomato, Cucumber and Date in Selected Areas of Al-Anbar Governorate, Iraq

Restoration of Peace, Livelihoods and Economic Cycles in Anbar (RePLECA)



**Value Chain Analysis for Potato, Tomato, Cucumber and Date  
In Selected Areas of Al-Anbar Governorate, Iraq**

**Restoration of Peace, Livelihoods and Economic Cycles in Anbar (RePLECA)**

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## Table of Contents

<b>1</b>	<b>Executive Summary</b>	<b>9</b>
<b>2</b>	<b>Background</b>	<b>15</b>
	2.1 Agriculture in Iraq	15
	2.2 Enabling Business Environment	18
<b>3</b>	<b>Introduction</b>	<b>20</b>
<b>4</b>	<b>Challenges</b>	<b>22</b>
	4.1 Data Availability and Quality	22
<b>5</b>	<b>Methodology</b>	<b>24</b>
	5.1 Current State of Research	24
	5.1.1 Value Chain Mapping	25
	5.1.2 Why Map Actors Along Value Chains?	26
	5.1.3 Methods Commonly Used in Value Chain Research	27
	5.2 Brief Overview of Agriculture in Al-Anbar	27
	5.2.1 Land and Water	28
	5.2.2 Agricultural Production	29
	5.2.3 Livestock	29
	5.2.4 Markets and Supply Chain Status	29
	5.2.5 Main Farming Indicators	29
<b>6</b>	<b>Potato Value Chain</b>	<b>31</b>
	6.1 Cultivated Area, Production and Average Yield of Potatoes	31
	6.2 Key Value Chain Actors and Their Functions	32
	6.2.1 Value Chain Actors	32
	6.2.2 Input Supply	34
	6.2.3 Production	36
	6.2.4 Productivity	40
	6.2.5 Marketing	42
	6.2.6 Wholesale	43
	6.2.7 Retail	44
	6.2.8 Consumption	45
	6.3 SWOT Analysis	46
	6.4 Summary of Findings	47
	6.5 Interventions	49

<b>7</b>	<b>Tomato Value Chain</b>	<b>50</b>
7.1	Cultivated Area, Production and Average Yield of Tomato	50
7.2	Key Value Chain Actors and Their Functions	50
7.2.1	Value Chain Map	50
7.2.2	Input Supply	53
7.2.3	Production	55
7.2.4	Productivity	58
7.2.5	Marketing	59
7.2.6	Wholesale	61
7.2.7	Retail	61
7.2.8	Consumption	61
7.3	SWOT Analysis	63
7.4	Summary of Findings	64
7.5	Interventions	65
<b>8</b>	<b>Cucumber Value Chain</b>	<b>67</b>
8.1	Cultivated Area, Production and Average Yield of Cucumber	67
8.2	Key Value Chain Actors and Their Functions	67
8.2.1	Value Chain Map	67
8.2.2	Input Supply	69
8.2.3	Production	70
8.2.4	Productivity	73
8.2.5	Marketing	74
8.2.6	Wholesale	76
8.2.7	Retail	76
8.2.8	Processing	77
8.2.9	Consumption	77
8.3	SWOT Analysis	79
8.4	Summary of Findings	80
8.5	Interventions	81

<b>9</b>	<b>Date Value Chain</b>	<b>83</b>
9.1	Number of Trees, Production and Average Yield of Dates	84
9.2	Key Value Chain Actors and Their Functions	84
9.2.1	Value Chain Map	84
9.2.2	Input Supply	86
9.2.3	Production	89
9.2.4	Productivity	92
9.2.5	Marketing	92
9.2.6	Wholesale and Retail Marketing	93
9.2.7	Processors	94
9.2.8	Consumption	94
9.3	SWOT Analysis	95
9.4	Summary of Findings	97
<b>10</b>	<b>Conclusion</b>	<b>99</b>
10.1	Major Value Chain Constraints and Challenges	99
10.1.1	Inputs and Input Supply	99
10.1.2	Water Availability and Access	99
10.1.3	Imported Products and Dumping	100
10.1.4	Research and Extension Services	100
10.1.5	Finance and Access to Credit	100
10.1.6	Post-Harvest Activities and Losses	101
10.1.7	Marketing and Competitiveness	101
10.1.8	Infrastructure and Enabling Environment	102
10.2	Recommendations and Proposed Areas of Intervention	103
	<b>Annex 1: Value Chains – Main Constraints and Threats</b>	<b>109</b>
	<b>Annex 2: Value Chain Opportunities</b>	<b>110</b>
	<b>Imprint</b>	<b>111</b>

## List of Tables

<b>Table 1:</b>	Cultivated Area, Production and Average Yield of Potato	32
<b>Table 2:</b>	Difference in Input Prices Between Importers and Suppliers	36
<b>Table 3:</b>	Socio-Demographic Characteristics of Potato Producers	37
<b>Table 4:</b>	Cost Distribution in Potato Production	41
<b>Table 5:</b>	SWOT Analysis of the Potato Value Chain	46
<b>Table 6:</b>	Cultivated Area, Production and Average Yield of Tomato	50
<b>Table 7:</b>	Distribution of Interviewees, by Region	52
<b>Table 8:</b>	Difference in Input Prices Between Importers and Suppliers	54
<b>Table 9:</b>	Socio-Demographic Characteristics of Tomato Producers	55
<b>Table 10:</b>	Quantity of Tomato Seeds and Fertiliser per Land Unit, by Cultivation Method	56
<b>Table 11:</b>	Average Quantity of Fertiliser Applied, by Type and Share of Farmers Applying this Type	56
<b>Table 12:</b>	Cost Distribution in Tomato Production	57
<b>Table 13:</b>	Productivity of Tomato Production, by Cultivation Method	58
<b>Table 14:</b>	SWOT Analysis of the Tomato Value Chain	63
<b>Table 15:</b>	Cultivated Area, Production and Average Yield of Cucumber	67
<b>Table 16:</b>	Difference in Input Prices Between Importers and Suppliers	70
<b>Table 17:</b>	Socio-Demographic Characteristics of Cucumber Producers	70
<b>Table 18:</b>	Quantity of Cucumber Seeds and Fertiliser per Land Unit	71
<b>Table 19:</b>	Average Quantity of Fertiliser Applied, by Type and Share of Farmers Applying this Type	72
<b>Table 20:</b>	Cost Distribution in Cucumber Production	72
<b>Table 21:</b>	Productivity of Cucumber Production, by Cultivation Method	73
<b>Table 22:</b>	SWOT Analysis of the Cucumber Value Chain	78
<b>Table 23:</b>	Number of Date Trees, Productivity and Production of Dates in Iraq and Al-Anbar	84
<b>Table 24:</b>	Average Price and Number of Traded Date Offshoots	88
<b>Table 25:</b>	Price and Number of Local Offshoots Sold, by Variety	89
<b>Table 26:</b>	Socio-Demographic Characteristics of Date Producers	90
<b>Table 27:</b>	Productivity of Date Orchards in Heet	92
<b>Table 28:</b>	Distribution of Dates	92
<b>Table 29:</b>	SWOT Analysis of the Date Value Chain	95
<b>Table 30:</b>	VCA Results and Proposed Areas of Intervention	103

## List of Figures

<b>Figure 1:</b> Total Population of Al-Anbar and Its Composition in 2020	28
<b>Figure 2:</b> Potato Value Chain Flow	33
<b>Figure 3:</b> Distribution of Actors Interviewed Along the Potato Value Chain in Amereyah Region	34
<b>Figure 4:</b> Average Land Holding by Farmers and Average Size of Land Used for Potato Production (donum)	37
<b>Figure 5:</b> Type of Equipment Owned by Farmers (in %)	38
<b>Figure 6:</b> Productivity of Potato Production: Iraq and Countries of Origin of Imports (ton/donum)	40
<b>Figure 7:</b> Potato Distribution and Use (in %)	42
<b>Figure 8:</b> Value Addition Process for Potato	49
<b>Figure 9:</b> Tomato Value Chain Flow	51
<b>Figure 10:</b> Distribution of Actors Interviewed Along the Tomato Value Chain	52
<b>Figure 11:</b> Cost of Tomatoes (in %)	54
<b>Figure 12:</b> Share of Land Assigned to Different Tomato Cultivation Methods (in %)	55
<b>Figure 13:</b> Productivity of Tomato Production: Iraq and Countries of Origin of Imports (ton/donum)	58
<b>Figure 14:</b> Tomato Distribution and Use (in %)	60
<b>Figure 15:</b> Value Addition Process for Tomato	66
<b>Figure 16:</b> Cucumber Value Chain Flow	68
<b>Figure 17:</b> Distribution of Actors Interviewed Along the Cucumber Value Chain	69
<b>Figure 18:</b> Productivity of Cucumber Production: Iraq and Countries of Origin of Imports (ton/donum)	74
<b>Figure 19:</b> Cucumber Distribution and Use (in %)	75
<b>Figure 20:</b> Value Addition Process for Cucumber	82
<b>Figure 21:</b> Date Value Chain Flow in the Area Under Review	85
<b>Figure 22:</b> Distribution of Actors Interviewed Along the Date Value Chain	86
<b>Figure 23:</b> Distribution of Supplied Tissue Culture Offshoots by Variety (in %)	87
<b>Figure 24:</b> Distribution of Traded Offshoots, by Variety (in %)	88
<b>Figure 25:</b> Composition of Date Palm Orchards, by Variety (in %)	91

## List of Acronyms

<b>CGIAR</b>	Consultative Group on International Agricultural Research
<b>CSO</b>	Central Organization for Statistics of the Ministry of Planning
<b>DAP</b>	Di-Ammonium Phosphate
<b>DoA</b>	Directorate of Agriculture
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FAOSTAT</b>	Food and Agriculture Organization Statistics
<b>FFS</b>	Farmer Field Schools
<b>GAP</b>	Good Agricultural Practices
<b>GDP</b>	Gross Domestic Product
<b>IDP</b>	Internally-Displaced People
<b>IPM</b>	Integrated Pest Management
<b>IQD</b>	Iraqi Dinar
<b>NDP</b>	National Development Plan
<b>NPK</b>	Nitrogen, Phosphorus and Potassium
<b>OCHA</b>	United Nations Office for the Coordination of Humanitarian Affairs
<b>PDS</b>	Public Distribution System
<b>RePLECA</b>	Restoration of Peace, Livelihoods and Economic Cycles in Anbar
<b>SPS</b>	Sanitary and Phytosanitary Measures
<b>SSN</b>	Social Safety Net/s
<b>SWOT</b>	Strengths, Weaknesses, Opportunities and Threats (Analysis)
<b>VC</b>	Value Chain/s
<b>VCA</b>	Value Chain Analysis
<b>VCD</b>	Value Chain Development
<b>VCM</b>	Value Chain Mapping

## 1 Executive Summary

The economy of Iraq is critically oil-dependent, as oil revenues contribute about 60% of the country's Gross Domestic Product (GDP); by comparison, agriculture, forestry, hunting, and fishing represented only 4.3% of GDP in the first half of 2021. However, the agricultural sector constitutes a vital component of Iraq's economy. The farming sector is strategically crucial for food security and provides employment and income for millions of Iraqi families: about 20% of the country's workforce and 23.3% of women work in agriculture. Sector performance is low due to fluctuating agricultural policies, in combination with a challenging legislative environment; shortage of and poor access to water; deteriorating soil quality; low public and private investment in new technologies for equipment, irrigation, farming and fishing; and emerging climate change issues. It is noteworthy that many internally displaced people (IDP) in Iraq (mainly from Mosul, Salahuddin, and Al-Anbar governorates) worked in agriculture before their displacement.

Al-Anbar (in western Iraq) is one of the primary sources of food production in Iraq due to fertile, cultivatable land and sufficient water supply. Agriculture used to be the leading provider of jobs and livelihoods for the (semi-)rural population, especially women. However, Al-Anbar Governorate has suffered from security threats that have led to widespread destruction of infrastructure and large-scale internal displacement of the population. The productive and social infrastructure has been damaged or destroyed in rural areas, as well as in semi-urban and urban centres. Al-Anbar's agricultural sector is currently unable to compete with cheaper imported goods. Job opportunities in agriculture are sparse, and many people leave rural areas to seek employment in the cities of Fallujah and Ramadi. Both cities have grown significantly over the past five years and are overwhelmed by the demand for jobs and basic social services, which they cannot provide to a satisfying extent. As the security situation is improving, more internally displaced people return to Al-Anbar, adding to the strain on public infrastructure, already overburdened with the basic needs of the current population.

**The primary policy guidance for the agriculture and water (and natural resources) sector stems from the 2018-2022 National Development Plan, the main objectives of which are listed below:**

1. Increase the contribution of the agricultural sector to non-oil GDP from 4.5% in 2015 to 5.2% in 2022 and achieve a sector growth rate of 8.4% in the target year
2. Ensure sustainable food security
3. Meet annual demand for sustainable water use by agriculture, industry and municipal entities and achieve a balanced water supply, with the possibility of reducing annual demand by 500 million m<sup>3</sup>
4. Ensure sustainable water resources.

In accordance with the objectives of the Iraqi government, a Value Chain Analysis (VCA) was conducted, intended to feed into the implementation of the "Restoration of Peace, Livelihoods, and Economic Cycles in Anbar, Iraq (RePLECA)" programme for four critical agricultural products in Al-Anbar: tomato, potato, cucumber and date. The study aims to identify VCA-guided activities promoting Value Chain Development (VCD).

The selected value chains (VC) were identified in consultation with high-level stakeholders, with the intention to select commodities critical to the agri-food sector in Al-Anbar. By analysing market linkages and bottlenecks, the assessment provides information to policymakers, guiding them to design appropriate measures to increase production as well as income and employment opportunities.

Furthermore, the report aims to facilitate a detailed understanding of critical actors of value addition in order to identify challenges and opportunities as well as competitive and comparative advantages. The study set out with desk research of the information available and provides an overview of the status and the trends of the agricultural sector in Iraq in the areas selected for this review – informing research design and identifying areas for primary data collection and analysis. Primary data collection was conducted through field surveys, interviews with actors along the value chain and semi-structured interviews with value chain experts and representatives of relevant organisations, in order to obtain the intended results. Data were collected for 353 stakeholders in the potato value chain, 614 for tomato, 499 for cucumber and 387 for date. The data collected were analysed, reviewed, and discussed, and analyses and interpretations were presented as appropriate.

The report starts with sections outlining the relevant data for each set of actors along the value chains of the four crops, including information on the socio-economic characteristics of input and product traders, farmers, processors, consumers, and actors in support services. A SWOT analysis was conducted to determine the challenges and opportunities related to the value chain of each crop, and a summary of findings concludes each section on the value chain of the respective crop. The overall challenges characterising the four value chains and the potential opportunities and possible areas of intervention are summarised at the end of the report, which also includes a discussion of suggestions.

The analysis of the value chain of each crop was carried out independently, based on an identical methodology. The results were compiled for each value chain, allowing them to be utilised separately. The results of the complete VCA for the four products were presented both in a horizontal framework, addressing issues prevalent in most of the VC assessed, and in a vertical framework, raising issues specific to each VC. Value chain mapping (VCM) enables the visualisation of the product flow from the beginning to the end-consumer through various actors. It also helps to identify the different actors involved in the value chain system and to understand their roles and linkages.

Each value chain map highlights the involvement of a diverse set of actors who participate directly or indirectly in the value chain. Direct actors are commercially involved in the chains (input suppliers, producers, processors, traders and consumers), while indirect actors provide financial or non-financial services or support the functioning of the particular value chain (credit providers, business service providers, the government, researchers and extension agents). The latter play a vital role in stimulating or hampering the capacity of the direct actors to interact and generate value.

Based on the results of the analysis, several common challenges have been identified along the value chains of the four crops, as well as for other crops, which were explored and documented during the interviews that took place in the context of questionnaires, desk research and field visits carried out by the project team.

### **Inputs and Input Supply:**

Inputs and input supply represent the main weakness affecting the capacity of farmers to optimise production. Most farmers lack funds and access to financial support to purchase inputs, including seeds, seedlings, fertiliser and pesticides. Moreover, they also lack information about best practices in using the inputs. The utilisation of non-certified/improved seeds and the absence of qualified nurseries for the supply of seedlings reduce productivity significantly. The application of ineffective or inappropriate pesticides promotes the spread of pests and diseases and affects the yield and quality of produce negatively. The inefficient use of fertiliser adds costs to the production cycle without generating a tangible return for farmers. The quality of equipment, repair services and spare parts, farm infrastructure and land has also been the subject of widespread complaints among interviewed farmers. Producers also mentioned the lack of access to finance and low producer prices, which prevent them from accumulating sufficient capital to scale up mechanisation, instead forcing them to continue to rely on labour-intensive practices.

### **Water Availability and Access:**

Sufficient availability of water is a significant challenge for farming in the area under review and in Iraq, generally. Water flow to Iraq has declined dramatically, and the quality has deteriorated. Large parts of the groundwater along the developed central plain are unusable due to high salinity and pollution. Furthermore, water tariffs in Iraq are extremely low to allow farmers to pump water freely into their fields without paying an irrigation service fee. Treating water as a free good, combined with the lack of awareness of water scarcity, naturally reinforces water waste, excessive consumption, and low efficiency of water use. Accordingly, water supply and irrigation remain major challenges for many farmers, with poor and damaged water distribution infrastructure due to armed conflict, lack of maintenance of communal irrigation canals and changing weather patterns aggravating the problem. The adoption of a coherent water regulation system and the use of modern technologies for efficient irrigation can reduce water consumption in agriculture. Due to the severe drought, water and its management are now high priorities for both the government and the general public. Consistent regulation, critical infrastructure rehabilitation, and effective technologies and practices, including soil erosion control, will be required to improve the availability of surface water and groundwater.

### **Imported Products and Dumping:**

In recent years, imported products have played a significant role in bridging the gap between the demand for food and domestic supply. However, imports also constrain the recovery of the agricultural sector as local farmers struggle to compete with cheaper imported produce. Imports, which sometimes benefit from subsidies, are occasionally less fresh than local produce and more likely to be damaged in transportation due to the distance travelled. At the same time, imported products are often cleaner, better packaged and have a more uniform appearance that attracts consumers, even if their taste is not superior. Nevertheless, consumers and (to some extent) traders reportedly prefer locally produced Iraqi products to imports.

**Research and Extension Services:**

Research and extension services are an important component of agricultural development, particularly in a system dominated by small-scale farms. In Al-Anbar, an efficient technology transfer system that links knowledge generation to value chain actors is not in place. Extension agents play an essential role in improving social capital and instigating change, which then helps farmers access resources and boost their farm's productivity. Farmers have long experience and extensive knowledge with respect to their environment and their farming system. However, extension services can introduce innovation and Good Agricultural Practices (GAP), particularly regarding fertiliser use, the application of pesticides and water management. The weakness of agricultural extension services reflects a broader capacity challenge, with services often lacking appropriate facilities, such as offices, laboratories and equipment. The number of extension officers has also been insufficient, partly due to lack of training and limited partnering with local university experts.

**Technical Training in the Area:**

Knowledge is readily available at local universities, but partnerships and the exchange of information are absent. Accordingly, new technologies, innovations, and science-based recommendations are slow to reach farmers. Instead, the methods used by farmers continue to be based on traditional approaches, handed down from generation to generation, complemented by farmers' own practical experience. The connection between research, extension services, upstream suppliers and technology users is weak. Farmers expressed their overall dissatisfaction with the services provided by the government as they have not received adequate support over the past few years. Strengthening extension services to enhance farmers' knowledge and capacity to apply GAP would contribute substantially to higher productivity and quality of products while reducing costs. In particular, the use of pesticides and water leaves room for improvement.

**Finance and Access to Credit:**

Financial services and bank credit are constrained for most actors involved in the value chains examined, including credit for inputs and machinery – forcing farmers to rely on family members for credit. The available financial offers are not aligned with farmers' needs, and there is no evidence of microfinance institutions or relevant insurance schemes.

**Post-Harvest Activities and Losses:**

Lack of cooperation and communication negatively affects supply chain development, exacerbating losses and reducing income and competitiveness. Losses along the supply chain are prevalent at all stages due to poor handling, inadequate post-harvest management, and a lack of storage and processing facilities that would add value to raw products. In the absence of storage and logistics capacity, farmers are forced to sell their fresh produce quickly before it spoils, usually at low prices during harvesting. Centralised 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 contribute to reducing infrastructure-related challenges. Providing farmers with adequate services, technologies, and knowledge of harvesting and post-harvesting practices would reduce their losses. Government investment in capacity building, infrastructure rehabilitation and policy support to facilitate

market access for farmers could enable private sector investment in the agricultural sector and contribute to reducing food loss in Iraq. Technological development in the processing industry should be aligned with farmers' needs and the demand in local markets to allow agricultural production to once again become competitive and efficient. Facilitating the establishment of processing factories and refrigerated storage facilities for agricultural produce would support farmers and contribute to higher value chain efficiency.

#### **Marketing and Competitiveness:**

Social capital, which reflects the relationships, participation, and associations in a social group or community, seems largely absent or inactive in the agricultural sector under review. There is no evidence of mutual support and joint initiatives among farmers or other value chain actors. Farming contracts and opportunities for delayed input payment are lacking, indicating that socio-economic capital is limited. Insufficient coordination among farmers, suppliers and traders negatively affects farmers' bargaining power, thereby increasing marketing costs as producers must conduct transactions individually. The absence of synergies between the public and private sectors affects the efficiency and competitiveness of the value chains negatively. Government policies and interventions enforce dependency on the public sector, but do not promote participation by the private sector on a scale that could help to remove the apparent constraints.

#### **Infrastructure and Enabling Environment:**

Infrastructure requires a substantial upgrade to satisfy the requirements of actors in the agricultural value chains. Both generation and distribution of electricity are inefficient, and most rural areas do not have access to reliable electricity supplies: frequent electricity shortages and outages are the norm. Without access to adequate and reliable electricity, irrigation of crops and their storage is rendered impossible, and value-adding investment opportunities will remain unexploited. Unreliable electricity supply also makes the storage and preservation of seeds more expensive and riskier. Road conditions often contribute to losses and obstruct physical access to markets. Wholesale markets cannot provide services like storage, grading and packaging. Transparent policies for grading, quality, traceability and certification are absent, both up- and downstream of value chains, affecting the competitiveness of local products vis-à-vis imported goods and often generating a mismatch between supply and demand. The emphasis should be laid on strengthening policies and associations for farmers and industry, catalysing private sector investment and increasing product quality by enhancing the incentive structure, while developing export potential.

The SWOT analysis has provided the basis for specific recommendations regarding policies and measures that contribute to developing the value chains of potato, tomato, cucumber and date in Al-Anbar. Potential interventions should be prioritised in line with their expected impact and achievability. The proposed areas of intervention address the analysed value chains for the four crops, also considering desk research on the agricultural community in Al-Anbar. The proposed interventions include crop-specific measures. The causes of the weaknesses and challenges analysed in the context of this report have been identified. A comprehensive overview of possible interventions has been outlined to address the many constraints facing agricultural production in Al-Anbar – thereby laying the ground for strategies and initiatives that provide opportunities for all actors to use their full potential to contribute to a sector critical for the development of Iraq.

The proposed interventions constitute horizontal operational interventions with an impact on the entire agricultural sector in Al-Anbar. The interventions were defined and proposed because of their potential direct and immediate impact and as a foundation for any crop value chain improvement. They support the improvement of targeted crops as well as other crops considered essential, based on the results of desk research, VC field surveys, interviews and field visits, in addition to meetings with primary stakeholders and beneficiaries.

The main areas of intervention include developing extension services capacities, improving farmers' access to knowledge and training, setting up or strengthening farmer organisations, and supporting job skills training in the VC, as well as business start-up and development.

*Field training of the value chain survey team | Photo AFC © GIZ*



## 2 Background

Al-Anbar Governorate in western Iraq has suffered from security threats that have led to widespread destruction of infrastructure and large-scale internal displacement of the population. The productive and social infrastructure has been damaged or destroyed in rural areas, as well as in semi-urban and urban centres. As the security situation is improving, more internally-displaced people (IDP) return to Al-Anbar, adding to the strain on public infrastructure, already overburdened with the basic needs of the present population.

Al-Anbar is considered to be one of the main source areas for food production in Iraq due to fertile, cultivatable land and sufficient water supply from the River Euphrates and surrounding lakes. Agriculture was the main provider of jobs and livelihoods for the (semi-)rural population before the war, especially for Al-Anbar's women. Due to the destruction of infrastructure and the consistent use of outdated farming methods, Al-Anbar's agricultural sector is currently unable to compete with cheaper imported goods. Job opportunities in agriculture are sparse, and many people leave rural areas to seek employment in the cities of Fallujah and Ramadi. Both cities have grown significantly over the past five years and are overwhelmed by the demand for jobs and basic social services, which they cannot provide to a satisfying extent.

To improve the livelihoods of households and families in Al-Anbar, it is crucial to build or rehabilitate productive and social infrastructure. The main area identified for intervention at this stage is the agricultural sector – a promising part of the economy with significant potential. The agricultural sector and the livelihoods that rely on it require assistance to restore economic activity and community resilience. This should include effective sector coordination mechanisms to support livelihoods, enhancing the capability of rural and peri-urban communities (particularly in affected districts) to engage in viable farming activities and helping them to move effectively towards sustainable livelihood.

### 2.1 Agriculture in Iraq

The economy of Iraq is critically oil-dependent, as oil revenues contribute about 60% to GDP (according to data for 2021), accounting for the highest sectoral share of exports and government revenues. In 2021, Iraq's GDP reached US\$43.6 billion; agriculture, forestry, hunting and fishing represented only 4.3% of GDP in the first half of 2021.<sup>1</sup> However, the agricultural sector is meant to constitute a vital component of Iraq's economy. The farming sector is strategically crucial for food security and provides employment and income for millions of Iraqi families: about 20% of the country's workforce and 23.3% of women work in agriculture.<sup>2</sup> Sector performance is low due to fluctuating agricultural policies, in combination with a challenging legislative environment; shortage of and poor access to water; deteriorating soil quality; low public and private investment in new technologies for equipment, irrigation, farming and fishing; and emerging climate change issues. It is noteworthy that a large number of IDPs in Iraq (mainly from Mosul, Salahuddin and Al-Anbar governorates) worked in agriculture before their displacement.<sup>3</sup>

<sup>1</sup> Central Organization for Statistics of the Ministry of Planning (CSO): Statistics for 2021.

<sup>2</sup> FAO 2021: Agricultural value chain study in Iraq. Dates, grapes, tomatoes and wheat, Baghdad.

<sup>3</sup> United Nations Office for the Coordination of Humanitarian Affairs (OCHA): Annual Report 2020.

Iraq has transitioned from being a smallholder-driven, food-producing country that can cover its needs to becoming a significant food importer in order to meet domestic demand – driven by population growth, among other factors. Food security has thus deteriorated due to lower food production and a reduction in agricultural value added, also as a result of prolonged armed conflict, which the sector has not yet recovered from.

The sector's low productivity and growth rates are attributable to various causes, including the government's past policy of maintaining artificially low food prices through price and production controls and marketing restrictions. Nationwide distribution of imported subsidised food, through the Public Distribution System (PDS) has negatively impacted the local grain market, depressing producer prices and agricultural sector investment as a consequence. Government policies in the agricultural sector have been characterised by state control and subsidisation of farm inputs (fertiliser, seeds, insecticides, farm equipment and fuel) and strategic crops. In addition, years of insufficient maintenance and funding have degraded agricultural services and physical infrastructure, particularly the irrigation network. Against the backdrop of prolonged conflict, the military operations of 2003 and the years thereafter have caused extensive damage to government and private agricultural production as well as service facilities around the country. Climate change with its potentially severe impact on the conditions for agricultural production is another threat. The continued contraction of Iraqi agriculture threatens incomes in rural areas and is a missed opportunity with regard to the intention to ensure food security – given the increasing pressure to feed a population growing at an annual rate of around 2.7%.

Water stress and climate change contribute to the challenges for the agricultural sector. Iraq's natural resources base is under increasing pressure: climate change projections include an increase in average annual temperatures of 2°C and a decrease in average annual rainfall of 9% by 2050, with a higher likelihood of more frequent and extreme weather events (such as heat and dust storms). Water resources must be managed more strategically and efficiently, and productive land use needs careful reassessment. Extended droughts, changing rainfall patterns, desertification and salinisation call for rapid scale-up of efficient irrigation technologies and a switch to water-efficient crops. Overall water use efficiency at the conveyance level and on farms is less than 40%. Climate change will directly impact agriculture and amplify the challenges the agricultural sector is facing, thus undermining rural livelihoods even further and leading to more fragility and tensions, with potential displacement of the rural population on an even larger scale. Developing strategies to adapt to climate change in the agricultural sector and promoting climate-smart agriculture practices may thus yield economic, social and environmental benefits.

Poor marketing and complex logistics, including insufficient transport infrastructure, cold storage and storage facilities, can cause significant loss of crops before they even reach the market. Local demand for agricultural products is not being met and the availability of cheaper imported food products from neighbouring countries puts farmers out of business. Since government support for inputs and services has declined, farmers and agricultural enterprises are uncertain of the future, and some have even given up. Most of the farms in Iraq are small mixed-family farms and most jobs in the agricultural sector target semi-skilled and skilled workers. According to the latest estimates, the unemployment rate in Iraq stands at 13.8% and the Al-Anbar Governorate has the highest rate, with about 32.4%;<sup>4</sup> plans for a new unemployment survey have been announced by the Ministry of Planning.

<sup>4</sup> Central Organization for Statistics of the Ministry of Planning (CSO): Statistics for 2021.

Agricultural development is critical to allow Iraq to achieve its vision of a more diversified economy, generating employment and boosting private sector involvement. Approximately 22% (9.5 million ha) of Iraq's area is suitable for agriculture production, yet only about 5 million ha are currently cultivated.<sup>5</sup> Crop production is the primary income source for most farmers (about 75%), while the remaining ones depend on livestock or mixed crop and livestock production systems. Small-scale farming systems dominate the sector and are typically characterised by the use of traditional methods and minimal capital investment, resulting in low productivity. Social capital is limited and positive outcomes from group interactions are rare, causing poor integration along the supply chain.

A robust private sector is needed for economic diversification and sustainable growth. Significant private investment in the agricultural sector is required to meet these challenges and to enable the sector's potential contribution to growth, diversification, food security and employment generation – in the context of the overall set of development policies. Yet, there are currently no incentives for private sector investment in food and agriculture. Due to the isolation of Iraq in recent decades, agribusiness and food and agricultural enterprises have not been able to benefit from international markets, modern production techniques or global trading standards. There are limited incentives to invest in agricultural processing industries or value chains because of the complicated and outdated administrative and regulatory system; considerable shortcomings of the public agencies in charge of advisory and technical services; erratic price policies; inefficient marketing networks; poor infrastructure; limited market information; and complicated and time-consuming export-import procedures.

The Government of Iraq is committed to reforming the agricultural sector by revitalising and modernising its performance. The government believes that a shift to a competitive market-based system can produce significant gains in agricultural productivity, a stronger focus on value added and enhanced employment opportunities.

**The primary policy guidance for the agriculture and water (and natural resources) sector stems from the 2018-2022 National Development Plan, the main objectives of which are listed below:<sup>6</sup>**

1. Increase the contribution of the agricultural sector to non-oil GDP from 4.5% in 2015 to 5.2% in 2022 and achieve a sector growth rate of 8.4% in the target year
2. Ensure sustainable food security
3. Meet annual demand for sustainable water use by agriculture, industry and municipal entities and achieve a balanced water supply
4. Ensure sustainable water resources.

<sup>5</sup> FAO 2021: Agricultural value chain study in Iraq. Dates, grapes, tomatoes and wheat, Baghdad.

<sup>6</sup> Ministry of Planning: National Development Plan 2018 – 2022, pp. 132-137.

In the context of the revision of the National Development Plan (NDP), the National Food Security Strategy is one of the main policy documents. The comprehensive document provides ample details on the priorities to be addressed, identifying a significant number of areas for action.

**Furthermore, the White Paper adopted by the government in October 2020 sets out the economic reform plan for the government, outlining priorities for agriculture and agro-industries in order to ensure sustainable food supply:<sup>7</sup>**

- Review public support programmes
- Review regulatory and policy framework
- Increase investment
- Ensure access to technology, knowledge and skills.

**The White Paper also sets out the reform agenda for national social protection, which is expected to have a profound impact on the food system, including the demand for affordable and nutritious food:**

- Reform the Public Distribution System (PDS): introduce a targeting mechanism for PDS in combination with compensatory measures for negatively-affected beneficiaries
- Reform Social Safety Nets (SSN): (i) improve targeting of the Unconditional Cash Transfer by updating the Proxy Means Testing formula, based on the upcoming household socio-economic survey 2021, and (ii) establish a Social Registry.

In February 2021, an Action Plan for implementing White Paper priorities was agreed on, focusing on essential areas, such as defining and refining the agricultural value chain from beginning to end.

## 2.2 Enabling Business Environment

Several stakeholders are involved in Iraq's agriculture, including the ministries of agriculture, water resources, science and technology, higher education, planning and finance, as well as farmer associations and individual farmers. The Ministry of Agriculture is in charge of policy design, the development of the legal and regulatory framework and financial support. The ministry also provides extension services and generates market information, leaving farming in the responsibility of private farmers.

Neither the public nor the private sector, be it in their individual or collective capacity, is adequately equipped to offer effective support to agricultural value chains. Public sector involvement in agriculture faces considerable challenges, including fluctuations and conflict of sector policies; multiplicity of legal instruments and regulations; conflict of interest, leading to operational discordance (public sector vis-à-vis private sector); lack of capacity to address the rapidly changing dynamics of emerging global issues, against the background of an expanding domestic market and changes in regional markets; inadequate technical abilities to provide services to a wide range of value chain actors; an ineffective communication framework and insufficient ICT facilities; underutilisation of infrastructure, such as produce-handling facilities (e.g. cold storage); and inadequate M&E mechanisms.

<sup>7</sup> Government of Iraq: White Paper for Economic Reforms, 2020.

The private sector, including producer associations, also faces challenges, such as circulating market information; disseminating improved technologies through extension services, also accompanied by access to credit; generating economies of scale in marketing; and enhancing the bargaining power of producers. However, producer associations cannot currently fulfil these roles: trader associations are virtually non-existent, and trading along the agricultural value chain is generally disorganised and captured by a large number of informal intermediaries. The regulatory environment is generally weak, since insufficient resources result in limited ability to regulate and enforce marketing and quality standards. With a multitude of informal intermediaries, formal market organisation and contract enforcement are near impossible along the value chain.

Finance, accounting and business development skills, as well as insurance, quality testing/certification, and research and extension play a critical role in agricultural value chain development. Most value chain actors lack linkages to the providers of a.m. services and the capacity to engage with them. In addition, there are no reliable finance facilities (including insurance services) specifically targeting value chain actors, but there are credit facilities targeting producers in general. Some of these facilities are made available through access to bank loans for farmers or via the private microfinance sector. Support services to producers and other value chain actors are also provided by input suppliers. However, knowledge about the existence of these service providers and their regulations and arrangements remains limited.

Due to Iraq's political situation, fragile institutions and lack of legal standards, the regulatory framework for the agricultural sector remains weak, impeding initiatives to enhance transparency along the value chain in order to generate better returns for producers. The other component critically important for efficient value chain performance and enhanced value added is infrastructure, including energy; transportation; irrigation systems; storage facilities; communication; and bulking and cooling plants. In view of the perishability of agricultural products, storage and transport infrastructure is a critical determinant of product quality and related producer prices, including cooling (refrigeration), roads and rail facilities. Most smallholders along the value chain have insufficient access to these facilities. Moreover, the provision of ample government support through subsidies has distorted price signals and the incentive structure, thereby hampering value chain development and, ultimately, agricultural production.

### 3 Introduction

The value chain approach is a market-driven concept, taking into account the entire framework of interrelated economic activities, with the intention to understand the position and role of all relevant stakeholders within a value chain – from input suppliers to final consumers; the support markets that provide technical, business and financial services; and the overall business environment, in which the value chain operates. Such a broad scope for value chain analysis is needed since principal constraints to competitiveness could exist in any of the relevant market segments or the surrounding economic environment. Accordingly, the development of successful strategies for VCD is based on the results of a comprehensive VCA. The assessment of the value chains of the four commodities was conducted to identify major challenges and potential areas of intervention for the “Restoration of Peace, Livelihoods, and Economic Cycles in Anbar, Iraq (RePLECA)” programme.

The selected value chains were identified in consultation with high-level stakeholders,<sup>8</sup> with the intention to select commodities critical to the agri-food sector in Al-Anbar. By analysing market linkages and bottlenecks, the assessment provides information to policymakers, guiding them to design appropriate measures that will increase production, income and employment opportunities.

This document outlines the mapping of actors along the value chains and reports on the four commodities, to which this analysis was applied in four communities in Al-Anbar Governorate, West Iraq. A value chain “is the set of value-adding activities, through which a product passes from the design to the consumption stages. The product’s value increases at each point of the process, hence the term value chain.”<sup>9</sup> The livelihoods of stakeholders in agri-food commodities do not only depend on agricultural production itself, but also on the ability of producers to access resources such as fertiliser, seeds, and other inputs “upstream” in the value chain, as well as opportunities to sell their surplus produce “downstream” in the chain. The position of stakeholders (including producers) in the value chain affects their ability to access resources, information and markets: in short, stakeholders are embedded in larger systems of activities and relationships that provide opportunities for and constraints to improving production systems and, thereby, people’s livelihoods. A better understanding of the opportunities and constraints faced by stakeholders in participating in a value chain is essential to ensure that markets work more efficiently.

Available official data are incomplete and do not reflect the actual situation in these areas – to some extent explained by the fact that farmers and private sector business owners in rural areas do not provide adequate information about their businesses.

<sup>8</sup> Consultations were held with the Al-Anbar Governorate, the Directorate of Agriculture in Al-Anbar and the Ministry of Agriculture Extension Services, as well as farmers and wholesale and retail traders.

<sup>9</sup> McCormick, D. and Schmitz, H. (2001): *Manual for Value Chain Research on Home Workers in the Garment Industry*. Institute of Development Studies, University of Sussex, UK., p. 155.

**To achieve the objectives of the project, 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 agricultural commodity in the corresponding geographic areas? Where are the gaps or redundancies in the value chain structure?
2. How does the value of each commodity change throughout the respective value chain? What are the value-added and net benefits associated with each value chain segment, and what is the competitive advantage of each commodity?
3. Which critical interventions along the value chain (activities, agents, enabling environment and support services) will increase farmers' profits?
4. Which challenges do farmers face in accessing agricultural inputs (seeds, fertiliser, tools, water etc.), which agricultural practices are farmers currently using (planting, irrigation, fertiliser, harvesting methods etc.), and to what extent are these aligned with best practice (e.g., the Climate Smart Agriculture approach)? Which factors are causing the most significant post-harvest losses, and how can these factors be modified?
5. To what extent are there opportunities to add value in storage, processing, marketing, packaging, transportation, wholesale and retail marketing, and distribution systems for each of the four commodities?

*Women participating in farmer field schools in Ramadi, Iraq | Photo: AFC © GIZ*



## 4 Challenges

Agriculture used to be the primary source of income, providing jobs and livelihoods for Al-Anbar's rural and semi-rural population. However, Al-Anbar Governorate is facing security threats that have led to widespread destruction of infrastructure and large-scale internal population displacement. The productive and social infrastructure in rural, semi-urban and urban areas has been severely damaged or destroyed. For significant parts of the population, essential prerequisites for peaceful social coexistence, livelihoods and income generation do not exist. The aftermath of the armed conflict and slow recovery processes have pushed large numbers of internally-displaced people, returnees and people in host communities into precarious and vulnerable living conditions.

To improve the livelihoods of households and families in Al-Anbar, building or rehabilitating productive and social infrastructure is crucial. The first possible area identified for intervention is the field of agriculture, as particularly promising with significant potential. The agriculture and livelihood sectors need assistance to restore economic activity and community resilience. This should include effective sector coordination mechanisms to support livelihoods, enhancing the capability of rural and peri-urban communities to engage in viable farming enterprises and help them move towards sustainable livelihood, in particular in the affected districts.

Among a wide range of issues, the following areas were identified for high-priority interventions: strategic investments to promote agriculture, livestock and agro-industrial development; higher production efficiency in crops and livestock, as enhanced productivity would raise the income of farmers and pastoralists and reduce rural and peri-urban poverty levels; more efficient water use; better access to input and output markets; and the development of human resources with appropriate skills and knowledge of relevant technologies, including food processing, packaging and cold-chain infrastructure. The development of core business planning and management skills will also help to enhance the sustainability of interventions by strengthening institutions in the agricultural sector.

In order to meet the many challenges, the identification and analysis of agricultural value chains is critical, beginning with the suppliers of inputs and ending with final consumers. Analysing market linkages and bottlenecks will guide policymakers in designing appropriate measures in the selected areas of intervention and contribute to increased production and income and better employment opportunities.

### 4.1 Data Availability and Quality

Timely, accessible high-quality data are key to measuring and tracking different activities. Agricultural statistics in Iraq are produced and published by the Central Organization for Statistics in the Ministry of Planning (CSO). The organisation usually issues one leading publication per year, the Statistics Yearbook. The data for this publication originate from different sources: the census, surveys and additional data collection.

Last year's statistics for the governorates of Al-Anbar, Ninevah, Salah-Al-Din and Kirkuk did not cover any substantial areas of these governorates because of security-related issues. Available of-

ficial data are therefore incomplete and do not reflect the actual situation on the ground in these areas. Moreover, farmers and private sector business owners in rural areas do not provide adequate information about their businesses, often reporting inconsistent data on income, yields, trading volumes, profit margins and livestock. This may reflect an unwillingness to share such information with others, but it could also result from the absence of records on farming activities and related data on quantities, costs and revenues. The uncertain business environment in Iraq is a critical feature as it dominates almost all economic activities. In the Al-Anbar Governorate, primary data collection faces numerous challenges, aggravated by the lack of secondary data. Due to the a.m. constraints, significant gaps in time series have made it extremely difficult to compile accurate statistics and reliable information on agricultural activities.

*Field work during the value chain analysis | Photo: AFC © GIZ*



## 5 Methodology

The report aims to facilitate a detailed understanding of critical actors of value addition in order to identify challenges and opportunities as well as competitive and comparative advantages. The study set out with desk research of the information available and provides an overview of the current status and the trends of the agricultural sector in Iraq, in particular in the areas selected for this review – informing research design and identifying areas for primary data collection and analysis. To obtain the intended results, primary data collection was conducted through field surveys, interviews with actors along the value chain and semi-structured interviews with value chain experts and representatives of relevant organisations.

Due to the absence of secondary data, the actual number of stakeholders along the targeted value chains is unavailable. Hence, sampling could not be conducted in line with standard statistical methods. Because of these shortcomings, and in order to obtain adequate data and information benefitting the survey as foundation for a database of agriculture in the governorate, almost 1,900 interviews with actors along the value chains of the four crops were conducted. Data were collected for 353 stakeholders in the potato value chain, 612 for tomato, 499 for cucumber and 387 for date. The data collected were analysed, reviewed and discussed, and alternative analyses and interpretations were presented, as appropriate.

The sections of this report outline the relevant data for each set of actors along the value chains of the four crops, including information on the socio-economic characteristics of input and product traders, farmers, processors, consumers and actors in support services. The report also includes a discussion of challenges and suggestions. A SWOT analysis was conducted to determine the challenges and opportunities related to the value chain of each crop and a summary of findings concludes each section on the value chain of the respective crop. The overall challenges characterising the value chains of each of the four crops, the potential opportunities and possible areas of intervention are summarised at the end of the report.

The analyses of the value chains of each crop were carried out independently, based on an identical methodology. The results were compiled for each value chain, allowing them to be utilised separately. The results of the complete VCA for the four products were presented both in a horizontal framework, addressing issues prevalent in most of the VC assessed, as well as in a vertical framework, raising issues that are specific to each VC.

### 5.1 Current State of Research

Value chain studies in Iraq are generally scarce. With regard to value chain studies analysing the crops under consideration (potato, tomato, cucumber and date), a study published by the Food and Agriculture Organization of the United Nations (FAO) indicated that 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 an extended period of time, even before the pandemic, making it difficult to organise meetings with key actors and interviewees. Thus, some interviews were conducted remotely, and secondary data were used to fill any gaps.<sup>10</sup>

<sup>10</sup> FAO, 2021: Agricultural value chain study in Iraq. Dates, grapes, tomatoes and wheat, Baghdad.

The FAO study found that the tomato value chain is affected by a lack of physical infrastructure and a 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 mainly a family business, and access to financial services is limited. Farmers lack knowledge about Good Agricultural Practices (GAP), affecting yield and quality negatively. Post-harvest management, such as sorting and grading, is practically absent. Moreover, the lack of appropriate packaging, reliable cold chains, storage facilities and processing plants contributes to significant losses, which also applies to other perishable commodities. Beyond losses, the lack of a reliable cold chain forces farmers to sell immediately, negatively impacting prices and curtailing the season of locally-produced agricultural commodities. In the peak season, 10 kg of local tomatoes cost IQD 1,000, while 1 kg of Iranian tomatoes is sold for the same price in the off-season.

Regarding dates, a major cash and food crop in Iraq, access to best practices, technologies, and markets is critical to accelerating the recovery of the sector that was booming before the Gulf War, producing three-quarters of the dates consumed globally. Date palm orchards are often inter-cropped with fruit trees, 300,000 ha on a permanent basis (i.e. olives, grapes, oranges, apples and other fruits). Small-scale farming continues to dominate the sector, and these farmers have limited access to credit and the knowledge required to introduce modern agricultural practices, irrigation and fertilisation systems. They also face difficulties applying improved pest management approaches and adopting mechanised systems. Acute shortage of skilled labour and higher minimum wage requirements have incentivised farmers to streamline their production; on the condition of access to financial resources, farmers could invest in mechanisation. The government is making a concerted effort to rehabilitate the date value chain and support farmers, e.g. investing in thousands of new commercial palm tree varieties. Increasing the number of producing palm trees by planting new ones and replacing mature ones, particularly with economically profitable varieties such as Medjool and Barhi, will bolster the sector. Beyond production, there is also scope to upgrade 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 of revitalising exports. Thus, cooperation between farmers, processors and distributors is required, in addition to government support and facilitation.

For potatoes, an MSc research project has found that all actors along the value chain have made profits ranging from 46 IQD/kg for retailers to 660 IQD/kg for processors, while potato producers have made about 15 IQD/kg. Generally, the added value of the entire value chain was about 1,970 IQD/kg.<sup>11</sup> The study concluded that traders account for a value share of 60%. Marketing efficiency has been assessed as weak, estimated to reach about 35%.

### 5.1.1 Value Chain Mapping<sup>12</sup>

The livelihoods of agricultural producers depend not only on their production, but also on their ability to access resources, such as fertiliser, seeds and other inputs “upstream” in the value chain, as well as markets to sell their produce “downstream” in the chain. How producers are embedded in the value chain has implications for their ability to access resources, information and markets.

<sup>11</sup> The Value Chain Analysis of Potato Crop in Iraq/Baghdad Province, Case Study, 2019.

<sup>12</sup> CGIAR Research Program on Water, Land and Ecosystems (WLE), 2017: Mapping Actors Along Value Chains. Integrating Visual Network Research and Participatory Statistics into Value Chain Analysis.

In short, producers are embedded in larger economic systems, relationships that define opportunities for and constraints to improving agricultural production and people's livelihoods. It is essential to ensure that markets work for the poor, in order to better understand the possibilities and conditions faced by agricultural producers when participating in a value chain, including the benefits and risks associated with their involvement in the chain. The best way to understand and analyse all actors along the value chain is to map them.

### 5.1.2 Why Map Actors Along Value Chains?

Value chain analysis is about understanding how activities and actors involved in taking a product from production to consumption are linked. "There is a simple element at the heart of value chain analysis – the idea of a chain is a metaphor for connectedness."<sup>13</sup> This metaphor highlights that most goods and services are produced by a set of complex and sequenced activities. Creating a value chain map is usually integral to most value chain analysis: "Analyzing value chains comprises a whole series of different methods. The essential method and the core of any analysis is value chain mapping."<sup>14</sup> Mapping a value chain is a crucial component of a VCA. It can be complicated to see the relevant interdependencies in a complex system or discuss systemic interventions without mapping them. Mapping a value chain with its various components, linkages and actors can, among other things, facilitate a structured discussion about the opportunities and constraints that producers and other actors face and the possible interventions to address them.

The notion of a chain suggests a linear and sequential order that is unlikely to be found in the real world. Most VCA has focused on vertical linkages, i.e. how a product comes into existence and then gets traded or transferred downstream in the value chain. While it is essential to know how actors and activities are linked vertically, it is also important to understand the horizontal dimension, i.e. the relationships between actors at the same level of the chain. Horizontal linkages show how producers and other value chain actors are embedded in a value chain, but are frequently not included in VCA.

There are likely multiple channels through which a product can be traded across a value chain. It is essential to realise that there might be differences in the ability of actors to access resources or trade products, depending on their capacity, gender, relationships etc. Besides the characteristics of actors, it is also essential to take into account that an actor with a strategic position within a value chain can exercise control over processes in this value chain. Depending on the actors' relationships, they have different opportunities to access information or benefit from participating in a value chain.

Therefore, understanding value chains is not only about knowing how activities and actors are linked vertically in a linear fashion. It might also be informative to distinguish between different channels and consider the role of horizontal linkages connecting actors at the same level of the value chain. A typical example of horizontal links would be an association of producers, where horizontal links could empower farmers, reduce transaction costs, or help them to gain better access to inputs and services.

<sup>13 + 14</sup> See footnote 12." might be a possibility

It is important to note that producers or other actors along a value chain do typically not constitute a homogenous group of actors but have very different assets, skills, rights and preferences, depending on age, gender or class. Therefore, it might be necessary to differentiate between types of actors, for example, by collecting gender-disaggregated data. When distinguishing between actors and considering the horizontal linkages between them, many value chains resemble a network, rather than a linear chain.

### 5.1.3 Methods Commonly Used in Value Chain Research

A range of methods commonly used for researching value chains can complement the Value Chain Mapping approach presented here. These methods include (i) interviews; (ii) focus group discussions; (iii) surveys; (iv) document analysis; and (v) participatory observations. This list is by no means conclusive, but should highlight that VCA and VCM can benefit from the synergies of the various methods employed.

There is no single, universally appropriate method for studying value chains and the combination of different approaches is often most informative. Both qualitative and quantitative methods can be applied to value chain analysis. While there is no single rule for the research approach, whether quantitative or qualitative, experts recommend starting with a qualitative approach, followed by quantitative analysis, time and resources permitting. Initial qualitative research or the production of a value chain map can also help to design a more targeted questionnaire within a specific socio-economic context. Above all, the particular context and the research questions should determine which methods are used and in which sequence they are combined. The mapping process could include cross-checking findings and their validation with research participants. This should ensure that the most critical issues are covered and that the VCM accurately represents the value chain.

## 5.2 Brief Overview of Agriculture in Al-Anbar

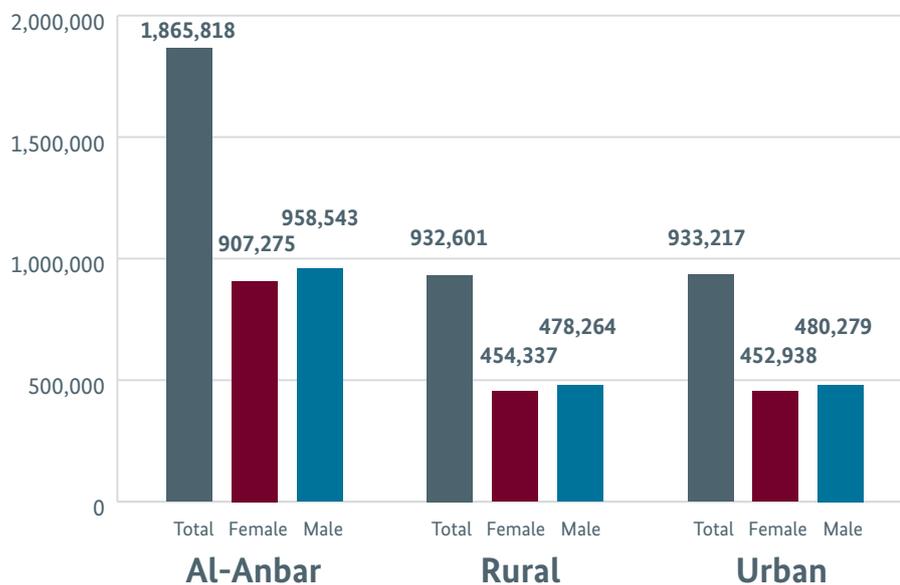
Al-Anbar Governorate is the largest governorate in Iraq, encompassing almost one-third of the country's territory and comprising seven districts: Al-Qa'im, Anaa, Haditha, Heet, Ramadi and Fallujah, all of which are situated on the Euphrates River, in addition to Ar Rutba District, which constitutes two-thirds of Al-Anbar and is essentially a desert. In 2020, the population of Al-Anbar was estimated at 1.866 million, with women accounting for 48.6% of the population and an equal distribution between urban and rural areas (Figure 1).<sup>15</sup>

Income sources in the Al-Anbar Region are diversified: crop production is the primary income source for most farmers, while the remaining ones depend on livestock or mixed crops and livestock enterprises. Grains, primarily wheat and barley, are the main crops, along with horticulture and date production. Dates represent a significant cash and food crop with fruit trees inter-planted in date palm orchards, making the governorate one of the main producers of dates in Iraq. Vegetables, mainly tomatoes, cucumber and potatoes, are important irrigated crops in Al-Anbar, depending on the Euphrates River for irrigation. Livestock production is widespread, and inland fisheries and backyard poultry farming are valuable complementary sources of protein and income for the rural population.

<sup>15</sup> Central Organization for Statistics of the Ministry of Planning (CSO): Statistics for 2021.

Figure 1

## Total Population of Al-Anbar and its Composition in 2020



Source: Central Organization for Statistics of the Ministry of Planning (CSO), 2021.

### 5.2.1 Land and Water

The majority of farmers in Al-Anbar are smallholder and subsistence farmers, mostly owning small plots of no more than 20 donums (1 donum = 2,500 m<sup>2</sup>). Most of the land is rented from the government under the Agrarian Reform Law number 30 of 1958 (continuous programme), which handed out small plots to farmers on the order of 10 donums per farmer. Another primary type of cultivated land for agriculture (backyard agriculture) includes shared communal and tribal land.

Due to the geographic characteristics of Al-Anbar, which is mostly desert, agricultural activity is limited to arable land with access to water supply. However, agricultural activities are not constrained to cultivated fields, but also include smaller plots that can be utilised for agriculture and livestock production. Households in Al-Anbar have access to a mix of spaces: families in Habaniyah, Haditha, Heet, Khaldya and Ramadi use all available space for agriculture, including gardens close to houses and private fields. Such intense utilisation of available space shows that households are maximising the use of land in the open areas for agricultural and livestock production, which can help to sustain livelihoods and address the need for food. As most agricultural land lies on the Euphrates River, irrigation from the river, streams and canals constitutes the primary water source for households and their agricultural production. Wells are the second important source of irrigation water. Surface irrigation is the irrigation method utilised the most, with most farmer households using flooding, followed by the use of sprinklers. Despite living close to the Euphrates River, households in Al-Anbar face constraints in accessing water sources for domestic and agricultural use.

### 5.2.2 Agricultural Production

Agriculture in Al-Anbar has been severely affected by recent conflict and the prolonged crisis. Production of cereals, vegetables, forages and pulses has decreased significantly over the past few years, rendering Al-Anbar more dependent on imports of these commodities. Lower production has been attributed to military operations, displacement from land, limited availability of inputs in local markets and constrained access to national output markets. The fall in agricultural production has affected the income of households as well as the nutritional diversification of available foods in local markets and at the household level. Date palms and other orchard crops, including citrus, grape and olive, have witnessed severe setbacks, largely attributable to lack of access to orchards because of military operations and the resulting difficulties. The reduced production of date palms has a significant negative impact on household income.

### 5.2.3 Livestock

Livestock husbandry includes raising cattle, sheep and goats, as well as poultry; beekeeping and fish farming are other important activities. Livestock holdings have also been severely affected by the unstable situation in the governorate. The majority of households have sold off their livestock as part of their income generation and coping strategy under difficult circumstances, while others have sold their livestock due to lack of feed and high input prices.

### 5.2.4 Markets and Supply Chain Status

Markets have continued to operate in Al-Anbar, the extent of operations depending on the specific area. Three main routes support supply chains, one from Baghdad to Al-Anbar via Abu Ghraib, the second one from the Syrian border to Al-Anbar and the third one from the Jordanian border to Al-Anbar. These routes were disrupted due to the security situation and the bridges on roads from Baghdad to Ramadi have been completely destroyed. However, traders continue to find other routes, while the situation has recently improved, facilitating the mobility and trading of goods.

Dependence on markets outside Al-Anbar has been mitigated by local food production. Backyard agriculture, especially the cultivation of vegetables such as tomatoes, onions, cucumbers and potatoes, is contributing to local food security. Households depend on local shops in nearby areas for food purchases. On average, around one-third of local produce from backyard agriculture contributes to household consumption, while the remainder is sold to generate income. This highlights the importance of backyard agriculture in supporting the food security and resilience of households.

### 5.2.5 Main Farming Indicators

Crop production is the main source of income for the majority of farmers in the areas under review, while some farmers depend on livestock or mixed crop and livestock production systems. Furthermore, the selected crops account for no less than 50% of in-farm income. Across the area under review, farmers operate in rather similar environments and under comparable conditions: the practices applied, the mindset and behaviour, and the attitudes and preferences with regard

to technical and financial issues are almost the same across the entire area. The analysis of the data collected showed that the average farm size is less than 15 donums, with low levels of peer interaction and cooperation. Most farms are small-scale, with only a few commercial farms. The majority of farmers interviewed along the four value chains are not satisfied with government policies or the technical support they receive, particularly with respect to agriculture subsidies and extension services. With some differences among farmers in the areas under review, the availability and quality of the business services provided are not considered sufficient and effective. Weak service hinders farmers' ability to manage their farms effectively, particularly with regard to tackling pests and diseases. This reflects a disconnect between farmers and the public sector organisations that produce and disseminate knowledge and information. Farmers highlighted the need for advisory services and research as well as training and information on GAP, including the use of fertiliser and pesticides.

In recent years, conflict and the displacement of entire communities, in combination with lack of access to information, finance and inputs, have led to a fall in agricultural productivity. Widespread displacement, targeting of agricultural infrastructure by armed groups, limited access to inputs and market disruptions have impacted the sector negatively. Households affected by the conflict still face significant obstacles regarding the resumption of agricultural activities, limiting the opportunities to improve their quality of life. Furthermore, increased soil salinity, prolonged droughts, flooding incidences and siltation have lowered the efficiency of existing irrigation systems. The reconstruction of infrastructure – i.e. irrigation systems, storage and processing facilities, roads and markets – is therefore a top priority. More proactive interactions between the government and stakeholders could accelerate recovery. Engagement of the private sector, civil society and farmers in participatory short-, medium- and long-term planning and implementation processes is required to address these challenges effectively.

*Training of trainers to improve the knowledge of agricultural advisory service providers in Anbar | Photo: AFC © GIZ*



## 6 Potato Value Chain

Potato is an important vegetable crop that arrived in Iraq in the 1960s. The crop is cultivated mainly in Baghdad, Al-Anbar and Ninevah, suitable potato cultivation regions where the favourable climate and good soil fertility offer ideal conditions for potato production, while cultivation and post-harvest activities provide important sources of employment and income. Despite increased demand for potatoes and their economic importance, the crop is still suffering from a decline in production vis-à-vis production levels in neighbouring countries.

Demand for potatoes is increasing because of changes in consumer preferences and overall population growth. Regardless of the potato source, considerable amounts are processed into chips, consumed in fast food restaurants and homes. Moreover, processing of crisps has become a major commercial activity, given the high and growing demand. Potato fits well with the greater food security focus on nutritious and staple foods not subject to international commodity market fluctuations. Statistics related to demand for potatoes are limited; however, the average quantity consumed on a regular basis is about 5 kg per person and month (according to the results of this study).

Potato farmers face considerable production challenges, e.g. a shortage of high-quality and affordable potato seeds and lack of access to improved seed varieties, while pest management is not consistent with GAP requirements. Furthermore, access to knowledge, which could help to overcome these bottlenecks, is hampered by the absence of investment in research and diagnostic services. The weak links between farmers and extension services add further problems, resulting in unsustainable crop production. Public services are also under-resourced, resulting in limited ability to provide farmers with guidance on production and post-harvest handling.

### 6.1 Cultivated Area, Production and Average Yield of Potatoes

The main indicators of potato production for the year 2021 are summarised in **Table 1**, comparing Al-Anbar with the entire country. The production of potato in 2021 was estimated at 466 thousand tons, implying a decline of 31% compared to the previous season. The production estimate for the spring season is 29% of total annual production, while the production of the autumn season is about 71% of annual production.<sup>16</sup>

The total planted area for potato for the spring and autumn seasons was estimated at 76.7 thousand donums, following an estimated decline of 20.5% compared to the previous season. The average yield was estimated at 6,079 kg/donum, based on the total cultivated area, 13.1% lower than in the previous season. The yield of the spring season was estimated at 6,994 kg/donum and for the autumn planting at 5,769 kg/donum. Potato cultivation comprises two planting seasons, spring and autumn, with spring productivity usually exceeding productivity of the autumn season. The spring round, which is the best time for planting potatoes, ranges from January to the end of May and the second round in the autumn from late August to the end of December.

<sup>16</sup> Central Organization for Statistics of the Ministry of Planning (CSO), 2021.

At the national level, Ninevah Governorate takes the first place in planted areas, with about 36,455 donums, followed by Baghdad with 30,104 donums. Potato growers in Ninevah grow potato under sprinklers, using well water channels or wells. In terms of amount produced, Baghdad achieved the first place with a total of 201,853 tons, followed by Ninevah with 194,945 tons.

**Table 1** shows Al-Anbar potato indicators in comparison with the entire country. The total cultivated area in Al-Anbar was about 2,906 donums, a dramatic decline compared with the area cultivated in 2002, which amounted to 19,102 donums. The potato cultivation area in Al-Anbar accounts for only 4% of the entire potato cultivation area in Iraq, compared to the 2020 season when it accounted for about 20%. However, official data show that some areas were not included in data reporting, due to the security situation. Al-Anbar's 3.8% share of total Iraqi potato production corresponds closely to its 4% share of the total area used for potato cultivation.

**Table 1: Cultivated Area, Production and Average Yield of Potato**

Governorate	Average yield (kg/donum)		Production (ton)	Cultivated area (donum)		
	Harvested area	Total area		Damaged area	Harvested area	Total area
Al-Anbar	6,031.3	6,071.0	17,527	19	2,887	2,906
<b>Total</b>	6,079.4	6,088.9	466,127	119	96,478	76,673

Source: Central Organization for Statistics of the Ministry of Planning (CSO), 2021.

## 6.2 Key Value Chain Actors and their Functions

### 6.2.1 Value Chain Actors

The potato value chain map highlights the involvement of a diverse set of actors who participate directly or indirectly in the value chain. Direct actors are commercially involved in the chain (input suppliers, producers, processors, traders and consumers), while indirect actors provide financial or non-financial services or support the functioning of the value chain (credit providers, business service providers, the government, researchers and extension agents). The latter play an important role in stimulating or hampering the capacity of the direct actors to interact and generate value. The absence of banks and credit agencies from the value chain is noteworthy.

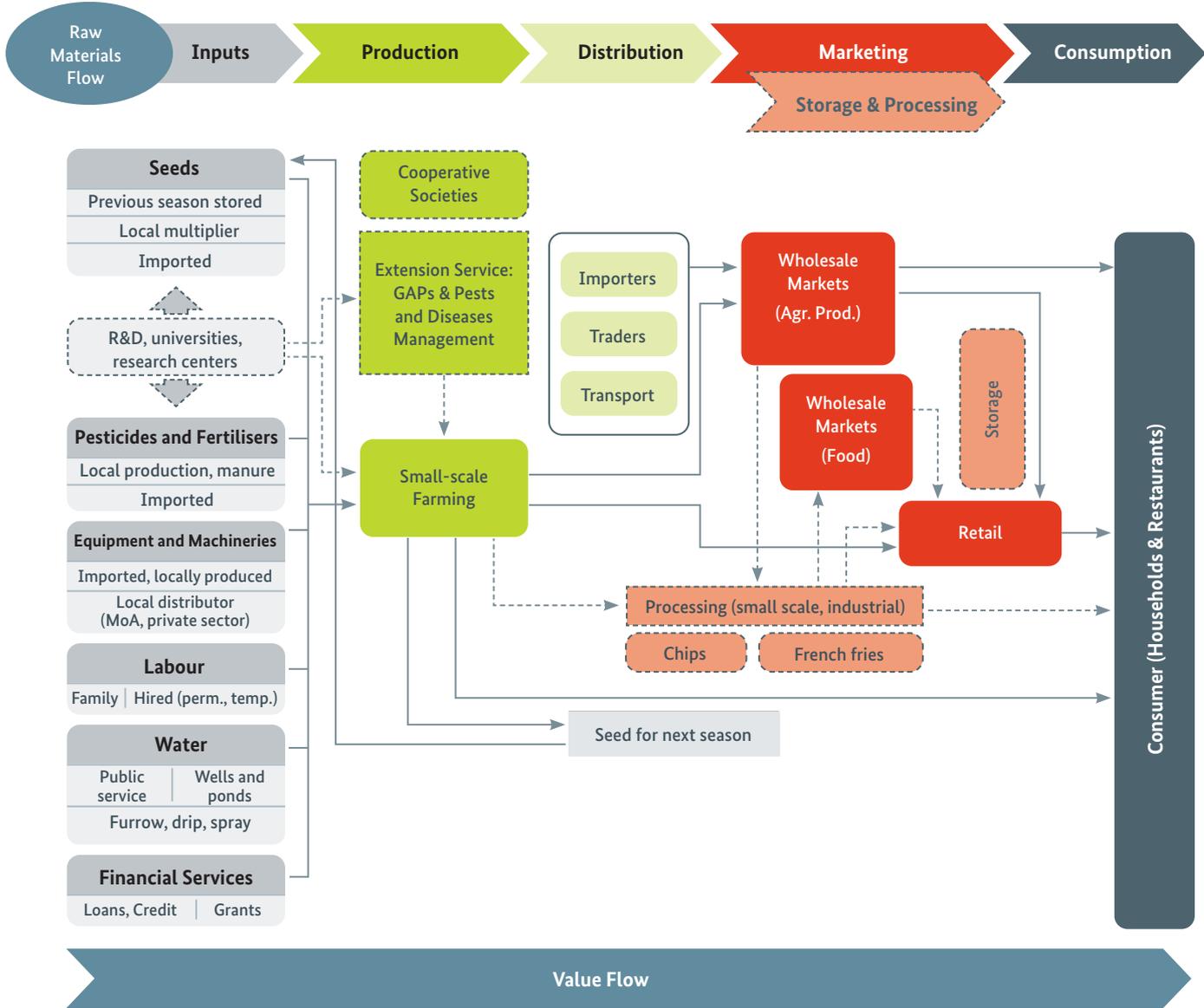
This section highlights the potato value chain in the area under review (Fallujah District), identifying key actors, their main characteristics and interactions, as well as critical constraints and gaps. **Figure 2** depicts a simplified diagram of the potato value chain in the area, showing input and service supplies to the farmers, and the basic flow from producers, through marketing actors to the end consumer. The flow along the VC is simple and there is no complicated interaction of multiple entirely private or informal actors, simplifying the analysis. The VC map also includes the chains and activities supposed to form part of the potato value chain in the area under review, but absent in reality (dashed lines and boxes). Nevertheless, a range of key stakeholders are

involved, both at the pre-planting stage (seed multipliers and seed traders) and as post-harvest traders. As mentioned already, adequate statistics on the number of growers, their cultivated areas or other actors in the region are missing.

Figure 2

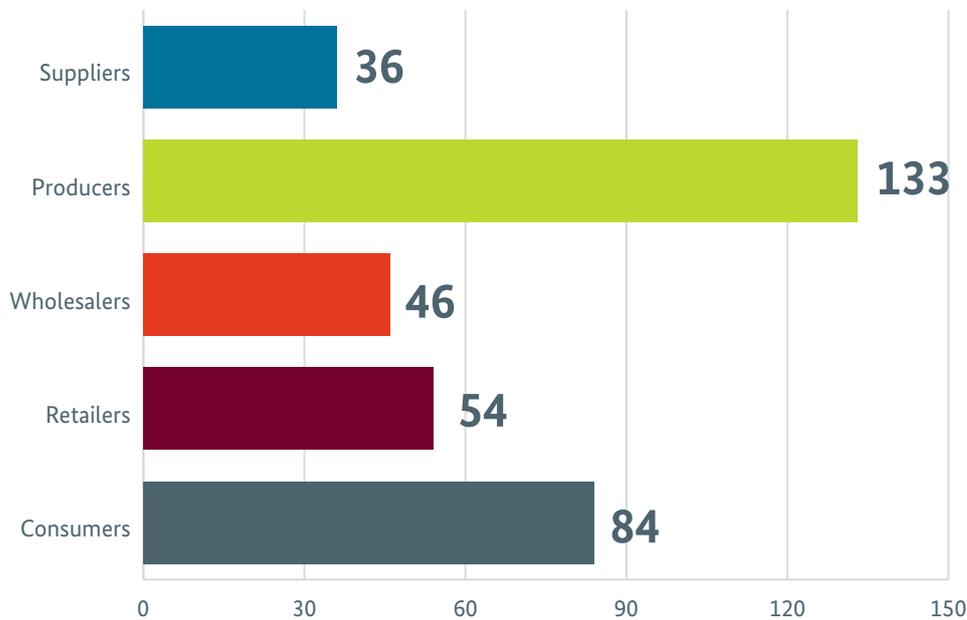
Potato Value Chain Flow

Agricultural Policies (Subsidies, Import & Export Licenses, Protection etc.)



■ Agricultural policies; framework conditions  
 ■ Flows: raw materials and value  
 ■ Inputs: categories  
 ■ Inputs: specific items  
■ Production phases  
 ■ Distribution network  
 ■ Marketing  
 ■ Storage and processing  
 ■ End-use: consumption  
 —————> Interdependency/direction of flow  
 - - - - -> Activity exists as part of the traditional VC but not during the study period; it constitutes a potential for the region

Source: Own design © AFC 2022.

**Figure 3****Distribution of Actors Interviewed Along the Potato Value Chain in Amereyah Region**

Source: Own research.

A total of 353 interviews were conducted along the potato value chain in Amereyah Region in Fallujah Province, with the composition of the panel shown in **Figure 3**. Furthermore, information was collected from the Directorate of Agriculture (DoA) and related agencies through discussions or by indirect means. Consumers consist of two groups, 67 households and 17 restaurants.

### 6.2.2 Input Supply

Potato production requires high initial investment in inputs and there are many actors engaged directly or indirectly in agricultural input supply in the area under review. Input suppliers are critical value chain actors represented by the Directorate of Agriculture (normally responsible for providing farmers with fertiliser and chemicals), private traders and farmers with functions to supply inputs for potato production. These input suppliers provide potato seeds, fertiliser and other chemicals, as well as spare parts and irrigation equipment, which are mostly imported.

All suppliers purchase the inputs they trade from importers outside Amereyah region and all imported inputs used in Al-Anbar are sourced outside the governorate. However, 28% of supply sites are located in the region, 11% in Baghdad, while the remaining supply sites are located in Fallujah Province. Imported inputs are relatively expensive as they are subject to fluctuating market prices and taxes. The list of countries of origin (according to interviewees) includes the Netherlands, China, Switzerland, Iran, Jordan, Bulgaria and others. The actual need for inputs is difficult to estimate since producers rely on various traditional cultivation practices in terms of type and quantity, e.g. the use of informal input sources or farmer-saved seeds.

Input supply activity is enabled by a business environment relying on the legal and regulatory base set out in Law 46/2012 on Regulating the Circulation of Agricultural Materials and Law 15/2013 on Registration, Approval and Protection of Varieties, as well as the regular inspection conducted by the Directorate of Seed Testing and Certification in the Ministry of Agriculture. The inspection of suppliers' storage is conducted to check the alignment of suppliers and supplies with the requirements of Law 46/2012.

In the context of this project, 94% of suppliers reported that the business under review represents their only source of income, corresponding to almost 98% of their total income. About 6% of suppliers have additional sources of income, such as a pension or social benefits. The data reflect limited diversification of suppliers' sources of income, placing them in a delicate situation, subject to the changes that affect demand on inputs and prices as well as other circumstances related to policy or security issues. Their vulnerability is exacerbated by the fact that the source of their invested capital is 100% private.

All suppliers interviewed reported that they purchase potato seeds from private sector importers (in the informal sector), with an average price of 2,500,000 IQD/ton, with the Netherlands being the main source of imported potato seeds. Problems identified relate to the high price of imported seeds, due to customs tariffs, trade barriers, such as import contingents, and transportation bottlenecks. However, all potato seed suppliers emphasised their preference for imported seeds over local ones, in view of higher productivity and quality, also mentioning the overall lack of local seeds. Potato seeds are treated with preservatives by 56% of suppliers. Losses of potato seeds caused by suppliers are estimated at less than 2%.

Potato seed suppliers reported that seeds and other inputs are stored up to 60 days before being distributed to farmers; this applies in particular to farmers' seeds from the previous season. As potato seeds are considered a perishable good in need of careful handling, suppliers of potato seeds equip themselves with rented storage facilities. Almost, 90% of suppliers own storage facilities in order to safeguard the seeds they trade and many suppliers apply preservatives to the seeds during storage. However, suppliers complained about the conditions for storing seeds, namely lack of electricity, the distance between storage facilities and potato farms, the high cost of building storage facilities and operational costs.

Under the Annual Agricultural Plan, the Ministry of Agriculture distributes inputs (mainly fertiliser and other chemicals) at subsidised prices. However, over the past few years, supply of fertiliser from the government has been insufficient. Accordingly, the share of fertiliser imported by the private sector accounts for 96% of all fertiliser supplied to potato growers, while the remainder has been purchased in local markets. High input costs, especially for seeds, fungicides and fertiliser, severely limit the production of potatoes. Estimating the exact amount of inputs used in potato production is difficult, since producers rely on a range of traditional cultivation practices in terms of type and quantity, e.g. the use of informal sources or farmer-saved seeds and the traditional method of cutting seeds into pieces in order to cover larger areas (particularly in spring cultivation).

Lack of security also affects transportation critical for the import and distribution of fertiliser and other chemicals. Other important constraints, as reported by input suppliers, are high taxes, customs tariffs, import contingents and distance to the main importers. Additional costs faced by suppliers relate to water, electricity, maintenance of storage facilities and equipment, oil and

fuels, labour and transportation. In some cases, input suppliers are located at such a distance from the farming communities they serve that the costs farmers face in order to access inputs significantly reduce the demand for these products. Overall, suppliers of fertiliser and chemicals prefer imported inputs because of quality, efficiency and effectiveness.

**Table 2** shows the considerable margin earned by input importers in trading inputs, particularly seeds; the differences between the import price and the supplier price reflects the value added at this stage of the value chain. The table shows that the price of fertiliser was 470,000 IQD/ton, which was (to some extent) affordable for the farmers. However, due to the shortage of government supply of subsidised fertiliser, the price has now risen to 2,000,000 IQD/ton.

**Table 2: Difference in Input Prices Between Importers and Suppliers**

Inputs	Import price (IQD/ton, kg)*	Supplier price (IQD/ton, kg)
Seeds (ton)	2,500,000	2,870,000
Fertiliser (ton)	470,000 (2,000,000)	1,624,000
Chemicals (kg, litre)	12,600 (27,000)	13,200

\* Numbers in parentheses show the price of the 2022 autumn season.

Source: Own research.

### 6.2.3 Production

The function of producers is to produce potatoes, mainly for their own consumption, and to generate income through sales. Potato growers are the major actors who perform most of the value chain functions, from input preparation on their farms or procurement of inputs from other sources to post-harvest handling and marketing. This includes land preparation, planting, fertilisation, weeding, pest/disease control, harvesting, post-harvest handling and transportation to markets. Farmers perform these functions twice a year as potato is cultivated in spring and autumn in Iraq.

Potatoes have a short growth cycle, maturing in about 100 days, and they can be easily integrated into existing farming systems. Potatoes reproduce by using small tubers that are grown as a whole or with large tubers after being cut (during spring cultivation only). Seeds of high-quality potatoes must be free of diseases and identical with the respective variety. Seeds are mainly imported from the Netherlands and France, and a part of the spring crop is kept for the later autumn cultivation, since it is not possible to import potato seeds during this phase, as they are not available in the main regions of potato production at this time of the year.

Producers of potatoes link up with input suppliers (backward linkage), while input suppliers link up with producers (forward linkage). Producers link up with traders (wholesalers and retailers) and with consumers in vertical linkages for providing produce and in downward linkages for

financial transactions. Chain influencers (and chain supporters) link up horizontally for similar functional activities and vertically with other main actors, who engage in different operational activities. Potato farmers establish horizontal linkages with fellow farmers in market transactions, such as the exchange (trade) of different seeds, and also for sharing farming experience. However, these interconnections seem to be weak. In the same way, traders establish horizontal and vertical linkages in the framework of the entire potato value chain.

**Table 3: Socio-Demographic Characteristics of Potato Producers**

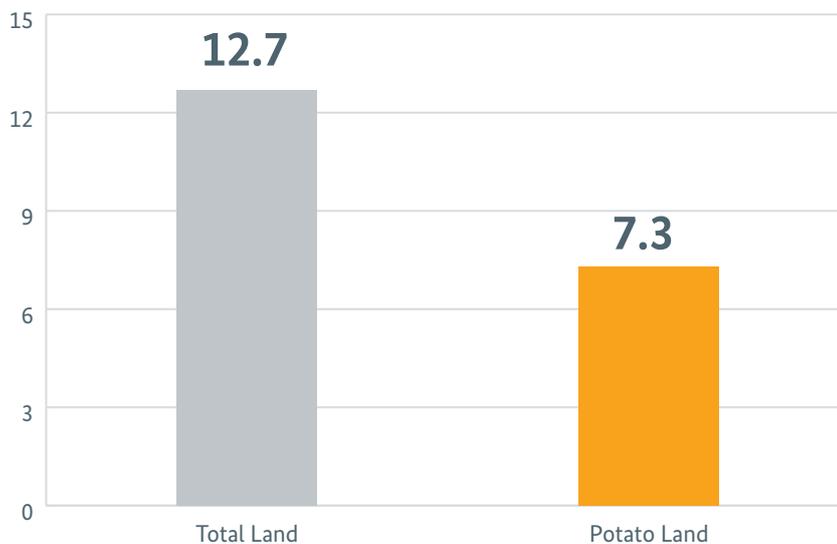
Characteristics	Average
Age of farmers (years)	45
Farmers' experience in agriculture (years)	25
Farmers' family size (persons)	9
Family members who work in agriculture (persons)	7

Source: Own research.

The area reviewed for this project is Amerayah Region in Fallujah Province, where a total of 133 farmers were interviewed. All of these farmers run family-based small-scale farms, with an average 25 years of experience in planting and growing potatoes. The average age of potato producers interviewed is 45 years and the average family size nine members. Out of these, an average of seven members work in farming, with an additional workforce mostly consisting of other family members, neighbours or seasonal labourers, as required (Table 3). Regarding the education level, 88% of potato producers have no less than 6 years of schooling.

**Figure 4**

**Average Land Holding by Farmers and Average Size of Land Used for Potato Production (donum)**



Source: Own research.

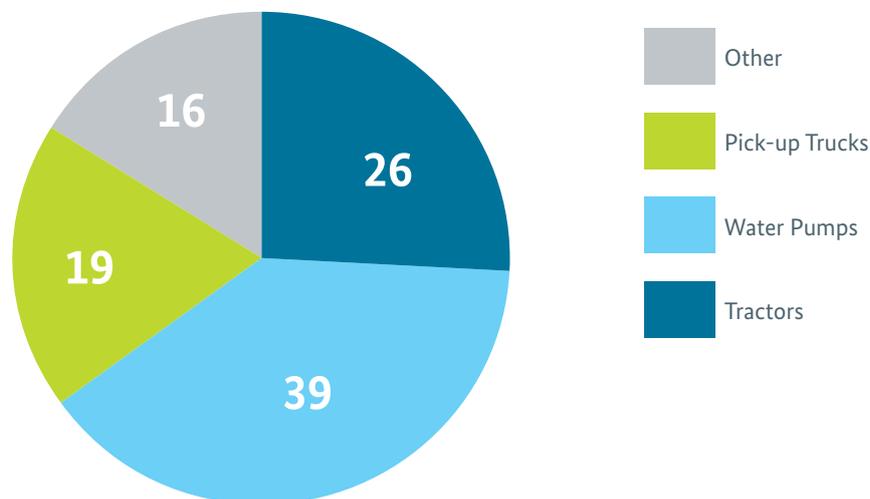
Potato producers in the area under review are mostly smallholders. The average land size of producers was about 13 donums per household (**Figure 4**), with 26.3% of the land being owned by the farmer or his family, with an average of 8.9 donums. The remaining area is rented from others or leased from public entities. More than 84% of the land has been reclaimed by the government over the past decades, while the remainder is semi- or partially-reclaimed. Reliance on small plots for potato production limits the possibilities for use of certain agronomic and management practices.

Farmers have allocated an average of 7.3 donums to potato cultivation, of which 99% are irrigated, using water pumps for furrow irrigation, in line with the vast majority of Iraqi potato cultivation areas. Only one farmer reported using sprinkler irrigation. Irrigation feeds on water pumped from the Euphrates River, using electrical pumps powered by main lines or generators. Due to the shortage of electricity and the high price and occasional lack of fuel, farmers are seeking clean energy solutions, mainly solar energy. Potatoes have no tolerance for water stress and to optimise yields, total available soil water should not be depleted by more than 30-50%.

The capital invested in potato production in the area under review is sourced entirely from farmers' personal assets. **Figure 5** shows the fixed assets – tractors, water pumps, pick-up trucks and other equipment – owned by potato farmers.

**Figure 5**

Type of Equipment Owned by Farmers (in %)



Source: Own research.

78% of potato farmers depend on farming as their main source of income, while potato production accounts for about 76% of farm income. About 34% of farmers have adopted a mixed plant-livestock production system by growing potato as well as other crops, in parallel with raising small ruminants, such as sheep. For those producers, farm income attributed to livestock husbandry accounts for about 41% of their in-farm income. Most farmers produce potatoes twice a year, in line with weather conditions; however, the number of producers involved in potato production in the two seasons varies.

In terms of varieties, data show that many farmers grow more than one variety of potato, 31% cultivating two varieties and 6.8% cultivating three varieties, including Bourina/Purina, Srengi, Munda and Nuaymii. Regardless of cultivated variety, the quantity of seeds used per land unit was estimated at 517 kg/donum on average, less than the lower bound of seed application recommended by specialists: 550-750 kg/donum, depending on whether the planting method is manual or mechanical, the seed variety and the intended final use of the harvest. Potato seeds originate from imported sources, via input suppliers, and from potatoes set aside for cultivation during previous harvests. There is no supply of certified seeds from government, so that farmers depend entirely on informal seed sources, also including seeds from local markets and seeds purchased from neighbours and relatives. Farmers in Iraq tend to overuse inputs, mostly due to lack of information and training on seed selection. Cultivating skills have mostly been developed on the basis of experience on family farms, passed on from one generation to the next, rather than through formal training or education.

In the area under review, farmers cover the cultivated area with the a.m. quantity by cutting potato seeds for the purpose of planting. Depending on size, farmers cut all or some portion of the seed provided. Seed potatoes of about 80 to 90 grams should be cut, ensuring a seed piece weight average of 40 to 50 grams, with at least one eye per piece of seed. The price of potato seeds was high during the season under review, ranging from 1,100,000 IQD/ton to 3,500,000 IQD/ton, with an average of about 2,870,000 IQD/ton.

Rapid decline in soil fertility is a major constraint to potato production among smallholders. Almost 81% of producers use two types of fertiliser, mainly nitrogenous fertiliser Urea and Di-Ammonium Phosphate (DAP), or Urea and animal manure; 17.3% of potato farmers use only one type. The fertiliser used includes Iraqi-manufactured Urea. Fertiliser seems to have been overused as well, as the interviewees reported that applied fertiliser (including manure) reached a maximum of 850 kg/donum, while the average was 242 kg/donum. The overuse is attributed to lack of knowledge about input management, in particular the correct use of seeds, fertiliser and other chemicals, in terms of both quantity and type. The average quantity of applied Urea is 225 kg/donum, and the quantity of DAP is about 260 kg/donum. Furthermore, continuous use of DAP without soil testing in inherently acidic soils limits production capacity and reduces the benefit of additional fertiliser use.

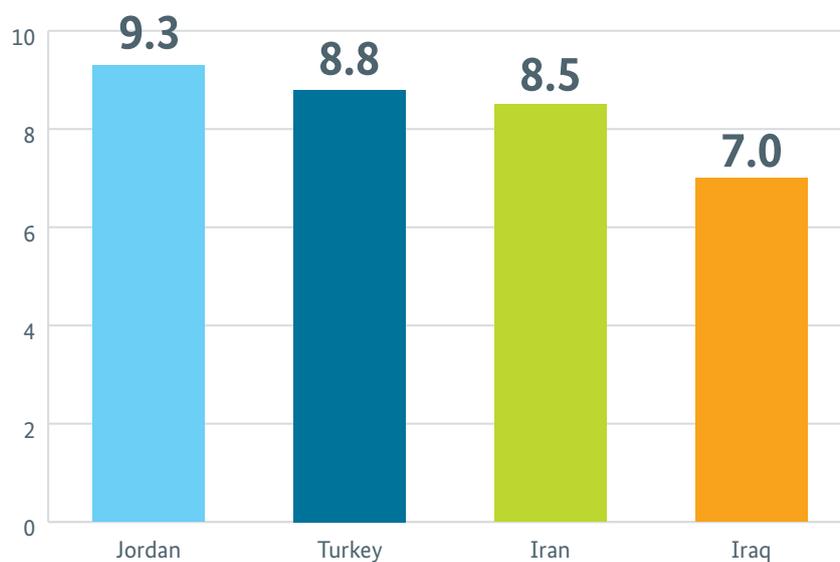


### 6.2.4 Productivity

Data indicate low levels of productivity of potato production, with an average yield of 4.5 ton/donum in the area under review, with significant differences among producers. In general, the potato sector tends to perform below its potential. The productivity of Iraqi potato production is lower than in the countries exporting their produce to Iraq, as shown in **Figure 6**.

**Figure 6**

**Productivity of Potato Production: Iraq and Countries of Origin of Imports (ton/donum)**



Source: FAOSTAT, 2022.

The main reason underlying low productivity is low efficiency, attributed to poor production technology, and small and declining farm size with outdated farming practices. The socio-economic characteristics of farmers also impact efficiency, and, accordingly, conditions for potato cultivation are not optimal. Furthermore, the lack of farmers' skills and competencies; poor rotation practices; insufficient water supply in terms of both timing and quantity; the lack of entrepreneurial skills; leakage of investment; and low yielding seed varieties, not optimal for small-scale producers, are important additional causes of low productivity. Poor rotation practices result in gaps in the management of potato diseases and remain an additional important challenge to production efficiency. Some producers rely on retained seeds and existing viruses are thus passed on to subsequent crops. For these reasons, potato producers do not generate economies of scale.

Applying improved agronomic practices, positive seed selection, conservation, and enhanced pest and disease management has the potential to contribute to increasing productivity and competitiveness of the sector. Enhanced performance of potato production would rely on intensive application of GAP; dissemination of relevant information; training; technical assistance; applied research; and improved seed varieties, suitable to an environment characterised by drought and water shortage. All these measures require extensive government support, as indicated by potato producers interviewed for this project. Investments in public goods and infrastructure are additional essential prerequisites for higher efficiency in the sector.

Farmers add the highest value in the chain, indicating that both value-adding activities and the operation cost incurred by farmers are more significant than those of other actors involved in the potato value chain. Fertiliser, seeds, chemicals, fuel and labour costs account for a major part of total variable costs associated with potato production.

The main cost items in potato production are listed in **Table 4**. As shown in the table, seeds account for about 64% of production costs, mainly because of imports; the costs of other imported items, required for storage and transportation, also feed into the high costs of seeds. The second most important item in terms of cost contribution is labour, which accounts for about 16% of total variable cost. Although fertiliser is costly, particularly in recent planting seasons, its share in total costs stands at only 13%.

**Table 4: Cost Distribution in Potato Production**

Cost item	(IQD/donum)	(IQD/ton)	Contribution to overall costs (in %)*
Seeds	1,469,719	324,318	64
Fertiliser	293,323	64,727	13
Chemicals	31,687	6,992	1
Labour	364,219	80,371	16
Machinery	90,192	19,902	4
Other	62,113	13,706	3
<b>Total costs</b>	<b>2,311,252</b>	<b>510,016</b>	<b>101</b>

\* Deviation from 100 percent due to rounding.

Source: Own research.

In general, production costs account for about 84% of the total cost of potato along the value chain. Marketing costs (including wholesale and retail margins) account for about 16%. Furthermore, the issue of cost is more prominent than the data available show: farmers need to fund their own rural roads to access their farm, their irrigation wells and their electricity grid. These additional costs prevent farmers from achieving profitability and from being competitive. If a small-scale farmer needs to invest resources to access knowledge, technical assistance and the market, transaction costs increase; however, when public goods are made available, small-scale farming can be profitable.

Potato producers suffer from rising costs of core inputs, exacerbated by declining sales prices. However, the calculation of costs and revenues is difficult and inadequate and does not reflect the actual situation on the ground – mostly because farmers in the region under review do not keep records that document farming operations and the related costs. Secondary data for comparative purposes is not available in the Directorate of Agriculture. The price of fertiliser is high due to lack of government supplies. Moreover, farming is still in the healing stage after the dramatic destruction caused by recent armed conflicts.

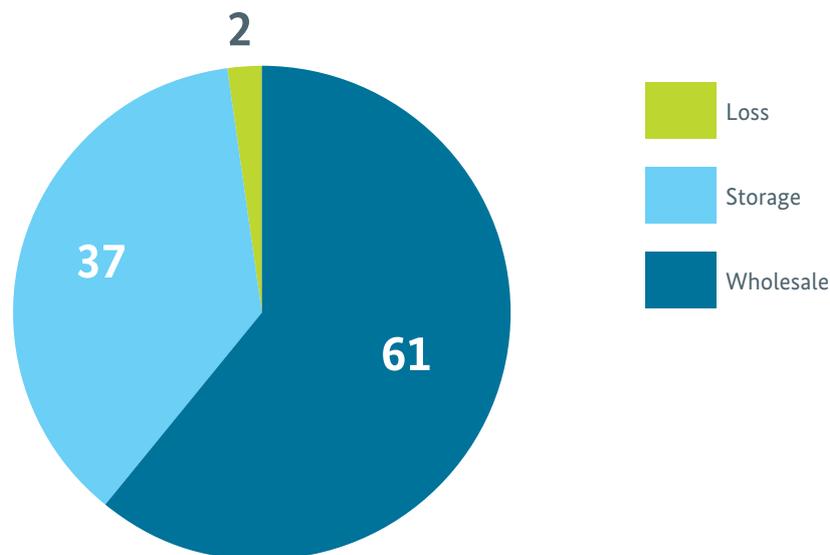
### 6.2.5 Marketing

Potatoes have a short shelf life and must therefore be distributed quickly or stored properly to avoid spoilage. However, like most agricultural produce from the smallholder sector, harvested potatoes are sold mainly at harvesting time without storage for future sale. The analysis found that on-farm storage is not a common practice and most marketed potatoes are sold shortly after harvest.

Potato producers mostly interact with local informal market traders including wholesalers. Direct interaction with potato processors is absent due to the lack of processing factories or facilities. Moreover, potato producers have limited influence on the governance of the value chain. Their role is limited to production, with traders (importers and wholesalers) serving as the main drivers of market behaviour and prices. Results show that producers sell their products to wholesalers who represent the main channel for product distribution, with about 61% out of total production (**Figure 7**). Farmers save potatoes as seed to be cultivated in the next season, usually one-third of their production, placed in cold storages that mostly belong to input suppliers.

**Figure 7**

Potato Distribution and Use (in %)



Source: Own research.

Marketing potato is not exclusive to Fallujah or Al-Anbar: 17% of producers reported selling their produce to Baghdad wholesalers as the distance to Baghdad is only 60 km, closer to Al-Anbar than other cities. However, the share of the potato harvest sold in Baghdad only corresponds to about 13% of total production. Farmers' own consumption is estimated at about 4 kg per person and month of fresh potatoes and one additional kilogram per person and month of processed potatoes, using data for individual consumption from the consumer chain. Farmers reported an average of 2% of losses out of the total traded quantity, which varies by marketing days.

Hidden losses during the production stage also have to be taken into consideration, mostly attributable to unsuitable practices regarding seedlings and fertiliser; however, data do not capture such losses adequately. The timing of data collection in relation to the production season has an effect on the responses of farmers and losses and inefficiencies can be interpreted as a result of systemic deficiencies in the value chain.

In marketing their products, producers face a range of challenges, in particular low-price imported or smuggled products that compete with local potatoes. Transportation is the other major challenge: poor transportation and marketing infrastructure as well as security-relevant issues are common features in most potato producing areas. Lack of storage facilities and processing plants put pressure on producers to sell their products at any price during the peak season, in order to reduce losses and waste, thereby reducing their bargaining power. Proper on-farm storage, preservation technologies and adequate transportation infrastructure would thus result in lower risk of loss and quality deterioration, contributing significantly to higher incomes.

In this regard, almost all producers interviewed proposed government provision of subsidised inputs, including fertiliser and other chemicals, fuel and seeds, in order to alleviate the many challenges farmers face. Interviewees suggested the establishment of storage and potato processing facilities, the provision of equipment and measures to overcome water shortage. Some producers also requested help in getting rid of wild boars that destroy potato fields.

### 6.2.6 Wholesale

Potatoes tend to pass through short marketing channels after leaving the Farm gate, before arriving at the final consumer. Producers usually sell potatoes to wholesalers as their main marketing channel, and in some cases farmers take their produce directly to the wholesale market. 46% of wholesalers take produce from farms directly to their stores.

Potato wholesalers have about 15 years of experience in their field of work and are – to some extent – equipped with marketing facilities like transport, storage (39%) and communication tools; some wholesalers employ professionals, such as accountants (37%) or weighing staff. According to the interviewees, 46% of wholesalers purchase potatoes directly from the producers, at the production site, and farmers take their produce to wholesale sites on a regular basis. Irrespective of the success of sales, they have to pay an upfront-fee at the entrance to the wholesale market, as a percentage of their estimated profit. In addition, farmers pay commission to the wholesale office of about IQD 8,000 for each market entry. The price of produce is negotiated and market-based, also taking into account the quality, with agreements among wholesalers being common. In some cases, contracts are agreed in advance and most transactions are conducted in cash. Potato wholesalers have substantial experience in trading agricultural products, which account for 96% of their income. They mostly use their own assets in conducting their business and 26% of them have taken out interest-free loans.

The waste of produce in this part of the value chain is insignificant as wholesalers work as mediators between farmers and retailers. Their tasks and operations are market-based and less time-consuming and do usually not include any marketing services, such as cleaning or grading. Wholesalers reported an approximate 103 kg/month as average waste, equivalent to less than 1% of the total traded quantity.

Wholesalers reported a range of challenges and constraints that hamper marketing. These challenges include transportation, particularly through check points; a shortage of pick-up trucks; substantial price fluctuations; and the absence of marketing initiatives of farmers. Problems include competition from other sellers, especially during low-supply seasons; low prices during supply gluts; the need for price negotiations; and the risk of debt default. Other challenges relate to losses as a result of storage and wholesalers are sometimes forced to sell at lower prices to avoid spoilage. Overall, wholesalers have a strong position in the potato market because of their access to capital and their control over the quantities purchased. Accordingly, wholesalers assert control over the potato value chain, acting as facilitators in the potato market.

### 6.2.7 Retail

Potatoes are sold mainly in small neighbourhood shops in small quantities, as per consumers' requirements. There is no reliable estimate for the quantities of potato that pass through retail markets. Retailers' activities in potato marketing in the area under review include purchase, transportation to retail areas and sale to consumers. They are key actors and the ultimate link between producers and consumers. Most retailers buy potatoes from wholesalers in order to resell them to urban consumers; sometimes they also buy directly from producers.

The average operational experience of retailers is eleven years and for 91% of them retail represents the main source of income. About 8% of them have received interest-free loans from relatives to conduct their business, mostly (in 93% of cases) operating in rented space. Although retailers could be expected to have access to cold storage facilities to maintain high quality of products and reduce waste and transportation costs, only 7% of them own such facilities and only 30% have a private power generator. All retailers interviewed source the produce from wholesale markets; in 7% of cases retailers purchase produce directly from farmers, also taking responsibility for the sorting and grading of the product. On average, the waste of produce at the retail stage is estimated at about 60 kg/month. Retailers have to pay fees up front at the wholesale site: a commission to wholesalers; fees for picking up products; and the cost of retail bags. They attract customers with low prices and special offers, also providing cleaning and grading services; delivery services are being offered by about 28% of retailers.

Retailers also face a range of challenges, including high and fluctuating supplier prices; occasionally, poor-quality potatoes due to lower-quality tubers; lack of cleaning and grading standards on the side of suppliers; competition from imported products; and waste due to storage and transportation. Retailers also face problems in their transactions with final consumers, mainly with respect to price, competition from other sellers and quality. The destruction of physical infrastructure, unreliable energy supplies and poor financial and social capital constitute limiting factors along the entire value chain. Retailers face the additional problem of substantial debt owed to wholesalers.

### 6.2.8 Consumption

Consumers are the ultimate actors in the potato value chain, purchasing produce for consumption. Potatoes represent an important component of the household food basket in the area under review. Consumers consist of households and restaurants that purchase potatoes. In rural households, especially in the producing areas, potatoes are consumed almost daily during the local production period; by contrast, only 18% of urban households reported daily consumption of potatoes in different shapes. At the commercial level, potatoes are mainly consumed as chips, served in restaurants and takeaway facilities, as well as in traditional dishes, such as broth. Specific potato varieties are particularly popular for chips, as they consume less oil and have a higher volume.

Restaurants are categorised as micro and small enterprises; however, such businesses constitute the main source of income for more than 86% of restaurant owners in the area under review. Managers of restaurants reported daily consumption of potatoes, mainly by young customers. They prefer imported potatoes to the local product because of taste and the lack of premade potato fingers for chips. Restaurants purchase almost twice the amount of premade potatoes compared to fresh potatoes bought in the market. Restaurant managers are generally satisfied with the price and quality of the potatoes they purchase and 88% of them reported that prices are affordable. The average price reported is 750 IQD/kg for fresh produce and about 2,100 IQD/kg for premade potato fingers – the latter being an import product preferred because of taste, colour, cooking time and a lower price.

Restaurant managers mentioned that facilities for potato processing, including potato flex to produce premade fingers, are not available. They suggested establishing such facilities as opportunities for job and income creation, and also to process the large quantities of produce during the peak season. The average household consumption of potatoes is about 4 kg/month per person, in addition to about 1 kg/month per person as premade potatoes. Households normally purchase potatoes from nearby retailers, as reported by 40% of those interviewed. Consumers are generally satisfied with the potatoes available in the market, at a price of 1,150 IQD/kg.

Almost 65% of households prefer local potatoes to imported ones because of their colour, taste, affordability and freshness. However, local produce is not available throughout the year. In addition to fresh potatoes, about 47% of households buy processed potatoes: about 80% of consumers prefer imported potato chips because of taste, packaging, and price, in the absence of a comparable local product. Accordingly, consumers also suggested establishing facilities for the production of potato fingers and chips.

Based on estimated monthly per-capita consumption of potatoes and data for the population of Al-Anbar, demand for potatoes is estimated to reach no less than 90,000 tons per year. Taking into account the demand for premade potato products and potatoes served at restaurants, overall demand for potatoes is potentially even higher.

### 6.3 SWOT Analysis

SWOT analysis is conducted to determine existing gaps and identify the strengths, weaknesses, opportunities and threats related to the potato VC in the area under review. This analysis forms the basis for potential areas of intervention with regard to potato production in Anbar (**Table 5**).

**Table 5: SWOT Analysis of the Potato Value Chain**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>■ Key pillar of food security and nutrition</li> <li>■ Wide acceptance as a source of food/nutrition</li> <li>■ Main source of income</li> <li>■ Short production cycle</li> <li>■ Fits well in enterprise diversification and integrated value chain strategies</li> <li>■ Suitable soil and climate conditions</li> </ul>	<ul style="list-style-type: none"> <li>■ Low productivity</li> <li>■ Losses</li> <li>■ High cost of production</li> <li>■ Inefficient use of (irrigation) water</li> <li>■ Lack of good agricultural practices</li> <li>■ Lack of storage facilities and limited use of available storage facilities</li> <li>■ Lack of knowledge of the market/consumer needs</li> <li>■ Limited attention paid to the inclusion of women, youth and vulnerable groups</li> <li>■ Cooperatives are absent or have limited capacity</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>■ Significant gap between local demand and domestic production</li> <li>■ Large domestic market due to population growth</li> <li>■ Increased production with new seed systems</li> <li>■ Availability of improved potato varieties</li> <li>■ Existence of potato tissue culture</li> <li>■ Processing opportunities as demand for processed products increases</li> <li>■ Higher incomes through increased productivity and stable yields</li> </ul>	<ul style="list-style-type: none"> <li>■ High input costs</li> <li>■ Declining farm sizes</li> <li>■ Diseases/pests</li> <li>■ Market distortions and price volatility</li> <li>■ Lack of financial services</li> <li>■ Ineffective application of legal/regulatory framework</li> <li>■ Poor infrastructure</li> <li>■ Competition of imported products</li> <li>■ Mismatch between the preferences of input suppliers, producers and consumers</li> </ul>

Source: Own research.





## 6.4 Summary of Findings

- Current per capita consumption of potatoes in Al-Anbar is about 4 kg/month, less than 20% of which is produced locally.
- Consumption (of fresh and processed potatoes) is expected to increase in line with population growth and changing taste.
- Higher demand will likely need to be met mainly by domestic production, due to consumer preferences and affordability.
- In the current farming system and in view of low investment, it is unlikely that farmers will increase potato production sufficiently to fill the domestic supply gap.
- Main actors (directly or indirectly) engaged in the potato value chain are input suppliers, producers, (wholesale and retail) traders and consumers, in addition to those providing financial and extension services.
- The actual need for inputs in the area under review is difficult to estimate as producers rely on traditional cultivation practices in terms of sources, types and quantities.
- Imported inputs are preferred by both suppliers and farmers.
- Inputs are relatively expensive as they are subject to fluctuating market prices, logistics and taxes.
- Lack of financial services results in limited investment and equally limited diversification of suppliers' sources of income, exacerbated by the use of own capital as the main source of funds for investment.
- Small-scale farming hampers the expansion of input supply enterprises in terms of size and inequality.
- Input suppliers link up with producers (forward linkage); therefore, the high costs of imports result in high input costs, feeding into production costs. On the other hand, there is no supply of certified seeds or other government inputs, and farmers rely entirely on informal sources, including imports and local markets. A large number of producers rely on retained seeds that result in low productivity.
- Smallholders are the leading producers of potatoes in the area under review, and farming is a family business. Farmers link up with input suppliers (backward linkage) as inputs are mainly imported through input suppliers.
- Access to financial services is constrained, implying that funds for investment are limited.
- Productivity is low, reflecting the absence of conducive conditions for growing potatoes.
- Outdated practices, lack of knowledge, lack of farmers' skills and labour skills as well as lack of competencies gained through experience on family farms, passed on from one generation to the next, all result in low efficiency.
- Insufficient water supply in terms of timing and quantity, and low-yielding seed varieties remain critical challenges to production.

- Farmers add the highest value in the chain, implying that their value-adding activities are more significant than those of other actors. Fertiliser, seeds, chemicals, fuel and labour costs account for a significant portion of total variable costs associated with potato production.
- Farmers are not independent of government policies. Continued support from government is critical, as is the identification of costs at different stages of the potato value chain.
- Potatoes are mainly sold at harvest, without storage for future sale, often creating gluts and low prices around harvesting time, thereby reducing farmers' bargaining power, aggravated by competition from imported low-price produce. Potato producers have limited influence on the governance of the value chain as their role focuses on production.
- Traders (importers and wholesalers) serve as the main drivers of market behaviour and prices. Wholesalers are the central governors in the potato value chain, influencing the market as a result of their central position with regard to capital and quantities purchased.
- High production costs in combination with low productivity prevent producers from achieving higher incomes.
- The operability of markets is limited by poor public services and poor infrastructure, in addition to low profit margins, which hamper investments in marketing facilities and operations.
- Consumers prefer local produce because of taste, freshness, and reasonable prices.
- There is a mismatch between consumer preferences and the preferences of other market players in terms of sources of seed and final produce. Moreover, local produce is not available throughout the year.

In sum, high input costs feed into the costs of production, and low quality of some inputs and the lack of GAP (including labour skills) result in low productivity and high costs. Local potatoes are produced in competition with imported potatoes, which puts pressure on farmers' margins. Low profitability leads to limited investment in updated farming practices and product handling, which (in turn) hampers technical and economic performance. The limited shelf life of produce in the wholesale market and the low profit margins of wholesalers reduce marketing functions. Lack of storage facilities, in particular well-equipped cold storage that could absorb higher production during peak periods, further reduces local farmers' competitiveness and income generating opportunities.

## 6.5 Interventions

To address these factors and improve performance along the VC, there is a need to

- Increase public and private investment in potato cultivation, storage, processing and marketing
- Promote access to affordable farm inputs and the adoption of recommended agronomic practices (including land preparation, the appropriate seeding rate, and pest and disease control)
- Improve farmers' access to effective extension services
- Promote the use of low-cost irrigation
- Reduce the risk of loss and quality deterioration through proper on-farm storage, preservation technology and adequate transportation
- Improve marketing functions and storage by wholesale and retail traders
- Establish processing facilities and enterprises
- Invest in public goods, infrastructure and marketing functions related to the potato value chain.

The main areas of intervention require improved understanding of domestic market functionality and investment in productivity-enhancing equipment and infrastructure. Fostering innovation in the agri-business sector will enhance opportunities for value-added activities in the potato sector. Shared processing facilities could be established at the community level and the adoption of energy-efficient cooling infrastructure and refrigerated transport equipment will contribute to climate-friendly production and marketing of potatoes. The use of drought-resistant varieties and a shift to climate-adapted nursing methods should be combined with the use of organic fertiliser, e.g. through composting.

**Figure 8** shows the value added to potatoes along the VC. As already mentioned, farmers add the highest value because of the wide range of their activities (involving inputs, material and operations). Due to the high cost of production, producer prices do not reflect the considerable value added by farmers in the context of the value chain. Farm prices for potatoes fluctuate in line with the season and the marketed quantities, and also with the various stages of marketing.

**Figure 8**



Source: Own research.

## 7 Tomato Value Chain

Tomatoes are the most important vegetable crop in Iraq, cultivated in all regions of the country. In 2020, the tomato area amounted to 127,917 donums, with an average productivity of 5,900 kg/donum, as shown in **Table 6** below. The governorates of Ninevah, Basrah, and Najaf take the first three positions in terms of the size of cultivated areas. However, in terms of tomato production, Basrah is the most important governorate, followed by Ninevah and Najaf.

### 7.1 Cultivated Area, Production and Average Yield of Tomato

**Table 6: Cultivated Area, Production and Average Yield of Tomato**

Governorate	Total production (ton)	Average yield (kg/donum)	Cultivated area (donum)
Al-Anbar	14,895	5,000	2,979
Iraq	754,760	5,900	127,917

Source: Central Organization for Statistics of the Ministry of Planning (CSO), 2020.

Tomato is usually cultivated during summer and winter, depending on type and variety. Data from the Central Organization for Statistics for the year 2020 indicate that summer cultivation accounts for about 62% of the total tomato area. Production of tomatoes in summer cultivation is higher than in winter cultivation, the former accounting for about 53.1% of total tomato production. The differences in percentage for cultivated area and production reflect lower productivity for summer tomato cultivation than for winter cultivation.

The total tomato area of Al-Anbar is estimated at 2,979 donums, which account for about 2.3% of Iraq's tomato area. Average productivity per land unit was approximately 5,000 kg/donum, about 15% lower than average productivity in Iraq. Productivity in other governorates, such as Kirkuk, Karbalah, Ninevah and Najaf is higher than in Al-Anbar.

### 7.2 Key Value Chain Actors and Their Functions

#### 7.2.1 Value Chain Map

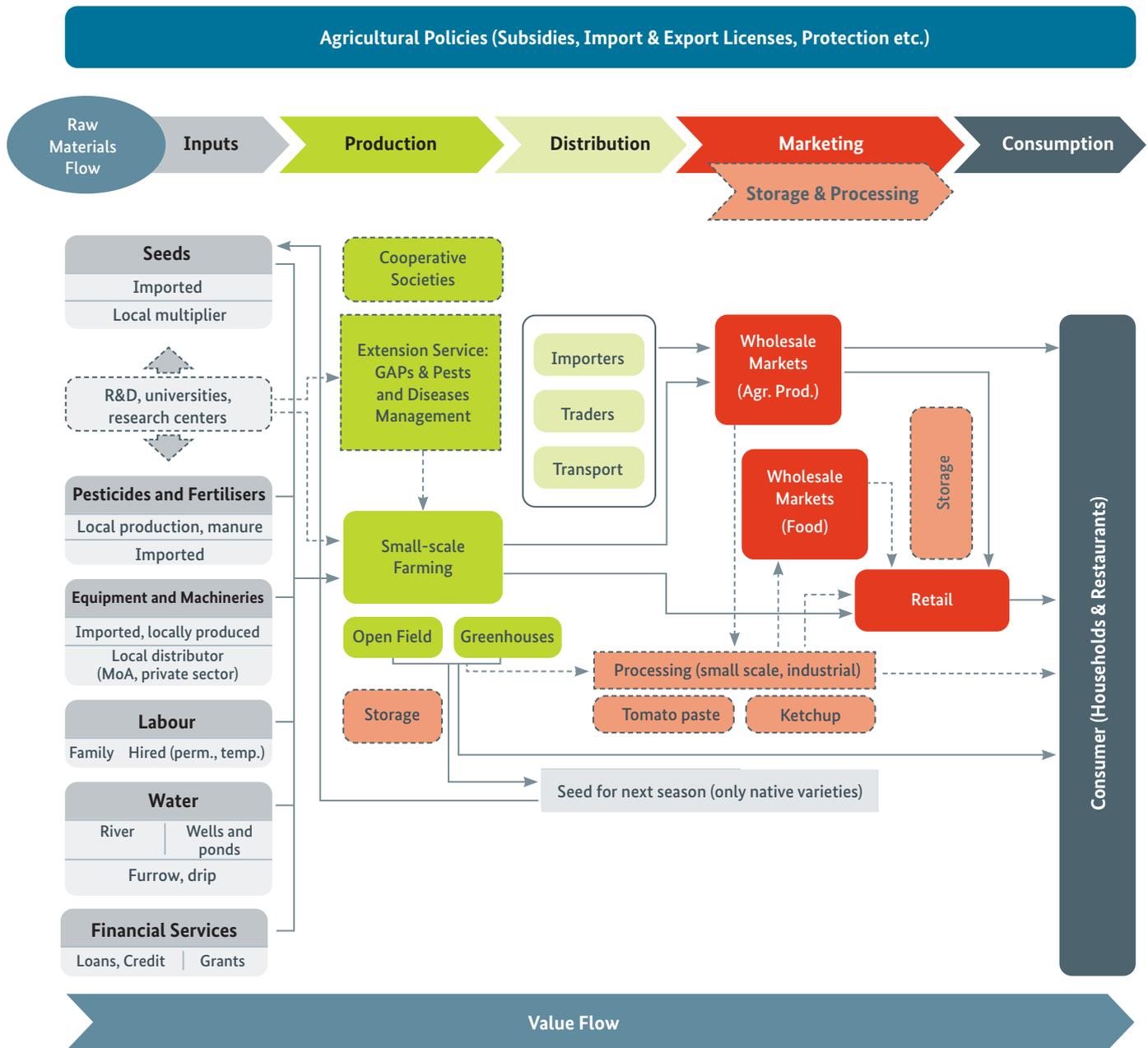
The actors of the tomato value chain are input suppliers, producers, wholesalers, retailers and consumers (**Figure 9**). Moreover, the framework of agricultural policies, infrastructure, the regulatory environment, processing conditions and the financial sector play an essential role in determining the capacity of the actors to interact and generate value.

The government does not consider tomatoes to be a strategic crop. Accordingly, the actors in the value chain are mostly private entities, except for extension services provided by MoA, which, in the past few seasons, have focussed on greenhouse production and on fighting the nematode pest.



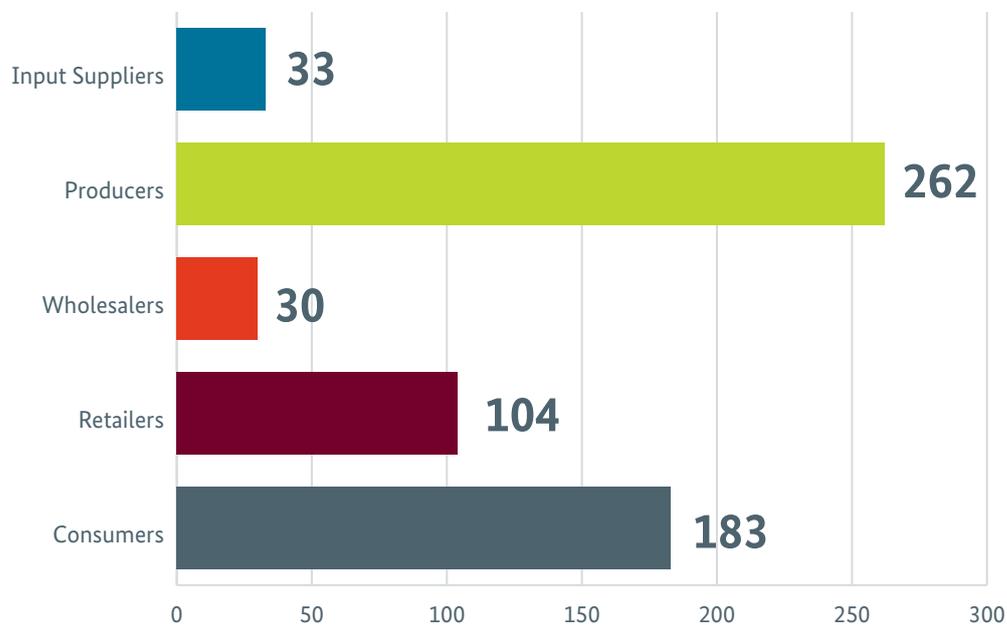
Figure 9

Tomato Value Chain Flow



- Agricultural policies; framework conditions
- Flows: raw materials and value
- Inputs: categories
- Inputs: specific items
- Production phases
- Distribution network
- Marketing
- Storage and processing
- End-use: consumption
- Interdependency/direction of flow
- - - - -> Activity exists as part of the traditional VC but not during the study period; it constitutes a potential for the region

Source: Own design © AFC 2022.

**Figure 10****Distribution of Actors Interviewed Along the Tomato Value Chain**

Source: Own research.

612 interviews were conducted along the tomato value chain in order to meet the requirements of the project. The panel was composed of 33 input suppliers, 262 producers, 30 wholesalers, 104 retailers and 183 consumers (155 households and 28 restaurants; **Figure 10**). Furthermore, information was collected from the Directorate of Agriculture and related agencies through discussions or by indirect means. The actors interviewed originate from two regions, Jazeerah district, belonging to Ramadi Province, and Saqlaweyah district, belonging to Fallujah Province. The distribution of interviewees by regions is shown in **Table 7**.

**Table 7: Distribution of Interviewees, by Region**

Region	Producers	Input suppliers	Wholesalers	Retailers	Consumers	
					Households	Restaurants
Ramadi/ Jazeerah	114	14	13	53	92	18
Fallujah/ Saqlaweyah	148	19	17	51	63	10

Source: Own research.



### 7.2.2 Input Supply

The suppliers interviewed for the project originate from Ramadi (14) and Fallujah (19, including Saqlaweyah). They provide almost all inputs, including seeds, fertiliser and other chemicals, spare parts, greenhouses and irrigation equipment. Most of these inputs are imported and some input suppliers also provide credit. Almost all suppliers purchase the inputs they trade from importers based outside Al-Anbar (mainly in Baghdad). However, only 3% of suppliers reported importing inputs from outside the country, as imported inputs are relatively expensive and subject to fluctuating market prices and taxes. The list of countries of origin (according to interviewees) includes Switzerland, France, USA, the Netherlands, China and Thailand. However, low-quality fake inputs are also traded in the market and some inputs are smuggled from neighbouring countries. Transportation of inputs (particularly fertiliser) through checkpoints is difficult and imposes higher costs on farmers; as a result, they might opt to purchase pesticides or fertiliser of poor quality without receiving correct advice for their application.

Generally, the legislative environment provides the framework for the input supply business, set out by Law 46/2012 on Regulating the Circulation of Agricultural Materials and Law 15/2013 on Registration, Approval and Protection of Varieties, as well as the regular inspection conducted by the Directorate of Seed Testing and Certification in the Ministry of Agriculture. The review of suppliers' storage facilities aims to check the compliance of suppliers and supplies with the requirements of Law 46/2012.

Almost 82% of suppliers reported that this business represents their only source of income, accounting for nearly 92% of their total income. About 18% of suppliers have an additional income source: a pension or a position in the public sector (3%). This reflects the limited diversification of suppliers' sources of income, leaving them exposed to changes in demand for inputs, prices, the government's agricultural or economic policy, and security issues. The invested capital originates exclusively from personal funds, but almost one-third of suppliers purchase inputs on credit, corresponding to 45% of their purchases.

While all suppliers purchase inputs from importers, 26% of seed suppliers buy seeds from local producers/multipliers, at an average price of 220,000 IQD/kg, compared to 362,000 IQD/kg for imported seeds. With regard to fertiliser, one-third of suppliers reported purchasing locally-manufactured products, in addition to imports. Local fertiliser generally consists of manure, accounting for about 38% of the total stock of fertiliser.

The vast potential to produce and multiply seeds locally is noteworthy: some producers keep native Iraqi seeds of tomatoes, preferred because of their taste, regardless of productivity. These farmers traditionally multiply their native varieties of sources, in order for them to be cultivated in the next season and to some extent exchange seeds with other farmers. Moreover, the Ministry of Agriculture has recently established a development programme to produce highly-ranked seeds of vegetables, which could fill part of the seed gap.



Almost 60% of suppliers own storage facilities for inputs, while one-third of facilities is rented. Some suppliers use preservatives for seeds during storage. However, suppliers raised complaints about the lack of information and the high and unaffordable costs of storage – in addition to transportation difficulties and checkpoint issues, particularly with regard to fertiliser and other chemicals. Suppliers of inputs emphasise that producers prefer imported inputs because of higher quality of seeds and more effective fertiliser and pesticides. In some cases, there is a mismatch between the varieties that producers prefer and the ones that are imported. Almost three-quarters of fertiliser is chemical, and the remainder organic or manure-based. **Table 8** shows the difference in input prices between importers and suppliers.

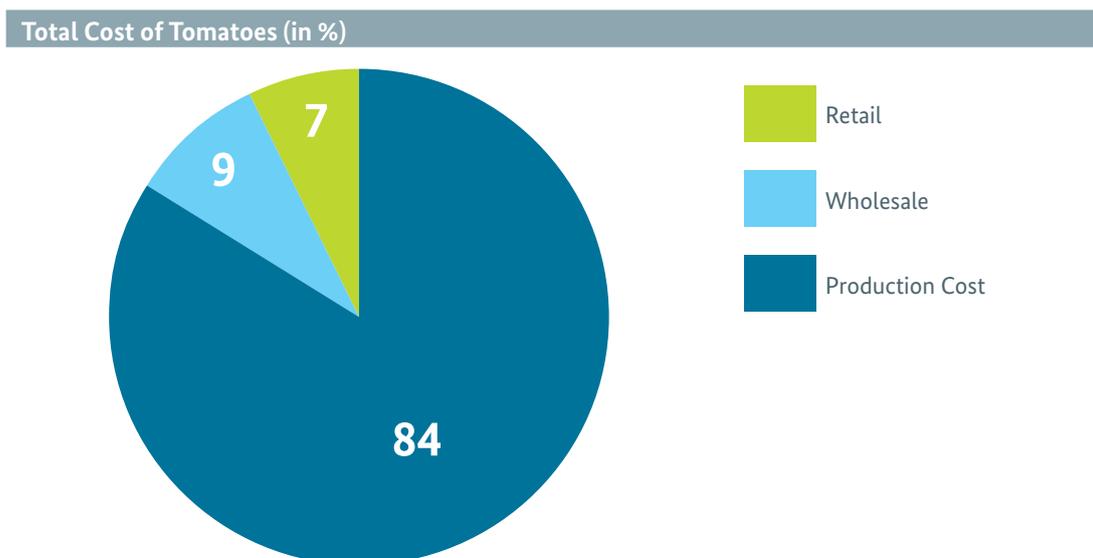
**Table 8: Difference in Input Prices Between Importers and Suppliers**

Inputs	Import price (IQD)	Supplier price (IQD)	Difference (IQD)
Seeds (100 g)	36,200	32,500*	
Fertiliser (ton)	1,870,000	2,000,000	130,000
Chemicals (kg, litre)	40,000	55,000	15,000

\* Weighted price, based on 26% of local seeds at IQD 22,000 and 74% of imported seeds at IQD 36,200.  
Source: Own research.

Production costs account for about 84% of the total cost of tomatoes along the value chain, while marketing costs (including wholesale and retail margins) account for about 16% (**Figure 11**).

**Figure 11**



Source: Own research.



### 7.2.3 Production

Tomato farmers have extensive experience in planting and growing the crop, with an average of 27 years, more than half their average biological age. Most farmers (80%) have no less than six years of education. The average size of families is ten members, more than half of whom (6 members) work in farming (**Table 9**), with women managing more than 10% of enterprises.

**Table 9: Socio-Demographic Characteristics of Tomato Producers**

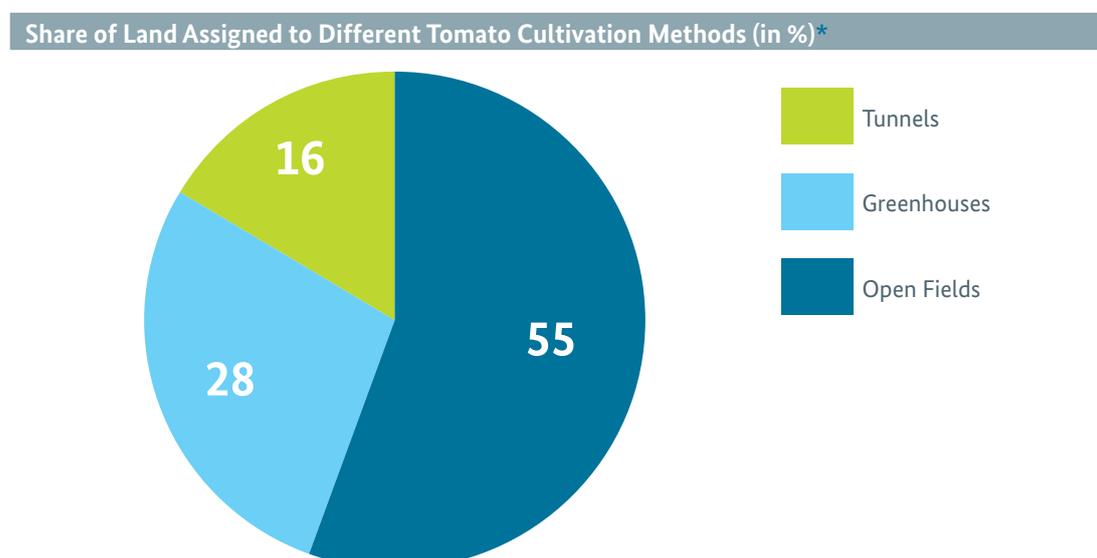
Characteristics	Average
Age of farmers (years)	47
Farmers' experience in agriculture (years)	27
Farmers' family size (persons)	10
Family members who work in agriculture (persons)	6

Source: Own research.

Average land under farmer control amounts to about 13 donums and almost 72% of the land used is owned by the farmer or his family. The remaining area is rented from others or leased from the government. More than 88% of the land has been reclaimed by the government over the past decades, particularly in the 1970s and 1980s, while the remainder has been partially reclaimed. Farmers allocate an average of 4.4 donums to cultivating tomatoes, of which 55% is under private ownership.

Two main cultivation methods are reported as the leading practices for tomato growing: open fields and covered cultivation, the latter consisting of greenhouses and tunnels. The share of land assigned to the different tomato cultivation methods is shown in **Figure 12**. According to the interviewees, the main reasons for choosing to cultivate tomatoes in greenhouses and tunnels are higher productivity, the ability to control insects and infections and lower water requirements. Farmers who prefer cultivation on open fields attribute their choice to lower costs, limited or no experience with greenhouses and an overall limited risk for plant infections.

**Figure 12**



\* Deviation from 100 percent due to rounding.

Source: Own research.



The capital invested in tomato production is entirely privately sourced, as reported by the farmers. 68% of tomato growers depend on farming as their primary source of income, whereas tomato production accounts for about 57% of agricultural income. Some farmers (9.5% of producers) have adopted a hybrid plant-livestock production system, growing vegetables and raising small ruminants such as sheep, with income from livestock accounting for about 35% of their total income. Farming remains predominantly a family business, and access to specific knowledge and financial services is rare. Accordingly, investment is often financed with limited personal resources, resulting in inadequate returns, in both quantitative and qualitative terms. Farmers’ access to finance is limited, with credit usually only available from families and friends on an informal basis. Moreover, Islamic finance principles deter farmers from taking loans with interest.

About 52% of farmers use furrow as the only irrigation method, with rivers as water source. The remaining farmers have invested in other irrigation methods, such as open wells, pumps or even improved techniques, e.g. drip irrigation. In terms of input use, data show that the quantity of seeds used per land unit was 325 g/donum in open fields, 310 g/donum in greenhouses, and 372 g/donum in tunnels (Table 10).

**Table 10: Quantity of Tomato Seeds and Fertiliser per Land Unit, by Cultivation Method**

Cultivation method	Quantity of seed (kg/donum)	Quantity of fertiliser (kg/donum)
Open field	0.325	226
Greenhouse	0.310	217
Tunnel	0.372	239
Average	0.324	226

Source: Own research.

Fertiliser seems to be overused as the data show use of an average 226 kg/donum of fertiliser in open fields, 217 kg/donum in greenhouses and 239 kg/donum in tunnels, respectively. Farmers apply different types of fertiliser, including Nitrogen (Urea), Di-Ammonium Phosphate (DAP), liquid fertiliser, NPK, compost and others. Table 11 shows the average quantity of fertiliser applied, by type of fertiliser, as well as the share of farmers who apply this type of fertiliser, either exclusively or in combination with other types. Almost 80% of producers used two types of fertiliser, mainly Nitrogen and DAP or Nitrogen and animal manure; 10% of farmers used only one type of fertiliser, and a further 10% of farmers used three types.

**Table 11: Average Quantity of Fertiliser Applied, by Type and Share of Farmers Applying this Type**

Type of fertiliser	Average (kg/donum)	Share of farmers applying the type of fertiliser (in %)
DAP	103	39
Manure	80	5
NPK	84	7
Urea	106	50

\* Deviation from 100 percent due to rounding.

Source: Own research.



Farmers' lack of knowledge about management and the correct use of seeds and fertilisers (and other chemicals) in terms of both quantity and type is noteworthy. **Table 12** shows the cost items and their share in the variable production costs of tomatoes.

**Table 12: Cost Distribution in Tomato Production**

Cost item	Cost (IQD/donum)	Cost (IQD/ton)	Share in variable production costs (in %)*
Seeds	125,000	33,784	15
Fertiliser	181,248	48,986	21
Chemicals	33,847	9,148	4
Labour	398,223	107,628	47
Machinery	87,450	23,635	10
Other	17,646	4,769	2
<b>Total costs</b>	<b>843,414</b>	<b>227,950</b>	<b>99</b>

\* Deviation from 100 percent due to rounding.

Source: Own research.

The main cost components in tomato production are presented in **Table 12**. The most important cost item is labour, which accounts for about 47% of total variable costs, followed by fertiliser (21%) and seeds (15%), three-quarters of which were imported. The high cost share of fertiliser, accounting for about one fifth of total variable costs, is explained by the absence of fertiliser subsidies during the season under review. In addition to the cost items shown in the table, farmers also reported incurring the following costs: water; electricity; storage; maintenance of warehouses and equipment; oil and fuel; and transportation.



### 7.2.4 Productivity

Productivity data show unexpected results, since productivity in open fields is higher than for the other two cultivation methods. As **Table 13** demonstrates, the yield in open fields reached almost 5 tons/donum, while the yield was 3.5 tons/donum in tunnels and 3.1 tons/donum in greenhouses. While productivity data for open fields in the regions under review are aligned with published official data for productivity in Al-Anbar, the same does not apply to data for productivity in greenhouses or tunnels.

**Table 13: Productivity of Tomato Production, by Cultivation Method**

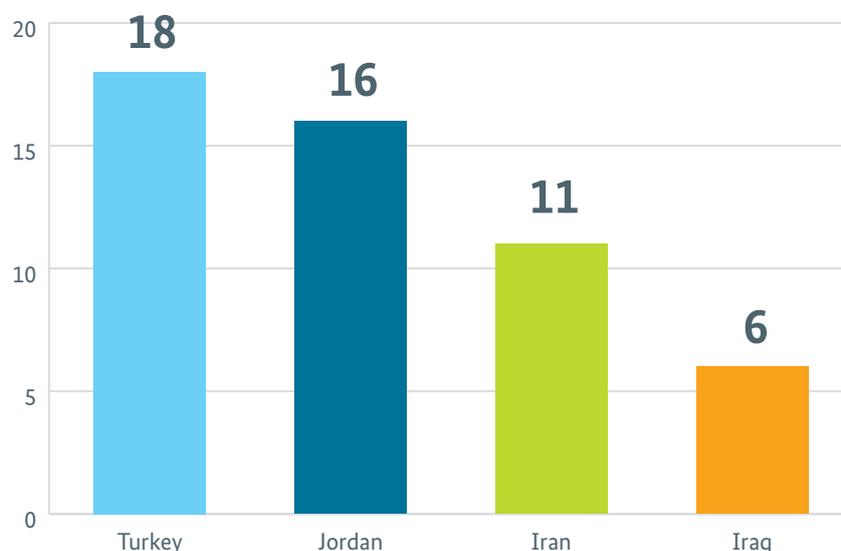
Cultivation method	Average yield (in ton/donum)
Open field	4.9
Greenhouse	3.1
Tunnels	3.5
Average	4.2

Source: Own research.

Tomato harvesting in all three types of cultivation is conducted by hand and none of the farmers interviewed performed any post-harvest activities, such as washing and sorting. Despite differences in productivity among the three-cultivation methods, farmers face low yields across the board, more specifically lower productivity than in the countries of origin of tomato imports to Iraq (**Figure 13**). Productivity of tomato production in Al-Anbar has also been negatively affected by crop damage due to weather extremes, such as drought and heat waves.

**Figure 13**

**Productivity of Tomato Production: Iraq and Countries of Origin of Imports (ton/donum)**



Source: Own research.



The main reasons underlying low productivity are the small size of farms; the use of outdated farming practices and varieties; inadequate agronomic research; and lack of climate-adapted varieties. The list of causes also includes limited skills and competencies among farmers; insufficient timing and quantities of water applied, with a focus on use of drainage water; crop infections and infestations; and investment leakage. Due to these factors, and a lack of investment in public goods and infrastructure, farmers are not in the position to benefit from economies of scale. The socioeconomic characteristics of farmers, such as age, education and experience, also play a role in affecting production efficiency, since the exclusive use of traditional cultivation patterns limits the possibility of transitioning from conventional methods and varieties to modern, more efficient inputs and techniques.

Production performance could be improved by the adoption of GAP in order to enhance crop diversification, soil fertility and climate resilience. To promote the adoption of GAP and efficient production techniques, it is essential to invest in extension services and financial support. To meet the challenges of climate change and water shortage, the use of water-efficient technologies (e.g. drip irrigation) and drought-resistant varieties is critical. Low-cost tools to monitor soil moisture and salinity are equally essential as the preparation and use of organic fertiliser, e.g. composting, and a shift to modern nursing methods. Furthermore, the use of pest-resistant varieties and better knowledge of pesticide use and application (including biological pest-control techniques) would also contribute to higher productivity. The restoration or establishment of shared processing facilities at the community level could help to build energy-efficient cooling infrastructure and facilitate the use of refrigerated transport.

### 7.2.5 Marketing

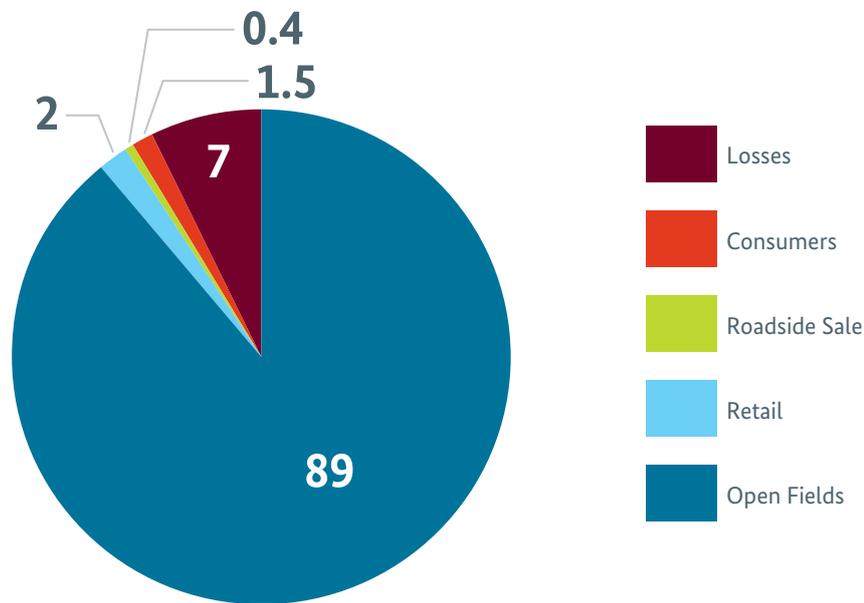
Like most agricultural produce from the smallholder sector, harvested tomatoes are sold immediately, often creating gluts and contributing to low prices during the harvesting season. Storage is almost non-existent and peak periods are often followed by scarcity and high prices a short period later. Tomato producers mostly interact with local informal market traders and wholesale traders. Direct interaction with tomato processors is absent due to the lack of processing enterprises in the area under review. Moreover, tomato producers have little influence on the governance of the value chain. Their role is limited to production, with traders serving as the main drivers of market behaviour and price.

Tomato producers usually sell their products to wholesalers, representing the main channel for product distribution and accounting for about 89% of total production. The other distribution tracks are shown in **Figure 14**, indicating that retailers are the second most important channel for product distribution. Post-harvest losses, accounting for a significant 7% of production, are attributed to poor management, including inappropriate packaging, and poor storage and transport conditions, all of which damage the product. Adequate post-harvest handling and transportation of tomatoes could help to reduce damage and loss significantly. In addition to the sale of tomatoes in the market, farmers' own consumption accounts for about 5.5 kg per person and month. Indirect, hidden loss at the production stage also has to be taken into consideration, attributable to unsuitable seedling and fertiliser application and reflecting systemic deficiencies in the value chain.



Figure 14

## Tomato Distribution and Use (in %)\*



\* Deviation from 100 percent due to rounding.

Source: Own research.

Producers who transport their products themselves also mentioned transportation difficulties due to security arrangements. Price dumping constitutes an additional obstacle facing producers, in view of ample imported products (which, however, sometimes are offered at higher prices than local products). Lack of storage and processing facilities during the peak production period places pressure on farmers to sell their products at any price, reducing their bargaining power considerably. While Iraqi tomatoes cannot compete with imported or smuggled products in price, consumers prefer Iraqi tomatoes because of their colour and taste.

Although tomato farmers suffer from rising costs of key inputs, costs and revenues do not reflect the standard situation in the regions under review, as they remain in the stage of recovery following the dramatic destruction in the wake of armed conflict. In addition, the current fertiliser price also reflects the fact that the government did not provide subsidised fertiliser to farmers. Secondary data from the Directorate of Agriculture are not available.

The challenging cost structure is even more significant than shown by the data: farmers also need to fund rural roads in order to access markets. Moreover, additional cost for wells and access to the electricity grid also need to be funded. High costs also arise when small-scale farmers invest resources to access knowledge, technical assistance and the market. As a result, profits are low and production of tomatoes is not competitive. Small-scale farming could be profitable though, on condition of availability of public goods. For their farming activities, farmers rely on conventional energy sources (electricity, fuel), particularly for irrigation. Due to the shortage of electricity, high fuel prices and intermittent fuel supplies, farmers show an interest in clean energy, mainly solar energy. Almost 45% of farmers indicated their preference for clean energy over fossil energy sources.



### 7.2.6 Wholesale

Producers of tomatoes use wholesalers as their main sales channel (**Figure 14**). In some cases, farmers take their produce directly to the wholesale market, but 26% of wholesalers transport the product from the farm to their shops. Irrespective of the quantity sold, farmers have to pay an upfront-fee at the entrance to the wholesale market, based on estimated profit. In addition, farmers pay a commission to the wholesaler office of about 2% of the product value. Prices are market-based, also taking into account quality, but in some cases, contracts are agreed in advance. Price agreements among wholesalers are common.

Wholesalers in the area under review have extensive experience in trading vegetables, including tomatoes. Their average experience in this line of business is about 18 years, and wholesale constitutes the primary income source for 87% of them. Wholesalers use their own assets as business capital, and almost 10% of them have taken out interest-free loans.

Among wholesalers, availability of cold storage facilities is wide-spread, with 75% of them having access; in view of unreliable energy supplies two-thirds of wholesalers mentioned the use of private generators. The loss of produce in this part of the value chain is negligible due to quick interactions among farmers and retailers: wholesalers mentioned a stable share of product waste of approximately 0.5%. They are normally not involved in services such as cleaning, sorting or grading.

### 7.2.7 Retail

On average, retailers have 13 years of experience in their line of business, which accounts for 92% of their income. 12% of retailers have received interest-free loans from relatives. Although retailers could be expected to own cold storage facilities to maintain quality of products, reduce waste and minimise transportation costs, only 2% of them have storage facilities with a generator. Retailers purchase produce at the wholesale site, but do usually not pay commission to wholesalers; they also purchase produce directly from farmers and take it to their shops. Most retailers perform some pre-sale functions as they clean the product, sort it and grade it. Product waste at the retail stage is estimated to reach an average of more than 500 kg/month, equivalent to almost 3% of the traded quantity.

Retailers aim to attract customers by special offers. Among the challenges they face are high or fluctuating prices; low-quality products; limited availability of facilities, due to the destruction of physical infrastructure; unreliable energy supplies; competition from imported products; and poor financial and social capital along the value chain.

### 7.2.8 Consumption

Tomato consumers in the areas under review comprise restaurants and households. Both groups tend to prefer local tomatoes to imported ones because of colour and taste. However, locally-produced tomatoes are not available throughout the year because of seasonality and insufficiencies along the value chain. With regard to fresh tomatoes, restaurant managers consider a price of 720 IQD/kg to be affordable and find that the price of local produce is more justified than the price of imported tomatoes. Restaurants also purchase tomato paste and ketchup at around 6,000 IQD/kg.



Almost all families and individuals interviewed in the context of this project consume tomatoes on a daily basis, with average monthly per capita consumption reaching about 5.5 kg, in addition to 1.7 kg/month as imported tomato paste. Overall, interviewees find the reported price of 1,040 IQD/kg unaffordable. Consumers prefer to purchase tomatoes from retailers, but sometimes buy them in the supermarket or from small-scale traders. While 61% of consumers are satisfied with local products, 39% are not satisfied because of the price, shape and size of the tomatoes, in addition to damages and products that have not been cleaned and graded. 83% of consumers believe that the price of local tomatoes is more justified than the price of imported tomatoes. Damage to imported tomatoes was reported to be more prevalent than damage to local products because of a longer period of time between harvest and consumption, due to transportation.

Based on data for average per capita consumption of tomatoes and the population of Al-Anbar, demand for tomatoes is estimated at more than 123,000 tons annually. The high demand, in combination with a strong preference for local produce, justifies initiatives to expand local production. Consumers suggest establishing industrial facilities for the production of tomato paste and ketchup. They also propose better marketing of local produce, enhanced support for farmers and the imposition of price ceilings by the government.





### 7.3 SWOT Analysis

SWOT analysis is conducted in order to determine existing gaps and identify the strengths, weaknesses, opportunities and threats related to the tomato value chain in the area under review, in order to propose potential areas of intervention (Table 14).

**Table 14: SWOT Analysis of the Tomato Value Chain**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>■ High-value agricultural commodity</li> <li>■ Wide acceptance as a source of food/nutrition</li> <li>■ Main source of income</li> <li>■ Comparative advantage in production</li> <li>■ Short production cycle</li> <li>■ Fits well in enterprise diversification and integrated value chain strategies</li> <li>■ Suitable soil and climate conditions</li> </ul>	<ul style="list-style-type: none"> <li>■ Low productivity</li> <li>■ High post-harvest losses</li> <li>■ High production costs</li> <li>■ Inefficient use of (irrigation) water</li> <li>■ Lack of good agricultural practices</li> <li>■ Substantial loss</li> <li>■ Lack of storage facilities at farmers' level</li> <li>■ Lack of knowledge of the market/consumer needs</li> <li>■ The inclusion of women (to some extent), youth and vulnerable groups is given little attention</li> <li>■ Cooperatives have limited capacities</li> <li>■ Lack of high-quality tomato seeds in the market</li> <li>■ Use of counterfeit and unfit chemical products</li> <li>■ Increased emissions, risk of pollution and eutrophication of water</li> <li>■ Use of outdated varieties and no evidence of climate-adapted varieties</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>■ Increased production with new seed systems</li> <li>■ Large domestic market</li> <li>■ Increasing demand</li> <li>■ Processing opportunities as demand for processed products increases</li> <li>■ Higher income through increased productivity and stable yields</li> <li>■ Large-scale demand for fresh and processed produce</li> <li>■ Proliferation of native seeds</li> </ul>	<ul style="list-style-type: none"> <li>■ High input costs</li> <li>■ Declining farm sizes</li> <li>■ Diseases/pests</li> <li>■ Market distortions and price volatility</li> <li>■ Lack of access to financial services</li> <li>■ Ineffective legal/regulatory framework</li> <li>■ Poor infrastructure</li> <li>■ Competition of imported products</li> <li>■ Harsh weather conditions</li> <li>■ Lack of access to processing industries</li> <li>■ Water scarcity, pollution and salinisation</li> </ul>

Source: Own research.



## 7.4 Summary of Findings

- Per capita tomato consumption in Al-Anbar amounts to about 5.5 kg/month as fresh produce and 1.7 kg/month in the form of tomato paste.
- Consumption of both fresh and processed tomatoes is expected to increase as a result of population growth and changing taste.
- Higher demand needs to be met mainly by increasing domestic production, in view of consumer preferences and lower prices. In view of prevalent farming systems and low levels of investment it seems unlikely that the considerable gap between local demand and domestic supply can be bridged.
- The main actors engaged in the tomato value chain are input suppliers, producers, traders (wholesalers and retailers), and consumers (households and restaurants). The value chain is characterised by the absence of processing facilities, financial services, and research and extension services.
- Both suppliers and farmers prefer imported inputs, which, however, are relatively expensive and subject to fluctuating prices, high taxes and unreliable logistics.
- Lack of financial services results in limited investment and a lack of diversification in suppliers' sources of income.
- Smallholders, small scale farming and family businesses are the main features of tomato production, hampering the expansion of enterprises in terms of size and product quality.
- Farming skills are usually developed through experience on family farms or neighbours' farms.
- Outdated practices, lack of knowledge and insufficient skills among farmers and agricultural labourers result in low efficiency. Furthermore, insufficient water supply in terms of both timing and quantity, low-yield varieties not appropriate for small-scale production and gaps in the management of tomato diseases remain critical challenges. Accordingly, productivity is low, reflecting the lack of conducive conditions.
- Farmers add the highest value in the chain, demonstrating that their value-adding activities as well as their operation costs are larger than those of other actors.
- Fertiliser, seeds, chemicals, greenhouse materials, fuel and labour costs account for the largest part of total variable costs associated with tomato production.
- The absence of a valid cost calculation base hampers economic decision making.
- Competition by low-cost imports reduces farmers' influence on the governance of the value chain.
- Traders (importers and wholesalers) serve as the main drivers of market behaviour and prices.
- Wholesalers are the main governors in the tomato value chain, as a result of their critical position with regard to capital and the quantities purchased, as well as their role as main channel of product distribution.



- High production costs, expensive inputs and low productivity, in combination with declining sales prices reduce farmers' income.
- Limited operability of markets reduces profit margins, thereby hampering investment in production, storage and marketing facilities.
- Local produce is strongly preferred by consumers because of taste, freshness and lower prices, reflecting a mismatch between consumers' preferences and the preferences of other market players. The availability of local produce is subject to seasonality.

In line with the problem tree analysis, the main challenges of the tomato VC are high costs of inputs that translate into high production costs, as well as low input quality resulting in low productivity. High production costs in turn lead to high prices of the final product, which should be reduced in order to compete with imported tomatoes. Lack of good agricultural practices also contributes to low productivity, including in greenhouse production. In the absence of processing facilities that can absorb large amounts of tomatoes during the peak season, farmers are forced to accept lower prices, reducing their bargaining power – the problem being exacerbated by limited investment in infrastructure, in particular cold storage facilities. Insufficient profit margins result in limited investment in updated farming practices and product handling, reducing technical efficiency and economic performance. Poor marketing as well as poor handling of produce by farmers result in limited competitiveness and lower profits. The high demand for local produce, attributed to both taste and price, and the substantial gap between domestic supply and demand represent a significant opportunity for future expansion in the production of tomatoes, based on strategies for value chain improvement.

## 7.5 Interventions

**To address and handle the a.m. issues, limiting performance along the VC, there is a need to**

- Increase public and private investment geared towards improving the efficiency of VC actors, particularly farmers
- Promote access to affordable farm inputs and the adoption of recommended agronomic practices with regard to land preparation, appropriate seeding rates, and pest and disease control
- Improve farmers' access to high-quality and effective extension services
- Promote use of low-cost irrigation
- Reduce the risk of loss and quality deterioration through proper on-farm storage or preservation technology and reliable transportation
- Improve marketing functions by developing market facilities, particularly storages
- Establish processing facilities and enterprises
- Invest in essential public goods, in particular infrastructure.



These areas of intervention require a better understanding of domestic market mechanisms and investment in productivity-enhancing equipment and infrastructure. In particular, support for agri-business innovation to develop value-added activities; restoring or establishing shared processing facilities at the community level; the adoption of energy-efficient cooling infrastructure and refrigerated transport equipment; better availability and more wide-spread use of drought-resistant varieties and a shift to modern climate-adapted nursing methods; and the preparation and use of organic fertiliser, e.g. composting.

**Figure 15** shows the value added in tomato production along the VC. As mentioned, farmers added the highest value due to their wide range of activities in the production of tomatoes. In view of high production costs, producer prices do not reflect the considerable value added along the production chain. Producer prices for tomatoes fluctuate in line with seasonality, depending on quantities available and the stage of marketing.

**Figure 15**



Source: Own research.



## 8 Cucumber Value Chain

Cucumbers are an essential ingredient of traditional Iraqi meals, in particular salads. They are mainly consumed during the summer season and sometimes used to replace lettuce in winter.

### 8.1 Cultivated Area, Production and Average Yield of Cucumber

The quantity produced in Al-Anbar accounts for almost 7% of total Iraqi production, with an average yield of 3,309 kg/donum – about 30% higher than country-wide productivity of cucumber cultivation (Table 15). In 2020, the planted area in Anbar amounted to 4,587 donums. Cucumbers play a significant role as food crop in Al-Anbar, and as a source of income for many farmers and other stakeholders along the value chain.

**Table 15: Cultivated Area, Production and Average Yield of Cucumber**

Governorate	Total production (ton)	Average yield (kg/donum)	Cultivated area (donum)
Al-Anbar	16,073	3,309	4,857
Iraq	242,614	2,546	95,281

Source: Central Organization for Statistics of the Ministry of Planning (CSO), 2020.

### 8.2 Key Value Chain Actors and Their Functions

#### 8.2.1 Value Chain Map

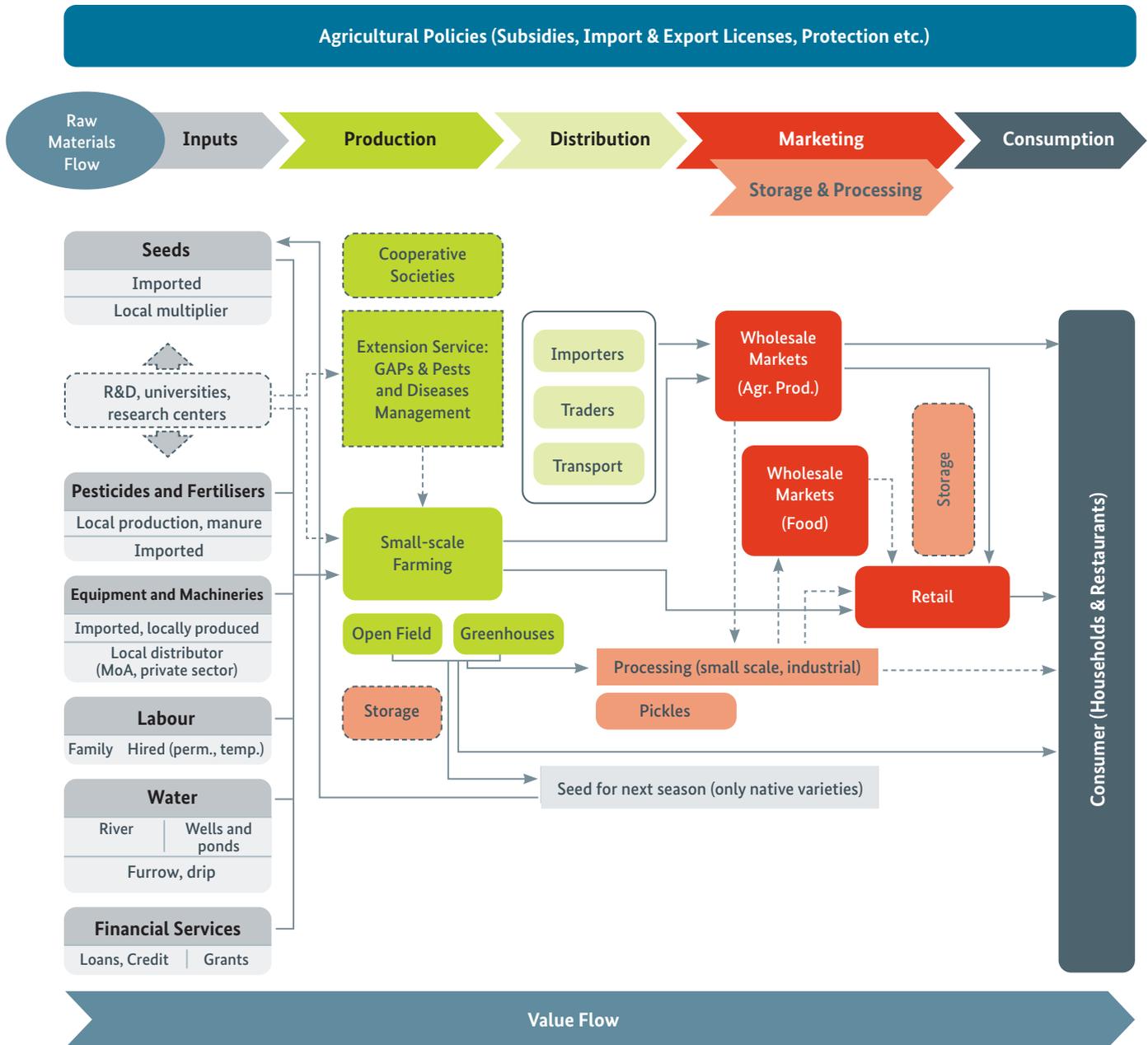
Actors in the cucumber value chain include input suppliers, producers, processors, wholesalers, retailers and consumers. Regardless of their efficiency, agricultural policies and infrastructure as well as the regulatory environment and the financial sector also play an important role in influencing the capacity of the actors to interact and generate value (Figure 16).

A total of 499 interviews were conducted along the cucumber value chain. The panel was composed of 19 input suppliers, 265 producers, 12 processors, 21 wholesalers, 97 retailers and 85 consumers (Figure 17). Moreover, information was collected from the Directorate of Agriculture and related agencies through discussions and by indirect means. The data collected from producers covered two regions, 151 producers from Jazeera district and 114 from Shameyah district; consumers interviewed comprised 21 restaurant managers and 64 families.



Figure 16

Cucumber Value Chain Flow



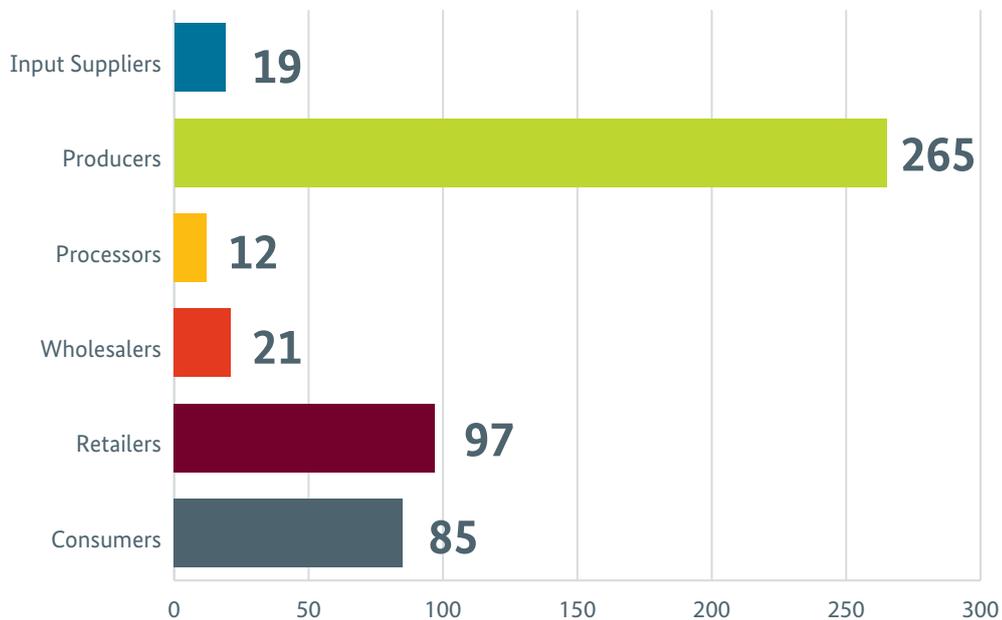
- Agricultural policies; framework conditions
- Flows: raw materials and value
- Inputs: categories
- Inputs: specific items
- Production phases
- Distribution network
- Marketing
- Storage and processing
- End-use: consumption
- Interdependency/direction of flow
- - - - -> Activity exists as part of the traditional VC but not during the study period; it constitutes a potential for the region

Source: Own design © AFC 2022.



Figure 17

## Distribution of Actors Interviewed Along the Cucumber Value Chain



Source: Own research.

### 8.2.2 Input Supply

In the context of this project, 19 suppliers were interviewed. These suppliers sell a combination of mostly imported inputs, including seeds, fertilisers and other chemicals, spare parts, greenhouses and irrigation equipment. Findings show that 16% of suppliers are the main importers of the inputs they trade, and the remaining 84% purchase their requirements from importers. Imported inputs are relatively expensive as they are subject to fluctuating market prices and taxes and exposed to transformation-related difficulties. The list of countries of origin (according to interviewees) includes Turkey, India, the USA, the Netherlands, China, and Spain.

The legislative environment determines the framework for business activities, including input supply enterprises. This framework is set out by Law 46/2012 on Regulating the Circulation of Agricultural Materials and Law 15/2013 on Registration, Approval and Protection of Varieties, as well as the regular inspection conducted by the Directorate of Seed Testing and Certification in the Ministry of Agriculture. The inspection of the suppliers' storage aims to check the alignment of suppliers/supplies with the requirements of Law 46/2012.

For almost 90% of suppliers their business constitutes their primary source of income, accounting for about 88% of total income. Nearly 15% of those suppliers have an additional source of income, such as a pension, while 10% are government employees, with their salary being the additional source of income. This reflects the limited diversification of suppliers' sources of income, leaving them exposed to changes in demand on inputs, prices, the government's agricultural or economic policy, and security issues. The invested capital originates exclusively from personal funds, but about 50% of suppliers purchase inputs on credit, corresponding to 50% of their purchases.



While all suppliers purchase inputs from importers, 58% of seed suppliers buy seeds from local producers/multipliers, at an average price of 160,000 IQD/kg, compared to 240,000 IQD/kg for imported seeds. 11% of seed suppliers produce their seeds locally. Almost three-quarters of suppliers have access to storage facilities to store the input they trade, with 50% of these being rented. However, suppliers raised complaints about the loss affecting the stored seed, mainly due to transportation and unreliable availability of power.

Suppliers also complained about the absence of input quality control and certification, affecting the quality of seeds as well as chemicals. Suppliers of inputs emphasised that producers prefer imported inputs because of higher quality and more reliable availability. Importers sell seeds, fertiliser and chemicals to suppliers at 24,000 IQD/100 g, 2,000 IQD/kg and 17,000 IQD/kg, respectively. Suppliers, in turn, sell inputs to farmers at a price of 46,000 IQD/100 g, 2,170 IQD/kg and 35,000 IQD/kg for seeds, fertiliser and chemicals, respectively (Table 16).

**Table 16: Difference in Input Prices Between Importers and Suppliers**

Inputs	Import price (IQD)	Supplier price (IQD)	Difference (IQD)
Seeds (100 g)	24,000	46,000	22,000
Fertiliser (ton)	2,000,000	2,170,000	170,000
Chemicals (kg, litre)	17,000	35,000	18,000

Source: Own research.

### 8.2.3 Production

Cucumber farmers have extensive experience in planting and growing the crop, with an average of 23 years in the field, more than half their average biological age (Table 17). More than two-thirds of farmers (68%) have no less than 6 years of education.

**Table 17: Socio-Demographic Characteristics of Cucumber Producers**

Characteristics	Average
Age of farmers (years)	43
Farmers' experience in agriculture (years)	23
Farmers' family size (persons)	9
Family members who work in agriculture (persons)	4

Source: Own research.



Cucumbers are mostly grown in small-scale mixed farming systems as farmers cultivate other vegetable crops in between the lines of cucumber, in order to achieve diversification that reduces risks and leads to higher returns. Accordingly, land is not limited to cucumber cultivation. Farmers allocated an average of 2.1 donums out of 11 donums to cultivate cucumbers, with more than two-thirds of the total area in private tenure. The cultivated areas in open fields and greenhouses are similar in size, at 2.13 donums for greenhouses and 2.16 donums for open fields, respectively.

85% of farmers reported that the capital invested in cucumber production is privately sourced. For 74% of cucumber growers, farming constitutes the main source of income and half of them reported that cucumber production accounts for 51% of their agricultural income. Some farmers have adopted a mixed plant-livestock production system, cultivating both vegetables and small ruminants, such as sheep. For these farmers, who account for 15% of cucumber producers, the income attributed to livestock accounts for about 16% of their total income. Farming remains predominantly a family business, with a family size of 9 members, about half of whom work in farming. This implies that resources for investment are often limited, resulting in poor access to knowledge and financial services as well as inadequate income.

More than 20% of enterprises are managed by women, reflecting an overall upward trend in households and farms headed by women. Unequal access to qualification opportunities, extension services and agricultural training for women needs to be taken into account as a priority area in future development initiatives and the number of women in agricultural extension and research should be increased.

About 40% of the farmers interviewed have invested in greenhouses and 6% in improved irrigation methods, such as drip irrigation. Producers reported that the main reasons for greenhouse cultivation were larger production, the ability to control insect infestation and diseases and the opportunity to save water. Farmers who prefer open-field cultivation attributed their preference to lower establishment costs, limited or no experience with greenhouse cultivation and a presumed low risk for infestations. In terms of input use, data show that the quantity of seeds used per land unit was 349 g/donum for open fields and 268 g/donum for greenhouses (**Table 18**); it is noteworthy that the quantity of seeds used in open fields is below recommended standards.

**Table 18: Quantity of Cucumber Seeds and Fertiliser per Land Unit, by Cultivation Method**

Cultivation method	Quantity of seed (kg/donum)	Quantity of fertiliser (kg/donum)
Greenhouse	0.268	188
Open fields	0.349	173
Average	0.314	179

Source: Own research.



Fertiliser seemed to be overused as the average quantity used was 188 kg/donum for green-houses and 173 kg/donum for open fields, respectively. Almost two-thirds of producers used two types of fertilisers, mainly Urea and DAP or Urea and NPK. About 15% used one type of fertiliser and the same share of farmers used three types, while a few farmers used four types of fertiliser. Fertiliser types comprised micro elements, organic and liquid fertiliser, in addition to animal manure, which was used by 7% of farmers. Large quantities of manure (previously called animal fertiliser) are being used on a regular basis during or before land preparation as farmers believe that manure will keep the plants warm.

**Table 19: Average Quantity of Fertiliser Applied, by Type and Share of Farmers Applying this Type**

Type of fertiliser	Average (kg/donum)	Share of farmers applying the type of fertiliser (%)
DAP	65.64	45
NPK	26.20	8
Manure	367.89	7
Urea	64.39	40

Source: Own research.

**Table 19** shows the average quantities of fertiliser applied, by type and share of farmers who apply this type of fertiliser, either exclusively or in combination with other types. DAP fertiliser contributes about 45% of all fertiliser applied, with an average quantity of 65.6 kg/donum – on the same order of magnitude as Urea, which contributes about 40% of total fertiliser use. The overall lack of knowledge about farm management, in particular the adequate use of seeds, fertiliser and other chemicals, both in terms of quantity and type, is noteworthy.

**Table 20: Cost Distribution in Cucumber Production**

Cost item	(IQD/donum)	(IQD/ton)	Contribution to overall costs (%)
Seeds	145,016	42,652	12
Fertiliser	129,503	38,089	11
Chemicals	34,421	10,124	3
Labour	736,306	216,560	62
Machinery	92,532	27,215	8
Other	47,980	14,112	4
<b>Total costs</b>	<b>1,185,758</b>	<b>348,752</b>	<b>100</b>

Source: Own research.



**Table 20** lists the costs involved in cucumber production and their share in production costs, with labour accounting for 62% of total production costs. Labour skills are generally low due to lack of technical training, also explaining underperformance and low productivity and the resulting high production costs. Fertiliser accounted for the second highest contribution to costs, mostly due to the absence of fertiliser subsidies during the season under review. Both low efficiency and high costs (translating into high producer prices) affect the economies of production negatively.

#### 8.2.4 Productivity

Productivity data indicate that greenhouse yields are 63% higher than yields in open field cultivation. **Table 21** shows that productivity per land unit of greenhouse was 4.4 tons/donum, while open field yield reached only 2.7 tons/donum. Productivity data for the region under review are aligned with official data for productivity in Al-Anbar, which exceeds the Iraqi average, nevertheless remaining below productivity levels achieved in other countries (**Figure 18**).

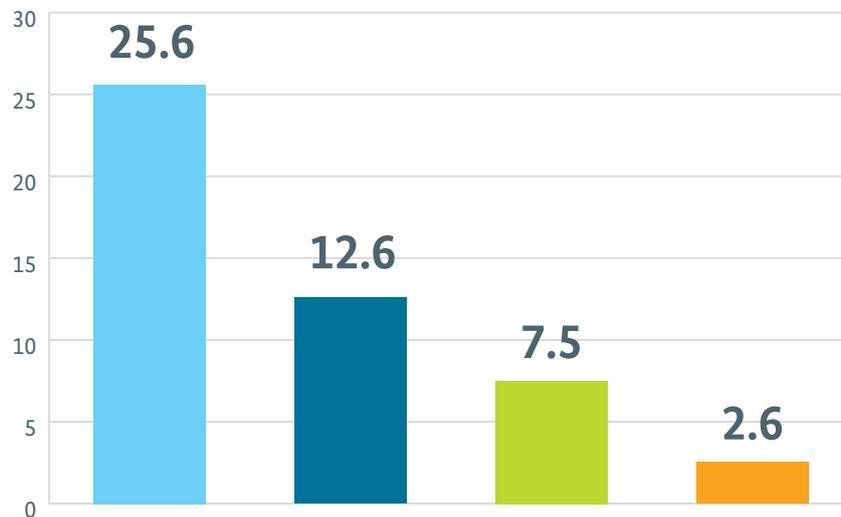
**Table 21: Productivity of Cucumber Production, by Cultivation Method**

Cultivation method	Average yield (in ton/donum)
Greenhouse	4.4
Open field	2.7
Average	3.4

Source: Own research.

Low productivity in cucumber cultivation results from limited farm size; the use of outdated farming practices; lack of farmers' skills and competencies; lack of entrepreneurial skills; and the reluctance and inability of farmers to invest in their business. The broader set of market conditions, in addition to constrained availability of water, limited technical assistance and a lack of financial services, exacerbates the problems. Raising productivity and generating adequate revenue in a sector composed of small-scale farms are challenges that also need to be addressed by investment in public goods and infrastructure.



**Figure 18****Productivity of Cucumber Production: Iraq and Countries of Origin of Imports (ton/donum)**

Source: Own research.

The socioeconomic characteristics of farmers also play a role in low production efficiency: age, education and experience have an impact on production methods and the cucumber varieties cultivated, which are still mostly traditional. Exclusive reliance on traditional knowledge potentially hampers the possibility to transition to modern and efficient techniques and inputs. Production efficiency could be improved by the application of GAP, building on information dissemination, training, technical assistance, applied research and the use of improved varieties, suitable to an environment marked by water shortages and drought.

In order to facilitate the adoption of GAP, investment in infrastructure and extension and research services should be expanded, in addition to financial support that would allow farmers to purchase the required inputs and the equipment needed to apply these practices.

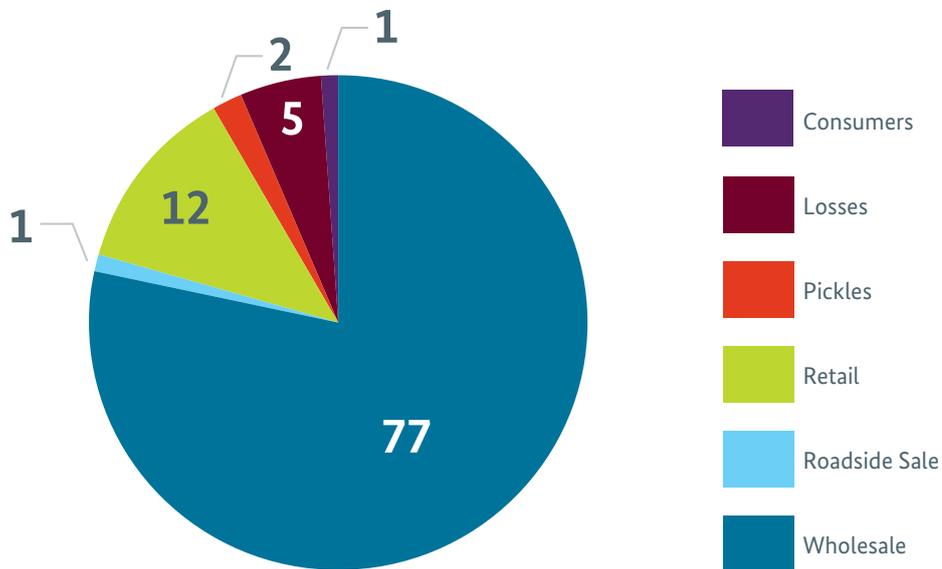
### 8.2.5 Marketing

Cucumber producers usually sell their products to wholesalers, who represent the main channel for product distribution, accounting for about 77% of total production. The other sales channels are depicted in **Figure 19**, which shows that retailers are the second major channel for product distribution. Farmer family consumption is estimated to reach about 4.2 kg/month, based on the available data on consumption patterns.



Figure 19

Cucumber Distribution and Use (in %)\*



\* Deviation from 100 percent due to rounding.  
Source: Own research.

Direct production loss of 5% mainly occurs during harvest and immediately before product sale, resulting from traditional practices, poor harvesting methods, improper handling of cucumbers, and inadequate transport conditions. Indirect, hidden loss at the production stage also has to be taken into account, attributable to unsuitable seedling and fertiliser application and reflecting systemic deficiencies in the value chain.

Producers who transport their products themselves also mentioned transportation difficulties due to security arrangements as well as long distances. Price dumping constitutes an additional obstacle facing producers, in view of ample imported products. While Iraqi cucumbers cannot compete with imported or smuggled products in price, consumers prefer local cucumbers because of their taste. Lack of storage and processing facilities during the peak production period places pressure on farmers to sell their products at any price, reducing their bargaining power considerably. Although cucumber farmers suffer from rising costs of key inputs, costs and revenues of the season under review do not reflect the standard situation, as the region remains in the recovery stage following the dramatic destruction due to armed conflict. In addition, the current fertiliser price also reflects the fact that the government did not provide subsidised fertiliser to farmers. Secondary data from the Directorate of Agriculture are not available. The challenging cost structure is even more significant than shown by the data: farmers need to fund rural roads in order to access markets, and additional expenditure for wells and access to the electricity grid also needs to be funded. High costs also arise when small-scale farmers invest resources to access knowledge, technical assistance and the market. As a result, profits are low and production of cucumbers is not competitive. Small-scale farming could be profitable though, on condition of availability of public goods. In the cucumber value chain, internal advantageous factors, such as knowledge, experience and investments, are not well defined and the



external business environment is risky and unstable. Rather than increasing production as such, enhanced efficiency in terms of both technical and economic factors will improve the cucumber value chain and contribute to higher profitability.

### 8.2.6 Wholesale

Farmers sell cucumbers to wholesalers or directly to retailers, including roadside sales, as shown in **Figure 19**. In some cases, farmers take their produce directly to the wholesale market and in about one-third of cases, wholesalers source the produce directly from farmers. Irrespective of the quantity sold, farmers have to pay an upfront-fee, based on estimated profit, at the entrance to the wholesale market where most transactions are cash-based. Prices are market-based, also taking into account quality, but in some cases, contracts are agreed in advance. Price agreements among wholesalers are common. The cost of transportation is paid by farmers and depends on the location, with an average estimate of 2,000 IQD/ton.

Wholesalers in the area under review have extensive experience in trading vegetables, including cucumbers. Their average experience in this line of business is about 24 years, and wholesale constitutes the primary income source for 90% of them. Wholesalers use their own assets as business capital, and almost 20% of them have taken out interest-free loans.

There is limited availability of cold storage facilities due to destruction of physical infrastructure and a lack of reliable energy supplies: 50% of wholesalers have access to cold storage and 60% depend on private generators. The loss of produce in this part of the value chain is negligible in view of quick interactions among farmers and retailers. Wholesalers mentioned stable product waste of about 650 kg/month, equivalent to a share of 0.5% of total produce. They are also involved in services, such as cleaning, sorting and grading. Almost 30% of wholesalers offer loans to producers, and occasionally loans are also offered to retailers.

### 8.2.7 Retail

Retailers usually purchase produce directly from farmers and take it to their shops. 91% of them indicated that cucumber sales are their main source of income, while the remaining ones conduct additional business. 25% of retailers have received interest-free loans from relatives. Although retailers could be expected to own cold storage facilities to maintain quality of products, reduce waste and minimise transportation costs, only 9% of them have storage facilities with a generator. Most retailers perform some pre-sale functions as they clean the product, sort it and grade it. Product waste at the retail stage is estimated to reach an average of about 140 kg/month, equivalent to 3% of the quantity produced. Post-harvest losses at the wholesale and retail stages constitute a significant challenge and can be attributed to poor management, including inappropriate packaging and poor storage and transport conditions, all of which damage the product. Basic services are available to some extent, but the handling of cucumber and activities such as grading and quality control are almost absent.

Retailers aim to attract customers by special offers. Among the challenges they face are high or fluctuating prices and low-quality products; limited availability of facilities, due to the destruction of physical infrastructure; unreliable energy supplies; competition from imported products; and poor financial and social capital along the value chain. The price paid by wholesalers to



farmers ranges from 450 to 650 IQD/kg, depending on the season; in the early days of the harvesting period, produce tends to be more expensive. Wholesalers trade cucumbers with retailers in a price range from 650 to 1,000 IQD/kg.

### 8.2.8 Processing

Twelve processors with experience of about 13 years on average in the cucumber business were interviewed. Their single product, cucumber pickles, is the main source of income for almost three quarters of them. Processors purchase almost two-thirds of cucumbers for processing from farmers and the remainder from traders, with 60% of suppliers (farmers or traders) taking the product directly to the processor. In order to attract consumers, processors sell on credit as well as delivering products to consumers.

Cucumber-processing facilities are important assets for the value chain. The majority of processors rent their factory and selling spaces without private generators, thus depending mostly on main line electricity supplies. All processors hand-package their products. The cucumber processing industry requires specific varieties, different from the varieties demanded in the market for fresh cucumbers, and prices differ as well. 60% of consumers traditionally produce pickles in their household, for family consumption and for the sale of excess quantities. The processing chain for cucumber relies on traditional methods and the establishment of modern processing facilities will enhance efficiency. 83% of processors stated that product waste arises, usually on the order of about 133 kg, equivalent to 2% of the total quantity produced, in addition to 2% of waste of the purchased quantities and a 2.5% loss during storage.

### 8.2.9 Consumption

Cucumber consumers in the area under review consist of restaurants and families. Restaurant managers prefer local cucumbers to imported ones because of taste, however, locally-produced cucumbers are not available throughout the year due to seasonality and poor management of supplies during the peak season. Restaurants buy cucumbers of two types, fresh ones and pickles, and restaurant managers find the wholesale price for cucumber of 715 IQD/kg generally affordable. They purchase more than half of their cucumber requirements from wholesalers, 25% from retailers and 20% from farmers, at a price of around 500 IQD/kg. In addition, restaurants also buy pickles at around 1,860 IQD/kg.

Almost three quarters of families and individuals consume cucumbers daily, finding a price of 780 IQD/kg affordable. The average monthly consumption of cucumber stands at about 4.2 kg. Consumers expressed a preference for purchase from retailers, but they also buy cucumbers in the supermarket or from small-scale traders. Local cucumbers are preferred by both restaurants and households because of taste and affordability. However, interviewees mentioned that locally-produced cucumbers are not available throughout the year due to seasonality.

Overall, 70% of consumers expressed satisfaction with local products, compared to 30% who were not satisfied because of the shape and size of cucumbers, damages, and a lack of cleaning and grading. As for pickles, 80% of consumers prefer local ones because of taste and price, while the remainder prefer the imported varieties on account of shape, taste and price. In general, 83% of consumers believe that the price of local cucumbers is more justified than the price of



imported ones. Product damage is more prevalent in imported cucumbers than in local produce because of the extended time-span between harvest and consumption.

Based on data for per capita consumption among the population of Al-Anbar, the demand for cucumber is estimated at 90,000 tons per year, pointing to potentially significant growth in demand. In the interest of both farmers and consumers, the latter suggested establishing a pickles plant. They also proposed enhanced marketing of local produce, more support to farmers, a price ceiling and government monitoring of the sector.





### 8.3 SWOT Analysis

SWOT analysis is conducted in order to determine existing gaps and identify the strengths, weaknesses, opportunities and threats related to the cucumber VC in the area under review, as a basis for proposed areas of intervention (Table 22).

**Table 22: SWOT Analysis of the Cucumber Value Chain**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>■ High-value agricultural commodity</li> <li>■ Wide-spread acceptance as a source of food/nutrition</li> <li>■ Major source of income</li> <li>■ Comparative advantage in production</li> <li>■ Short production cycle</li> <li>■ Fits well in enterprise diversification and integrated value chain strategies</li> <li>■ Cultivated throughout the year (in covered cultivation)</li> <li>■ Suitable soil and climate conditions</li> </ul>	<ul style="list-style-type: none"> <li>■ Low productivity</li> <li>■ Use of outdated varieties and no evidence of climate-adapted varieties</li> <li>■ Significant post-harvest losses</li> <li>■ High production costs</li> <li>■ Inefficient use of (irrigation) water</li> <li>■ Lack of GAP</li> <li>■ Lack of storage facilities</li> <li>■ Lack of knowledge of the market/consumer needs</li> <li>■ Limited attention paid to inclusion of women, youth and vulnerable groups</li> <li>■ Cooperatives face capacity limitations</li> <li>■ Lack of high-quality cucumber seeds</li> <li>■ Only traditional processing facilities</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>■ Large domestic market with high demand for local cucumbers as a substitute for imports</li> <li>■ Increased availability and use of drought-resistant varieties and a shift to modern nursing methods</li> <li>■ Processing opportunities as demand for processed products increases</li> <li>■ Higher incomes through increased productivity and stable yields</li> <li>■ Large-scale demand for fresh and processed cucumbers</li> <li>■ Existence of processing facilities</li> </ul>	<ul style="list-style-type: none"> <li>■ High input costs</li> <li>■ Declining farm size</li> <li>■ Diseases/pests</li> <li>■ Market distortions and price volatility</li> <li>■ Lack of financial services</li> <li>■ Ineffective legal and regulatory framework</li> <li>■ Poor infrastructure</li> <li>■ Competition from imported products</li> <li>■ Insufficient agronomic research at the national level</li> <li>■ Harsh weather conditions</li> <li>■ Water shortages</li> </ul>

Source: Own research.



## 8.4 Summary of Findings

- Demand for cucumber in Al-Anbar stands at around 90,000 tons of fresh produce, only 18% of which is met by local production.
- Demand is on the increase as a result of population growth and changing taste.
- Based on current farming systems and low levels of investment, farmers will likely not be able to increase production sufficiently to close the gap between local demand and domestic supply.
- The main actors engaged in the cucumber value chain are input suppliers, producers, traders (wholesalers and retailers), processors and consumers – all impacted negatively by the absence of financial services, as well as research and extension services.
- Both suppliers and farmers prefer imported inputs, which, however, are relatively expensive.
- In order to obtain inputs, farmers rely entirely on informal sources, including imports and local markets. Almost a quarter of producers rely on local multiplication of seeds, which results in lower productivity compared to imported seeds.
- Smallholders are the main producers of cucumber in the area under review, irrespective of cultivation method.
- Farming largely remains a family business with poor access to financial services, often implying limited investment opportunities.
- Outdated practices, lack of knowledge and insufficient skills among farmers and agricultural labourers result in low performance efficiency. Furthermore, insufficient water in terms of both timing and quantity, low-yield varieties not appropriate for small-scale producers and gaps in the management of tomato diseases remain critical challenges to production. Accordingly, productivity is low, reflecting the lack of conducive conditions.
- Farmers add the highest value in the cucumber value chain, demonstrating that their value-adding activities as well as their operation costs are larger than those of other actors. Fertiliser, seed, chemicals, greenhouse materials, fuel and labour costs account for the largest part of total variable costs associated with cucumber production.
- The absence of a valid cost calculation base hampers decision making. Cucumber is mostly sold at harvesting time without storage for future sales, often creating gluts and low prices during the harvesting season, with farmers' bargaining power reduced by the competition of low-price imported produce.
- Cucumber producers have little influence on the governance of the value chain and their role is limited to production.
- Traders (importers and wholesalers) serve as the main drivers of market behaviour and prices.
- Wholesalers are the main governors in the cucumber value chain as a result of their critical position with regard to capital and the quantities purchased, as well as their role as main channel of product distribution. High production costs, expensive inputs and low productivity, in combination with declining sales prices reduce farmers' income.



- Limited operability of markets reduces profit margins, thereby hampering investment in production, storage and marketing facilities.
- Local produce is strongly preferred by consumers because of taste, freshness and lower prices, reflecting a mismatch between consumers' preferences and those of other market players. The availability of local produce is subject to seasonality.

In line with the problem tree analysis, the main challenges of the cucumber VC are high costs of inputs that translate into high production costs, as well as low input quality resulting in low productivity. High production costs in turn lead to high prices of the final product, which should be reduced in order to compete with imported cucumbers. Lack of good agricultural practices also contributes to low productivity, including in greenhouse production. In the absence of processing facilities that can absorb large amounts of cucumbers during the peak season, farmers are forced to accept lower prices, reducing their bargaining power – the problem being exacerbated by limited investment in infrastructure, in particular cold storage facilities. Insufficient profit margins lead to limited investment in updated farming practices and product handling, reducing technical efficiency and economic performance. Poor marketing as well as inadequate handling of produce by farmers result in limited competitiveness and lower profits. The high demand for local produce, attributed to both taste and price, and the substantial gap between domestic supply and demand represent a great opportunity for future expansion in the production of cucumbers, based on strategies for value chain improvement.

## 8.5 Interventions

**To address and handle the aforementioned issues that limit performance along the VC, there is a need to**

- Increase public and private investment geared towards improving the efficiency of VC actors, particularly farmers
- Promote access to affordable farm inputs and the adoption of recommended agronomic practices with regard to land preparation, appropriate seeding rates, and pest and disease control
- Improve farmers' access to high-quality, effective extension services
- Promote use of low-cost irrigation
- Reduce the risk of loss and quality deterioration through proper on-farm storage or preservation technology and reliable transportation
- Improve marketing functions by developing market facilities, particularly storages
- Establish processing facilities and enterprises
- Invest in essential public goods, in particular infrastructure.



The a.m. areas of intervention require better understanding of domestic market mechanisms and investment in productivity-enhancing equipment, infrastructure and processes. Related strategies should address support for agri-business innovation to enhance value-added activities; restoring or establishing shared processing facilities at the community level; the adoption of energy-efficient cooling infrastructure and refrigerated transport equipment; better availability and more wide-spread use of drought-resistant varieties and a shift to modern climate-adapted nursing methods; and the preparation and use of organic fertiliser, e.g. composting.

**Figure 20** shows the value added in cucumber production along the VC. As mentioned, farmers added the highest value due to their wide range of activities in the production of cucumbers. Due to high production costs, producer prices do not reflect the considerable value added along the production chain. Producer prices for cucumbers fluctuate in line with seasonality, depending on quantities available and the stage of marketing.

**Figure 20**



Source: Own research.



## 9 Date Value Chain

Date palm cultivation is an important global industry. Processed dates are marketed all over the world for direct consumption and further processing into high-value products. For Iraq, dates represent a specific icon with a unique historic, religious, economic and social value. Dates are considered to be among the most important creators of national wealth – along with other natural resources, such as crude oil. The cultivation of date palms has a very long history in Iraq, although historians differ regarding their exact place of origin – nevertheless agreeing that Iraq could be the original home of date palms.

Dates are an important cash crop: in addition to being consumed as fresh fruit, they can be processed into different products, such as sugar, ethanol, syrup, animal feed, jam and a variety of by-products. Traditionally, dates have also been an important export crop. However, despite high global demand for the product, date production and quality have fluctuated over the past years, and export capacity has declined due to lower yields and poor quality. Iraqi date palm resources have been marked by severe deterioration over the past three decades. Due to the saturation of global date markets, competition has shifted to quality. Accordingly, in line with certification needs, traceability of origin and the entire supply chain is required.

The policy governing date production in Iraq, including Al-Anbar, would benefit from a comprehensive review by the relevant authorities, namely the Council of Ministers and the Ministries of Agriculture, Industry, Trade and Planning, also involving the private sector. High-level coordination between these parties is needed to increase production and develop competitiveness. The development of the date industry could contribute to the diversification of Iraqi exports. Reflecting high global demand, the distribution of Iraqi dates should target both Arab and international markets.



## 9.1 Number of Trees, Production and Average Yield of Dates

For the 2020 season, the production of dates of all varieties was estimated at almost 735,400 tons, reflecting an increase of 15% over production in the 2019 season. With production of an estimated 126.2 tons, Baghdad accounted for 17.2% of Iraq's total production, the highest share among Iraqi governorates. Average productivity of the date palm tree in the production stage was estimated at 68.2 kg, the highest average productivity of the palm tree being achieved in Salah Al-Din Governorate, with an estimated 90.3 kg.

The estimated number of date palm trees in the year 2020 was 17.349 million, including both female and male trees as well as young trees and those planted in the 2019 season. Female trees account for about 97% of the total number of trees, with a share of Al-Anbar of 7% of date palm trees and about 5% of total date production in Iraq (Table 23). The difference in yield per tree between Al-Anbar and the national average level is obvious, but in general, productivity of date production has declined over the past few years.

**Table 23: Number of Date Trees, Productivity and Production of Dates in Iraq and Al-Anbar**

Governorate	Total number of date palm trees		In % of Iraqi total	Average productivity per palm (kg/tree)		Production (ton)	In % of Iraqi total
				In the production stage	Productive		
Al-Anbar	1,156,036		7	57.8	59.0	36,424	5
Iraq	17,348,741		100	66.7	68.2	735,353	100
	Female trees	16,840,600	97				
	Male trees	508,141	3				

Source: Own research.

## 9.2 Key Value Chain Actors and Their Functions

### 9.2.1 Value Chain Map

Value chain mapping enables the visualisation of the product flow from the very beginning to the end-consumer through various actors. It also helps to identify the different actors involved in the value chain system and to understand their roles and linkages.

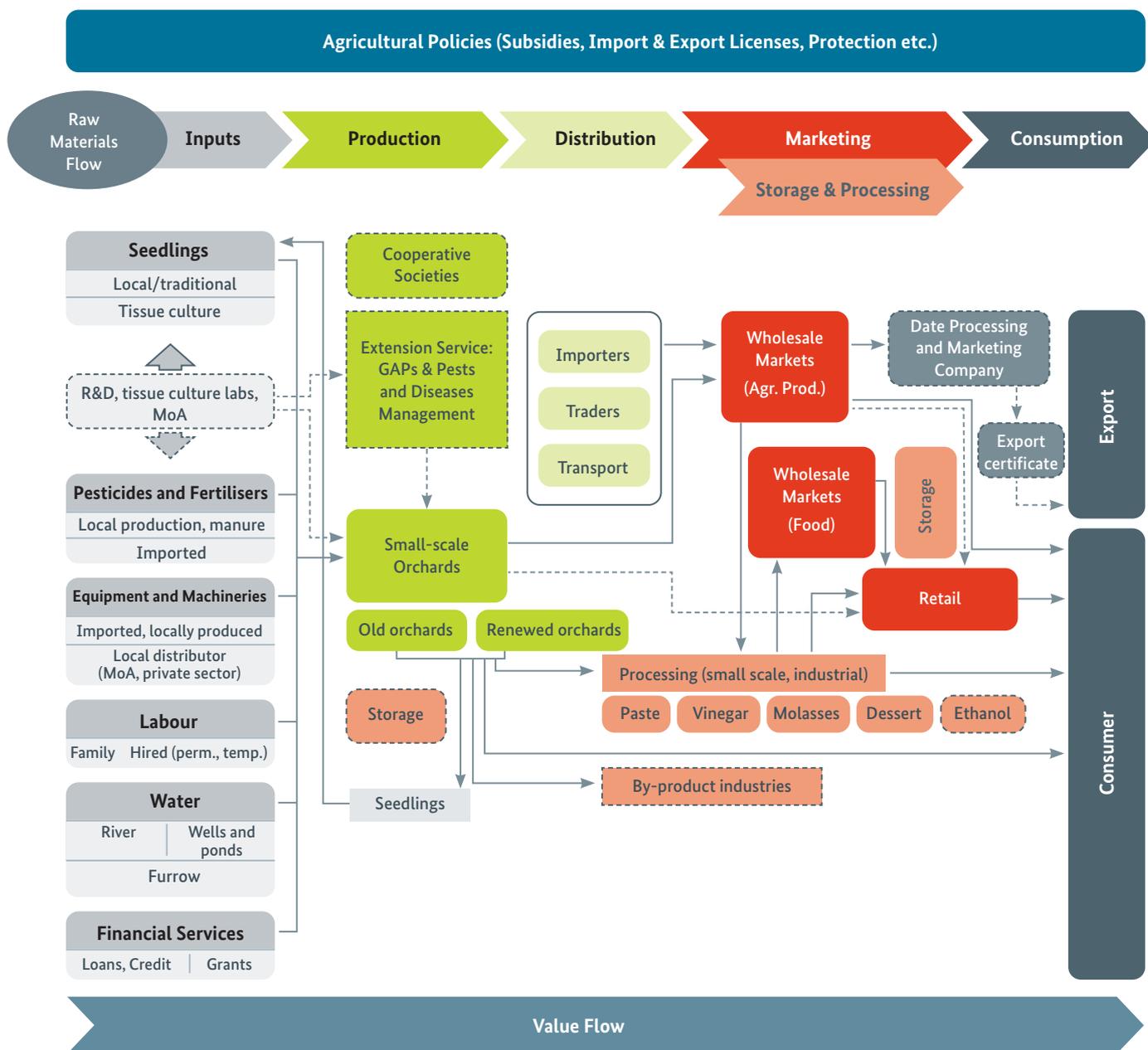
The date value chain in Al-Anbar comprises a range of actors at different stages of the chain: from input supply, via production, processing and wholesale, to retail and final consumption. It also involves actors providing supporting services to different functions of the value chain, including financial services (Figure 21).



**Figure 22** depicts the distribution of date value chain actors in Al-Anbar (Heet province), generated from data gathered through interviews with 387 actors along the value chain. Additional information was collected from providers of supporting services to the value chain through discussions or by indirect means.

**Figure 21**

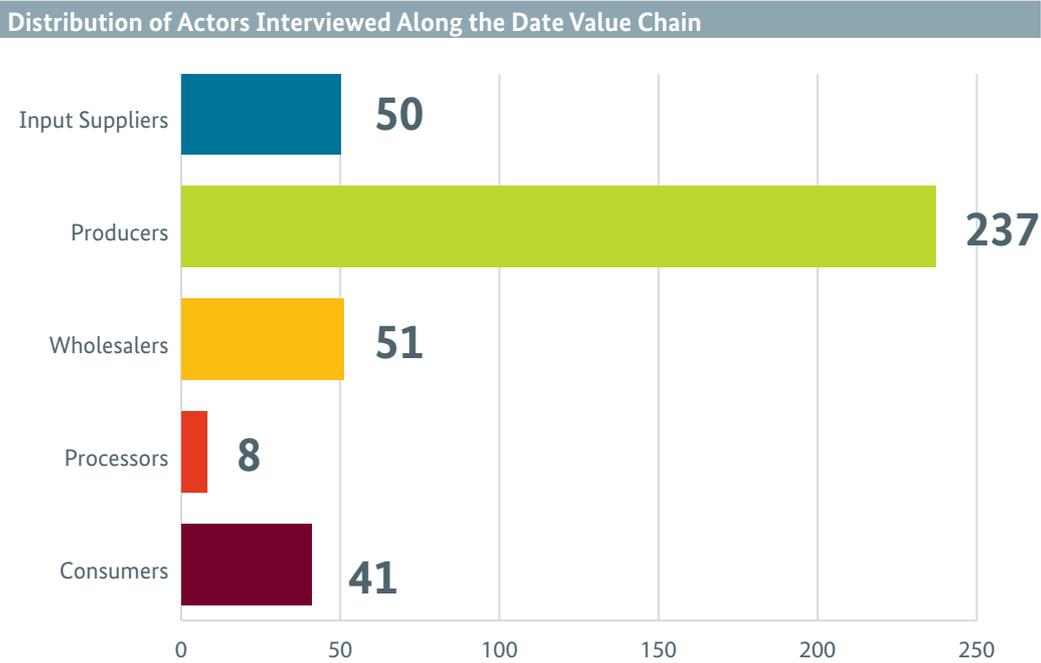
**Date Value Chain Flow in the Area Under Review**



- Agricultural policies; framework conditions
- Flows: raw materials and value
- Inputs: categories
- Inputs: specific items
- Production phases
- Distribution network
- Marketing
- Storage and processing
- End-use: consumption and exports
- Export-related activities
- Interdependency/direction of flow
- - - - - Activity exists as part of the traditional VC but not during the study period; it constitutes a potential for the region

Source: Own design © AFC 2022.

Figure 22



Source: Own research.

### 9.2.2 Input Supply

Input suppliers mainly supply seedlings, pesticides, machinery, and equipment to date producers. These are normally private sector players who can be divided into two categories, domestic producers of inputs and importers. Until a few years ago, the government used to support the date sector by providing date producers with inputs, mainly fertiliser and pesticides. Government support included plans to spray pesticides on palm orchards once a year, in order to control pests and diseases. Inputs like fertiliser and pesticides are mostly imported and purchased from the local market; however, the government still distributes some inputs at subsidised prices, such as seedlings, chemicals and some equipment.

Date production requires high initial investment in inputs and there are many actors engaged directly or indirectly in agricultural input supply in the area under review. Suppliers consist of two main categories, suppliers of regular inputs such as fertiliser, chemicals, equipment and spare parts, and suppliers of offshoots. Input suppliers provide inputs to farmers from their stores in Heet. All imported chemical inputs applied in the area under review are sourced from outside Al-Anbar Governorate. According to interviewees, the list of countries of origin includes the Netherlands, China, USA, Iran, Jordan, India, Australia and others.

According to the data collected, input suppliers have trading experience of more than 16 years on average. For almost 70% of suppliers their business constitutes their only source of income, accounting for almost 95% of their total income, while it represents a supplementary source of income for the remaining suppliers. The source of invested capital originates exclusively from personal funds, and 6% of suppliers purchase inputs on credit. Suppliers of fertiliser and insect/

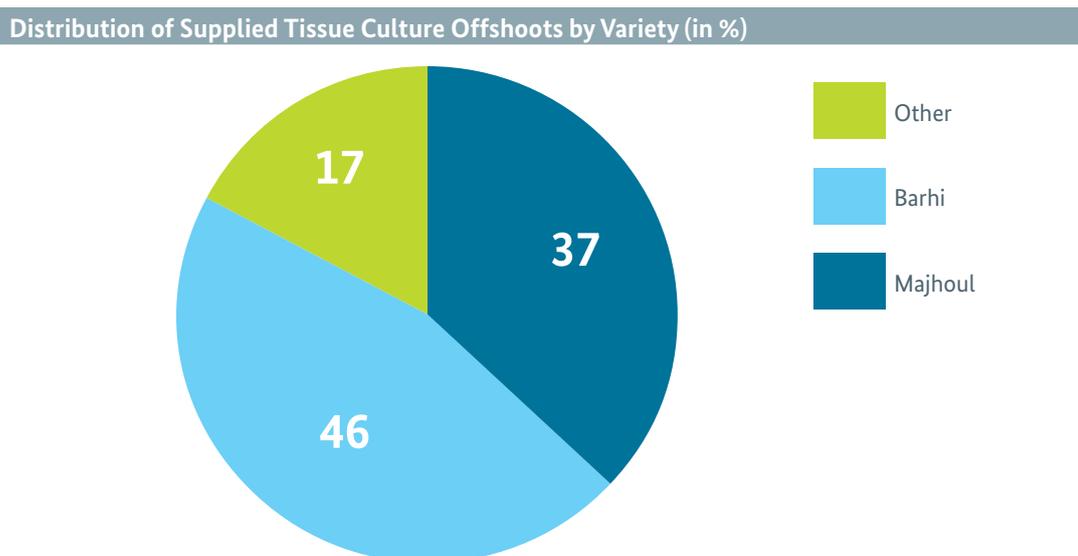


pest chemicals reported sourcing 94% of inputs in the private sector, while the remaining 6% are purchased from mixed public/private sector entities. Almost 6% of suppliers indicated that the fertiliser purchased is manufactured locally, accounting for about 9% of the total quantity of traded fertiliser. However, 16% mentioned distribution of fertiliser and other chemicals by the government as part of the annual agricultural plan. Suppliers are well equipped, with 80% of them owning storage facilities where fertiliser and other chemicals can be stored for almost two months on average. Suppliers of fertiliser and chemicals prefer imported inputs over domestic ones, in view of higher quality, efficiency and effectiveness.

High prices and transportation difficulties, also in connection with security-related issues, are the main constraints affecting import and supply of fertiliser and other chemicals. Other constraints, as reported by input suppliers, are high taxes and customs tariffs, import contingents and the physical distance to main importers. Suppliers are confronted with a range of cost items, including water, electricity, maintenance of storage facilities and equipment, oil and fuels, labour and transportation. They rely on their specific long-term experience in order to run their business efficiently. Importers sell fertiliser and chemicals to suppliers at 1,456 IQD/kg and 26,000 IQD/kg, respectively. Suppliers, in turn, sell these inputs to farmers at a price of 2,000 IQD/kg and 17,000 IQD/kg, respectively.<sup>17</sup>

Offshoots are the most important component of inputs, in particular for new or renewed orchards. The most common sources of offshoots are private sector nurseries. Suppliers reported that more than 60% of supplied offshoots originate from tissue culture propagation, while only 6% were bought directly from tissue culture laboratories. They trade in no more than three varieties of date tissue culture, originating from offshoots. The most common varieties supplied are Barhi (46%) and Majhoul (37%) (Figure 23). The majority of offshoots were taken directly from their tree mother, as reported by 83% of suppliers, while more than 55% of suppliers indicated that they purchase offshoots from specialist producers.

Figure 23



Source: Own research.

<sup>17</sup> The prices also reflect changes in agricultural policy during the survey period, including the discontinuation of subsidies for chemicals.

Although Barhi is one of the most highly preferred date varieties in Iraq, its purchase price is lower than the price of the other two varieties, as reported by suppliers. While the average price for an offshoot of the Barhi variety is IQD 190,000, it reaches IQD 215,000 for the Majhoul variety and IQD 225,000 for Ajwah offshoots, respectively. The number of traded offshoots for each variety is shown in **Table 24**, along with the average price per tree.

**Table 24: Average Price and Number of Traded Date Offshoots**

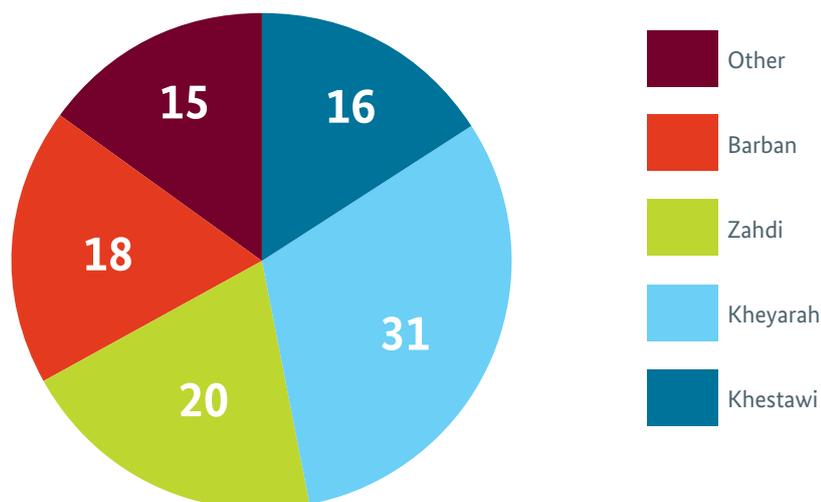
Variety	Average price (IQD/tree)	Number of plants sold
Barhi	190,000	28
Ajwah	250,000	10
Kuronfoli	200,000	10
Loloah	200,000	88
Majhoul	215,000	24

Source: Own research.

Suppliers usually trade various locally-sourced date offshoots, including Kheyarah, Zahdi and Khestawi. **Figure 24** depicts the share in total off-shoot sales for each variety sold, while **Table 25** shows the prices for local offshoots by variety, ranging from 6,000 IQD/tree for Khestawi to 125,000 IQD/tree for the less well-known variety Maamouri.

**Figure 24**

Distribution of Traded Offshoots by Variety (in %)



Source: Own research.

**Table 25: Price and Number of Local Offshoots Sold, by Variety**

Variety	Average price (IQD/tree)	Number of plants sold
Ashrasi	15,000	35
Barban	34,000	28
Khestawi	6,000	84
Kheyarah	27,000	87
Zahdi	16,000	340
Maamouri	125,000	10
Maktoum	48,000	39

Source: Own research.

A majority of more than 75% of suppliers find that date farmers prefer local offshoots to tissue culture offshoots, mainly because of guaranteed varieties and affordability. The use of clean offshoots is the most common way to control the spread of diseases. Accordingly, 90% of offshoot suppliers treat plants with preservatives before selling them. However, an average of 25% offshoots are damaged during handling, including in storage facilities.

Overall, input suppliers are well-equipped with the necessary tools to conduct their work. Farmers buy inputs from suppliers, usually paying in cash, in some cases including deferred payments, to be finalised after harvesting. Prices of imported materials, such as water pumps and pesticides, are a given for both farmers and suppliers.

### 9.2.3 Production

Producers are the main actors in the date sector in the area under review (Heet), with a significant majority of 82% involved in small-scale farming, with an average orchard size of seven donums. Producers usually establish date orchards either by generating their own seedlings from existing palm trees or by purchasing seedlings from offshoot suppliers, orchards or nurseries (including tissue culture offshoots, which account for only 4% of the total number of trees). The average number of date trees is almost 39 per donum. Farmers mostly manage the production cycle themselves, occasionally hiring external service suppliers for sowing, pruning and harvesting. Small-scale farmers of dates usually depend on family labour, in addition to seasonal labour. Availability of skilled labour is critical in the value chain of dates, especially at the production stage, in view of the specific nature of the crop and its need for trained and experienced staff, e.g. in pruning operations.

**Table 26: Socio-Demographic Characteristics of Date Producers**

Characteristics	Average
Age of farmers (years)	44
Farmers' experience in agriculture (years)	25
Farmers' family size (persons)	8
Family members who work in agriculture (persons)	4

Source: Own research.

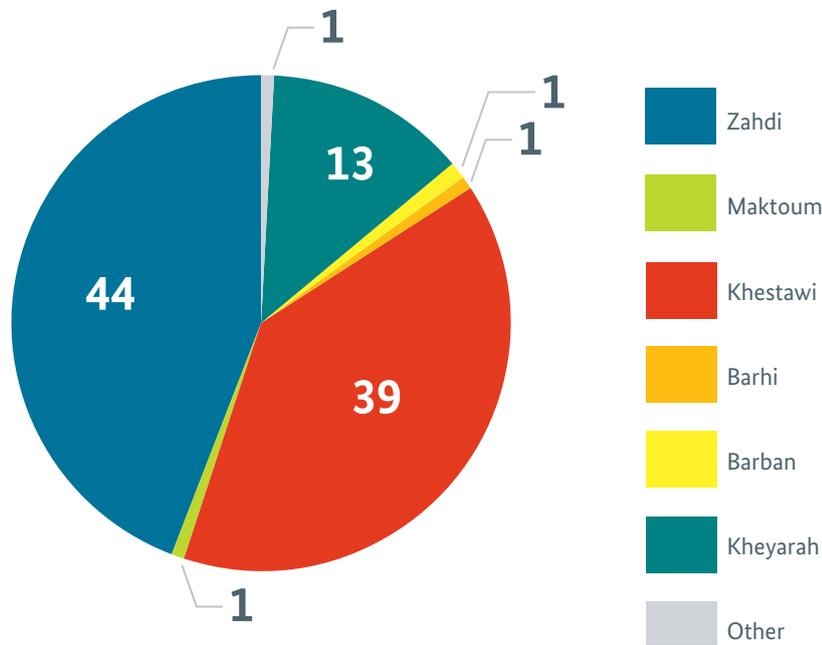
The average age of date farmers was 44 years, with 25 years of experience in date cultivation (**Table 26**). The average family size was 8 members, 50% of whom work in farming. With regard to the education level, 96% of date producers have more than six years of schooling.

Despite the importance of date production, date orchards have not benefitted from adequate management. Most orchards are cultivated using traditional methods that do not comply with the use of modern technologies. Against the background of water shortages, 99% of farmers use furrow irrigation. Farmers report that the capital invested in their date orchards is 100% privately sourced, financing a range of fixed assets, such as tractors, water pumps, insecticide sprayers, mowers and pick-up trucks. 71% of date producers depend on agriculture as their main source of income, and date production accounts for about 65% of farm income. About 61% of farmers have adopted a mixed plant-livestock production system by also raising small ruminants, such as sheep. For these producers, livestock husbandry contributed 26% of overall farm income.

Date palms perform best in sand, sandy loam, clay and other heavy soils and need effective drainage and aeration. While date palms tolerate saline soils, high salt levels tend to stunt growth and lower the quality of the fruit. According to interview data, saline levels in more than 50% of orchards are moderate to high, with 93% of interviewees confirming moderate soil texture. Date orchards in the area under review are mostly planted with two varieties (79%) or three varieties (19%), with about 90% of trees generated from existing palm trees. As **Figure 25** shows, Zahdi is the dominant variety, characterised by dry dates with a high sugar content, low moisture levels (< 20%) and dry and hard flesh.

Figure 25

Composition of Date Palm Orchards, by Variety (in %)



Source: Own research.

In terms of fertiliser application, 76% of date farmers in the area under review reported using mostly two types, while the remaining ones apply either one or three types of fertiliser. Urea accounts for almost 37% of fertiliser applied, while organic fertiliser (manure) takes a share of 31% and DAP a share of 30%. Chemical fertiliser, including Urea and DAP is mostly sourced from local input suppliers, while own farms or neighbouring farms provide manure. The amount of fertiliser applied varies considerably by type of fertiliser, ranging between 75 kg/donum and 85 kg/donum for Urea and DAP, respectively, while the average of applied manure is more than 1,600 kg/donum.

60% of date farmers apply two types of insecticides and pesticides, in 90% of cases purchased from local input suppliers, while the remainder is provided by the government. The wide-spread lack of knowledge about chemicals management, in particular the correct use of fertiliser, applies to both quantity and type of input. Major pests affecting date 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 in line with location, season, date variety, cultural practices, farm management and the overall environment.

### 9.2.4 Productivity

The reported productivity of date cultivation in the area under review (Heet) is aligned with official published statistics, pointing to an average of 55 kg/tree. One donum of date orchards produces approximately two tons of dates (Table 27) and the average production per farmer is about 10 tons. A more detailed analysis of productivity by date variety would require additional data collection.

**Table 27: Productivity of Date Orchards in Heet**

<b>Productivity (kg/donum)</b>	<b>1,935</b>
<b>Productivity (kg/tree)</b>	<b>55</b>

Source: Own research.

### 9.2.5 Marketing

Traditional small-scale date orchards sell their fruits to wholesale traders, date processors, and rural and urban markets, as well as to other date producers, allowing them to increase their sales volumes. Farmers report that their main client is the wholesale market, where about 50% of producers sell their dates. Direct purchase of dates from farms by wholesalers during harvesting time was reported by 19% of farmers, while 27% of them reported sales on the basis of advance contracts or agreements (Table 28). The sales price for transactions with wholesalers was on the order of 518 IQD/kg, depending on variety, size, and quality of the dates. Use of other parts of the date palms, either as raw material or for further processing, was not reported.

**Table 28: Distribution of Dates**

	<b>Producers (in %)**</b>	<b>Production (in %)</b>	<b>Price (IQD/ton)</b>
<b>Selling to wholesalers</b>	50	44	518,000
<b>Selling at farm gate</b>	18	15	480,000
<b>Stored</b>	3	2	
<b>Sales on the basis of advance contracts with traders</b>	27	21	400,000 – 420,000
<b>Losses / Damaged*</b>		13	285,000 Damaged produce is usually sold as feed for livestock
<b>Not identified</b>	3	5	

\* Damages occur mainly due to improper handling. Losses mainly occur during storage.

\*\* Deviation from 100 percent due to rounding.

Source: Own research.



A major concern relates to losses during harvest, which account for 13% of dates produced, caused by outdated harvest techniques, unsuitable handling of the produce, insufficient storage facilities, lack of pesticides, and diseases. Shortage of skilled labour, in combination with pressure for higher wages, has led to a reduction in orchard maintenance. The subsequent scaling-down of interventions has favoured the resurgence of pests and diseases, causing a significant reduction in date palm productivity and quality. Date producers face numerous challenges that constrain their capacity to enhance productivity, including endemic pests and diseases; high production costs; limited adoption of modern cultivation practices and technologies; lack of management skills and skilled labour; lack of reliable electricity supplies; the absence of storage facilities; and limited economies of scale.

In the context of suggestions for strategies to overcome the plethora of challenges, almost all producers interviewed mentioned the provision of input subsidies and the imposition of price ceilings by the government, in particular for fertiliser, other chemicals and fuel. Furthermore, modern techniques to re-establish orchards, substitute old palm trees and improve date palm quality should be disseminated widely and farmers should receive financial support and technical assistance to adopt those practices. Regarding sales, producers face challenges related to price fluctuations (76%), transport difficulties in terms of cost and distance (17%), and competition from imported date products (6%).

### 9.2.6 Wholesale and Retail Marketing

Wholesalers of fresh dates also act as collectors, traders and retailers, usually buying dates from producers on a short-sell basis (i.e. they order the crop around the start of the season and pay cash up front to the farmer), in addition to direct purchases. Producers sell dates to wholesalers on a routine bases, as their main sales channel, while in some cases, farmers take the produce directly to the wholesale market.

Wholesalers have an average of about 20 years of experience in their field of business. 82% of wholesalers rely on date trading as their main source of income, while 35% have an additional source of income. Wholesaler use their assets to fund their business, and almost 32% of them have taken out interest-free loans. They are well equipped to conduct their business, owning vehicles (45%), cold storage facilities (31%), power generators (22%) and scales, and also employing professionals, such as accountants (18%) and weighing staff.

Wholesalers of dates perform the main sales functions as 86% of them take dates directly from the farms to their stores or storage facilities; 80% of them clean the produce; 77% engage in sorting and grading; and 78% are involved in packaging. Wholesalers reported a range of difficulties and constraints that hamper the sales process: price fluctuations; inappropriate product handling; inadequate transportation; difficulties in shipping produce to areas beyond Al-Anbar Governorate; and the absence of marketing activities on the side of farmers.



### 9.2.7 Processors

Date processing could be very profitable, however, processors in the area under review still use traditional tools and methodologies. Processing plants are mostly medium-scale enterprises with an average operation capacity of around 390 tons/year, operating at about 50% of their capacity. Significant quantities of dates are processed by women in home industries. About two-thirds of producers purchase dates directly from farmers, while the remaining ones buy dates from wholesalers, with purchases occurring up to 13 times per year.

Processors have experience of up to 50 years in their industry with an average of 34 years in the production of date paste (debs) and 30 years in producing vinegar. The industry, which includes shisha molasses in addition to the two main products, paste and vinegar, is the only source of income for 63% of producers interviewed. The production of 1 kilogram of date paste requires 2 kilograms of crude dates, while vinegar and molasses require 1.25 kilograms and 1 kilogram of dates, respectively. All manufacturers use their distinguished trade brand. The different a.m. products require specific cultivars, and small-scale processing at the household level can help to develop value chains in local markets.

Households can reach niche markets if they adhere to quality standards and adopt effective marketing and sales strategies. Matching demand and supply and determining the correct timing for processing and sales for a given date variety, also taking into account pedoclimatic conditions, are key factors that determine success in the date business. In addition to the products resulting from date processing, there are opportunities to use other parts of the date tree in order to manufacture by-products, such as traditional furniture and crates.

### 9.2.8 Consumption

Consumers are important actors in the value chain of dates, purchasing either the fresh fruit or date products for consumption. Households were identified as the main date consumers and accordingly, members of 41 households were interviewed. A large majority of households (83%) consume dates or date products on a daily basis. Prices are considered to be affordable, irrespective of the sales point: traders in 75% of cases and supermarkets in 20% of cases. Those interviewed were satisfied with the dates they had purchased. The main factors guiding purchase decisions are product quality (55% of interviewees), distance to sales point (30%) and the availability of delivery services.

Dates and date products are available in the market in two categories, as fresh dates and processed ones. Processed dates include, inter alia, date paste, molasses and stuffed dates. The average purchased quantity of fresh dates is about 8 kg per family and month (or about 1.2 kg/month per person), in addition to about 3.1 kg/month as paste and vinegar. The price of products as reported by consumers was about 1,520 IQD/kg for fresh dates and 2,100 IQD/kg for paste; households that purchase dates directly from farmers pay an average price of 870 IQD/kg.

Based on estimates for monthly per capita consumption of dates and data for the population of Al-Anbar, the demand for dates is about 27,000 tons per year, reflecting significant potential for the expansion of a domestic market with a preference for local produce. Consumers generally prefer local dates and date products to imported ones because of higher quality in terms of taste and freshness, in combination with lower prices. While paste and molasses are available throughout the year, the availability of fresh dates varies in line with seasonality.

### 9.3 SWOT Analysis

A SWOT analysis is conducted in order to determine existing gaps and identify the strengths, weaknesses, opportunities and threats related to the date VC in the area under review, as a basis for potential areas of intervention (Table 29).

**Table 29: SWOT Analysis of the Date Value Chain**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>■ Culturally valuable Iraqi produce</li> <li>■ High-value agricultural commodity</li> <li>■ Wide acceptance as a source of food/nutrition</li> <li>■ Major source of income</li> <li>■ Comparative advantage in production</li> <li>■ Large domestic and global markets</li> </ul>	<ul style="list-style-type: none"> <li>■ Varieties with low market potential (in terms of productivity and quality)</li> <li>■ Limited access to inputs</li> <li>■ Small-scale farms and aged trees</li> <li>■ Significant pre- and post-harvest losses</li> <li>■ High production costs</li> <li>■ Inefficient use of (irrigation) water</li> <li>■ Lack of GAP</li> <li>■ Lack of storage facilities</li> <li>■ Limited attention paid to the inclusion of women, youth and vulnerable groups</li> <li>■ Low quality of some date varieties</li> <li>■ Poor management of pest and diseases</li> <li>■ Lack of access to agricultural credit</li> <li>■ Poor working relationship between farms and date processing factories</li> <li>■ Limited diversification of date products</li> <li>■ Poor handling and packaging</li> <li>■ Absence of by-products</li> </ul>



Opportunities	Threats
<ul style="list-style-type: none"><li>■ High and increasing demand</li><li>■ Expansion of processing opportunities as demand for processed products increases</li><li>■ Higher incomes through increased productivity and stable yields</li><li>■ High demand for fresh and processed dates</li><li>■ Improved horizontal linkages between farmers to develop economies of scale</li><li>■ Mechanisation to increase labour productivity</li><li>■ Introduction of high-yield date varieties</li><li>■ Promotion of Integrated Pest Management (IPM) to address pest and diseases threats</li><li>■ Access to financial support for date producers</li><li>■ Incentivise the establishment of additional date processing plants (small- and large-scale)</li><li>■ Diversify date products and by-products</li><li>■ Introduce equipment for handling of dates</li><li>■ Establish storage facilities</li><li>■ Invest in improving the packaging of date products</li><li>■ Enhance efficiency along the value chain</li><li>■ Adopt quality standards in date processing and trade</li><li>■ Strengthen national food control systems and traceability</li><li>■ Develop strategic infrastructure investment projects</li><li>■ Create awareness of the sector among policy/decision makers</li></ul>	<ul style="list-style-type: none"><li>■ High input costs</li><li>■ Shift to other types of cultivation</li><li>■ Diseases/pests</li><li>■ Market distortions and price volatility</li><li>■ Lack of financial services</li><li>■ Ineffective legal/regulatory framework</li><li>■ Water shortages</li><li>■ Traditional processing industries with limited efficiency</li><li>■ Shortage and high cost of labour</li><li>■ Limited options of processing plants that can produce a variety of products</li><li>■ Low storage capacity</li><li>■ Limited availability of market information</li><li>■ Insufficient research and development</li><li>■ Absence of data for sector development policies</li><li>■ Poor transportation and post-harvest infrastructure (roads and cold storage facilities)</li><li>■ Weak marketing institutions</li><li>■ Limited financing of traditional producers</li><li>■ Limited access to business support services</li></ul>

Source: Own research.





## 9.4 Summary of Findings

- Per capita consumption of fresh dates in Al-Anbar/Heet is about 1.2 kg/month and somewhat less for processed dates.
- Demand is mostly met by local production, with smaller amounts of imported produce.
- The main actors in the date value chain are input suppliers (including local production of seedlings and manure), producers, wholesalers, processors and consumers.
- Chemical inputs are mainly imported, in line with supplier and farmer preferences, however, at relatively high prices.
- Offshoots are provided by local producers or taken directly from their tree mothers, in addition to offshoots generated from tissue culture.
- Lack of access to financial services results in limited investment and limited income diversification.
- Smallholders are the main producers of dates in the area under review. Accordingly, farming is mostly a family business and investment is constrained by limited access to external financing.
- Outdated practices and a lack of knowledge and skills (mostly developed through experience on family farms or on neighbours' farms) result in inadequate management of orchards.
- Insufficient water in terms of timing and quantities and traditional low-yield varieties not suitable to small-scale production remain critical challenges.
- Productivity per palm tree is low, also as a result of inadequate orchard management.
- Farmers added the highest value in the date value chain.
- Labour, fertiliser, chemicals, fuel and harvest costs account for a major portion of total variable costs in date production.
- The absence of a valid cost calculation base hampers economic decision making.
- Dates in the area under review are mainly sold to wholesalers at the farm gate, partly on the basis of advance contracts, with limited bargaining power on the side of farmers.
- Date producers have limited influence on the governance of the value chain.
- Wholesalers are the main governors in the date value chain, as a result of their critical position with regard to capital and the quantities purchased, as well as their role as main channel of product distribution.
- High production costs, expensive inputs and low productivity, in combination with declining sales prices, reduce farmers' ability to enhance productivity and generate income. Additional challenges arise from endemic pests and diseases; limited adoption of modern cultivation practices and technologies; lack of management skills and skilled labour; unreliable electricity supply and lack of storage facilities.



- Limited operability of markets reduces profit margins, thereby hampering investment in production, storage and marketing facilities.
- Local produce is strongly preferred by consumers because of taste, freshness and lower prices, however, the availability of local produce is subject to seasonality.
- Processing relies mostly on traditional tools and methodologies and processing plants are usually medium-scale enterprises. Processing results in a range of different products (vinegar, molasses and date paste), requiring specific cultivars for each product. Palm tree by-products are largely absent.

In order to address the a.m. factors which limit performance along the VC, there is a need for public and private investment, focussing on improving efficiency of VC actors, in particular farmers and processors. Development of the date sector should stress the access to affordable farming inputs; adoption of recommended agronomic practices with regard to land preparation; an appropriate seeding rate; effective pest and disease management; enhanced access to effective extension services; promoting the use of low-cost irrigation; and reducing post-harvest loss and quality deterioration through proper on-farm storage or preservation technology and reliable transportation. Furthermore, investment in processing facilities and plants to produce processed date products and by-products is required. Small-scale processing at the household level can help to develop the value chain, particularly for the local market. Household level processing can be an effective way to reach niche markets if quality standards are adhered to and producers adopt effective marketing strategies. Matching demand and supply and selecting date varieties in line with pedoclimatic conditions are key factors for success in the date business.



## 10 Conclusion

### 10.1 Major Value Chain Constraints and Challenges

Based on the results of the analysis, several common challenges have been identified along the value chains of the four crops. These challenges and constraints are documented below:

#### 10.1.1 Inputs and Input Supply

- Inputs and input supply represent the main weakness affecting the capacity of farmers to optimise production. Most farmers lack funds and access to financial support in order to purchase inputs, including seeds, seedlings, fertiliser and pesticides. Moreover, they also lack information about best practices in using the inputs. The utilisation of non-certified/ improved seeds and the lack of qualified nurseries for the supply of seedlings reduce productivity significantly. The application of ineffective or inappropriate pesticides promotes the spread of pests and diseases and affects the yield and the quality of produce negatively. The inefficient use of fertiliser adds costs to the production cycle without generating a tangible return for farmers. The quality of equipment, repair services and spare parts, farm infrastructure and land also were the subject of wide-spread complaints among interviewed farmers. Producers also mentioned the lack of access to finance and low producer prices, which prevent them from accumulating sufficient capital to scale up mechanisation, forcing them to continue to rely on labour-intensive practices.

#### 10.1.2 Water Availability and Access

- Sufficient availability of water is a major challenge for farming in the area under review and in Iraq, generally. The flow of water to Iraq has declined dramatically and the quality has deteriorated. Large parts of the groundwater along the developed central plain are unusable due to high salinity and pollution.
- Furthermore, water tariffs in Iraq are extremely low to allow farmers to pump water freely into their fields, without paying an irrigation service fee. Treating water as a free good in combination with lack of awareness of water scarcity naturally reinforces water waste, excessive consumption and low efficiency of water use. Accordingly, water supply and irrigation remain significant challenges for many farmers, also as a result of armed conflict – with poor and damaged water distribution infrastructure, lack of maintenance of communal irrigation canals and changing weather patterns aggravating the problem.
- The adoption of a coherent water regulation system and the use of modern technologies for efficient irrigation can reduce the consumption of water in agriculture. Due to a severe drought, water and its management are now high priorities for the government and the general public. Consistent regulation, rehabilitation of key infrastructure, and the adoption of effective technologies and practices, including soil erosion control, will be required to improve the availability of surface water and groundwater.

### 10.1.3 Imported Products and Dumping

- In recent years, imported products have played a major role in bridging the gap between the demand for food and domestic supply. However, imports also constrain the recovery of the agricultural sector as local farmers struggle to compete with cheaper imported produce. Imports, which sometimes benefit from subsidies, are sometimes less fresh than local produce and more likely to be damaged in transportation due to the distances travelled. At the same time, imported products are often cleaner, better packaged and have a more uniform appearance that attracts consumers, even if the taste is not superior. Nevertheless, consumers and (to some extent) traders reportedly prefer locally-produced Iraqi products to imports.

### 10.1.4 Research and Extension Services

- Research and extension services are a major component of agricultural development, particularly in a system dominated by small-scale farms. In Al-Anbar, an efficient technology transfer system with the ability to link knowledge generation to value chain actors is not in place.
- Extension agents play an important role in improving social capital and instigating change, which then helps farmers to access resources and boost productivity. Farmers have extended experience and ample knowledge about their environment and their farming system, but extension services can introduce innovation and GAP, particularly with regard to the use of fertiliser, application of pesticides and water management. The weakness of agricultural extension services reflects a wider capacity challenge, with services often lacking appropriate facilities, such as offices, laboratories and equipment. The number of extension officers has also been insufficient, partly due to lack of training and limited partnering with local university experts.
- Similarly, technical training in the area is insufficient: knowledge is readily available at local universities, but partnerships and the exchange of information are lacking. Accordingly, new technologies and innovations and new science-based recommendations are slow to reach farmers. Instead, the methods used by farmers continue to be based on traditional approaches, handed down from generation to generation, complemented by their own practical experiences.
- The connection between research, extension services, upstream suppliers and technology users is weak. Farmers expressed their overall dissatisfaction with the services provided by the government as they have not received adequate support over the past years. Strengthening extension services in order to enhance farmers' knowledge and their capacity to apply GAP would contribute substantially to higher productivity and quality of produce, while reducing the costs. In particular, the use of pesticides and water leaves room for improvement.

### 10.1.5 Finance and Access to Credit

- Access to financial services and bank credit is constrained for the majority of actors involved in the value chains examined, including credit for inputs and machinery – forcing farmers to rely on family members for credit. The available financial offers are not aligned with farmers' needs, and there is no evidence of microfinance institutions or relevant insurance schemes.

### 10.1.6 Post-Harvest Activities and Losses

- Lack of cooperation and communication negatively affects supply chain development, exacerbating losses and reducing both income and competitiveness.
- Losses along the supply chain are prevalent at all stages due to poor handling, inadequate post-harvest management, and a lack of storage and processing facilities for adding value to raw products. In the absence of storage and logistics capacity, farmers are forced to sell their fresh produce within a short time before it spoils, usually at low prices during the harvesting season.
- Centralised 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 contribute to reducing infrastructure-related challenges. Providing farmers with adequate services, technologies and knowledge of harvesting and post-harvesting practices would reduce their losses.
- Government investment in capacity building, infrastructure rehabilitation and policy support to facilitate market access for farmers could enable private sector investment in the agricultural sector and contribute to reducing food losses in Iraq. Technological development in the processing industry should be aligned with farmers' needs and the demand in local markets, in order to allow agricultural production to once again become competitive and efficient. Facilitating the establishment of processing factories and refrigerated storage facilities for agricultural produce would support farmers and contribute to higher value chain efficiency.

### 10.1.7 Marketing and Competitiveness

- Social capital, which reflects the relationships, participation and associations in a social group or community, seems to be largely absent or inactive in the agricultural sector in the area under review. There is no evidence of mutual support or common initiatives among farmers or other value chain actors. Farming contracts and opportunities for delayed payment of inputs are lacking, serving as evidence that socio-economic capital is limited. Insufficient coordination among farmers, suppliers and traders negatively affects farmers' bargaining power, increasing marketing costs as producers must conduct transactions individually.
- The absence of synergies between the public and private sectors affects the efficiency and competitiveness of the value chains. Government policies and interventions enforce dependency on the public sector, but do not promote participation by the private sector on a scale that could help to remove the obvious constraints.

### 10.1.8 Infrastructure and Enabling Environment

- Infrastructure requires a substantial upgrade in order to satisfy the requirements of actors in the agricultural value chains. Both generation and distribution of electricity are inefficient and most rural areas do not have access to reliable electricity supplies: frequent electricity shortages and outages are the norm. Without access to adequate and reliable electricity, irrigation of agricultural crops and their storage are rendered impossible, and value-adding investment opportunities will remain unexploited. Unreliable electricity supply also makes the storage and preservation of seeds more expensive and riskier. Road conditions often contribute to losses and obstruct physical access to markets. Wholesale markets are not in a sufficiently adequate condition to provide services like storage, grading and packaging.
- Transparent policies for grading, quality, traceability and certification are absent, both up- and downstream of value chains, affecting the competitiveness of local products vis-à-vis imported goods and often generating a mismatch between supply and demand. The emphasis should be placed on strengthening policies and associations, both for farmers and industry, catalysing private sector investment, increasing product quality by enhancing the incentive structure, and developing export potential.

## 10.2 Recommendations and Proposed Areas of Intervention

Based upon the previously identified vertical and horizontal value chain constraints and challenges, the research team proposes realistic and effective interventions with an impact on the entire agricultural sector in Al-Anbar. The table below not only reflects the identified causes of the weaknesses and challenges in the different value chains, but also provides a comprehensive overview of interventions to address the many constraints facing agricultural production in Al-Anbar. The interventions have been categorised in line with their interrelationship and their position with regard to their value chain functions (Table 30).

**Table 30: VCA Results and Proposed Areas of Intervention**

Value Chain Function	Challenges	Opportunities	Areas of Intervention
Input Supply	<ul style="list-style-type: none"> <li>■ Sharp decline in water resources, whether from rain or natural flow from neighbouring countries, due to unfair water policies</li> <li>■ Non-market oriented varieties (low productivity and inconsistent quality of seed)</li> <li>■ Insufficient multiplication capacity of quality seeds (shortage of foundation seeds and certified seed suppliers)</li> <li>■ Limited economic, physical and administrative access to inputs (seed, seedlings, fertiliser, chemicals)</li> <li>■ Shortage and high cost of skilled labour</li> <li>■ Limited access to equipment and machinery for production, harvest and post-harvest processing, irrigation and clean energy)</li> <li>■ Subsidised seed distribution for certain crops generates market distortions and unfair competition</li> <li>■ Land areas increasingly affected by salinisation and desertification.</li> </ul>	<ul style="list-style-type: none"> <li>■ Encourage collective purchasing practices among farmers, as well as storage and marketing, which will enhance efficiency, reduce costs, and reinforce the competitive edge of their crops</li> <li>■ Introduction of new varieties</li> <li>■ Develop or rehabilitate local industry for fertilisers and pesticides, in order to increase availability and improve quality</li> <li>■ Public and private sector extension can raise awareness about fertilisers and other inputs/technologies</li> <li>■ Collecting and packaging centres for modern and effective joint post-production activities</li> <li>■ Increase interaction among farmer groups and agro-dealers.</li> </ul>	<ul style="list-style-type: none"> <li>■ Improve inputs in terms of quality and price</li> <li>■ Ensure quality control of inputs, especially for fertiliser and pesticides</li> <li>■ Introduce water-conserving cultivation methods (e.g. drip irrigation)</li> <li>■ Ensure correctly-labelled seedlings and provision of appropriate varieties</li> <li>■ Increase range and availability of alternative varieties (new varieties demonstrated and adopted and partnerships formed among distributors, farmer groups and seed importers)</li> <li>■ Encourage and enhance seed multiplication in partnership with seed producers (aligned with certification standards)</li> <li>■ Assist agro-dealers in developing a consignment business model that provides in-kind credit to value chain actors</li> <li>■ Develop smart incentives schemes (direct or indirect) to guarantee a fair (subsidised) input price for all farmers</li> <li>■ Establishment of agri-banks for agricultural supplies</li> <li>■ Support for renewable energy systems for farms</li> <li>■ Facilitate access to financing.</li> </ul>

Value Chain Function	Challenges	Opportunities	Areas of Intervention
<p><b>Production</b></p>	<ul style="list-style-type: none"> <li>■ Inadequate use and exploitation of natural resources, especially land and water</li> <li>■ Lack of knowledge and experience in GAP, such as use of pesticides and fertiliser, and rationalisation of water usage</li> <li>■ Deterioration of animal production, decline of natural pastures, scarcity of green and manufactured feeds, and existence of epidemic diseases some of which are trans-boundary</li> <li>■ Poor farm management and adoption of cultivation practices (lack of capacity to apply GAP)</li> <li>■ Small-scale farms</li> <li>■ Low quality of some varieties</li> <li>■ High price of fertiliser and seeds</li> <li>■ Poor management of pest and diseases</li> <li>■ Inadequate access to agricultural credit</li> <li>■ Absence of subsidised inputs (mainly fertiliser)</li> <li>■ Low level of mechanisation in smallholder systems</li> <li>■ High level of losses due to poor management and pest and diseases</li> <li>■ Water scarcity, pollution and salinisation, exacerbated by inefficient irrigation practices (e.g. flood irrigation) and lack of international agreements on river water use</li> <li>■ Use of counterfeit and unfit chemical products, growing emissions, risk of pollution and eutrophication of water</li> <li>■ Use of outdated varieties, insufficient national agronomic research, and no evidence of climate-adapted varieties.</li> </ul>	<ul style="list-style-type: none"> <li>■ The presence of relatively new crops and activities that can be developed and improved, such as olives, peat moss production, and tissue propagation from palm tree offshoots</li> <li>■ Improve horizontal linkages between farmers to achieve economies of scale, enhanced access and reduced costs</li> <li>■ Introduce mechanisation to increase labour productivity</li> <li>■ Introduce high-yield varieties</li> <li>■ Improve quarantine, surveillance and monitoring of pests and diseases</li> <li>■ Expand financing opportunities for producers</li> <li>■ Increase productivity with the adoption of GAP, including integrated pest management and efficient use of resources</li> <li>■ Improve post-harvest handling and storage systems and low-cost on-farm storage facilities.</li> </ul>	<ul style="list-style-type: none"> <li>■ Promote and assist rural industries, particularly for youth and women</li> <li>■ Map and prioritise irrigation systems that require rehabilitation</li> <li>■ Develop suitable support processes to establish farmer associations/organisations to stimulate, revitalise and develop VC, including water management, joint production, processing and marketing, as well as other support services</li> <li>■ Provide internal training and organisation development through the utilisation of rehabilitated infrastructure</li> <li>■ Increase availability and use of drought-resistant varieties and shift to modern nursing methods.</li> </ul>

Value Chain Function	Challenges	Opportunities	Areas of Intervention
<b>Processing</b>	<ul style="list-style-type: none"> <li>■ Absence of processing industries for agricultural products (agribusiness industries)</li> <li>■ Limited availability of processing plants that can produce a variety of high-quality products</li> <li>■ Poor relationship between farms and processing factories/units</li> <li>■ Poor utilisation of facilities/infrastructure to enhance production and marketing</li> <li>■ Low capacity at the household level to process crops like tomatoes, dates, and potato</li> <li>■ Underutilisation of infrastructure, such as produce handling (e.g. cold storage) facilities.</li> </ul>	<ul style="list-style-type: none"> <li>■ In view of short seasons and availability, controlled-temperature storages can be used to extend the availability period of Iraqi crops, also to maintain fair prices</li> <li>■ Official/government intention to achieve food security</li> <li>■ Using available agricultural resources for by-products, such as cage manufacturing from palm fronds, creating job opportunities for women and youth and producing environmentally- friendly packaging materials</li> <li>■ Possibility of establishing home industries with objective to raise the value of agricultural products such as "Makdoose", dried tomatoes, date molasses, packing and wicker packages</li> <li>■ Educate farmers in post-harvest and processing practices</li> <li>■ Promote the establishment of processing plants (small- and medium-scale)</li> <li>■ Diversify crop products and by-products</li> <li>■ Local products are available instead of imported crops.</li> </ul>	<ul style="list-style-type: none"> <li>■ Promote value-added activities that favour small-scale farmers, particularly the profitable utilisation of agricultural residues</li> <li>■ Restore or establish shared processing facilities at the community level</li> <li>■ Adoption of energy-efficient cooling infrastructure and refrigerated transport equipment.</li> </ul>

Value Chain Function	Challenges	Opportunities	Areas of Intervention
<b>Marketing</b>	<ul style="list-style-type: none"> <li>■ Inadequate grading, storage and transportation processes for certain crops reduce opportunities for profitable producer prices, and limit availability of crops in markets.</li> <li>■ Competition from imported/smuggled products, offered at lower prices than domestic agricultural produce</li> <li>■ Low share of profit assigned to farmers, out of the overall profit generated throughout the VC</li> <li>■ Limited market linkages for small-scale producers</li> <li>■ Lack of handling and packaging facilities and methods</li> <li>■ Low storage capacity and unreliable power supply, resulting in losses and sale at low prices during the peak season.</li> <li>■ Lack of product processing and value addition (grading, packaging, and quality control at the farm level), and optimisation of required logistics</li> <li>■ Constraints to meeting market requirements (food quality and safety; varieties)</li> <li>■ Limited availability of market information</li> <li>■ Stiff competition in external markets</li> <li>■ Mismatch between supply and demand in terms of product quality and seasonality</li> <li>■ Lack of produce-processing facilities.</li> </ul>	<ul style="list-style-type: none"> <li>■ Growing demand for agricultural products (especially local ones)</li> <li>■ Preference for locally-produced agricultural products</li> <li>■ High demand for and low availability of certain locally-produced crops, such as potato and tomato</li> <li>■ Improve linkages between groups of farmers and wholesalers to increase production, productivity, and quality</li> <li>■ Introduce equipment for handling and processing of dates</li> <li>■ Establishment of storage facilities</li> <li>■ Invest in improved processing and packing of products</li> <li>■ Promote awareness of quality and standards throughout the value chain</li> <li>■ Horizontal and vertical links among actors (farmers and traders) can enhance technical and economic efficiency along the value chain</li> <li>■ Establish storage facilities that can stabilise prices, reduce losses and increase revenue for farmers.</li> </ul>	<ul style="list-style-type: none"> <li>■ Market and marketing development</li> <li>■ Establishing a database for activities related to domestic and export date marketing</li> <li>■ Improve the efficiency of the marketing process to guarantee fair prices for farmers, also by limiting the number of intermediate operators</li> <li>■ Producing in-demand products at competitive prices</li> <li>■ Modern strategies for storage and warehouse management</li> </ul>

Value Chain Function	Challenges	Opportunities	Areas of Intervention
<b>Support Services</b>	<ul style="list-style-type: none"> <li>■ Insufficient resources (staff and equipment) in agricultural extension</li> <li>■ Poor local food safety and quality control systems in terms of awareness and implementation</li> <li>■ Insufficient research and development</li> <li>■ High cost of mechanised services</li> <li>■ Lack of integrated pest and diseases management policy</li> <li>■ Poor extension services and technical support to value chain actors</li> <li>■ Lack of financial services.</li> </ul>	<ul style="list-style-type: none"> <li>■ Expansion of public sector staff in agriculture, with enhanced knowledge and experience</li> <li>■ Provide agricultural sector with the required expertise to raise productivity, by providing services and creating agricultural job opportunities for job seekers</li> <li>■ Support pilot/pioneer projects that improve the efficiency of the value chain for agricultural crops</li> <li>■ Creation of agricultural women's associations as institutions that promote gender equality and increase women's participation in the agricultural sector</li> <li>■ Adoption of quality and food safety standards to ensure readiness for export market requirements</li> <li>■ Strengthening of national food control systems and traceability</li> <li>■ High potential for the Iraqi agricultural sector, particularly if proper mechanisation, branding and marketing are adopted.</li> </ul>	<ul style="list-style-type: none"> <li>■ Support extension services with training and enhance their capacity to support farmers</li> <li>■ Improve risk assessment system</li> <li>■ Create awareness of SPS application</li> <li>■ Develop a national IPM service, in partnership with farmers' organisations, universities and research centres</li> <li>■ Improve farmers' access to knowledge and training</li> <li>■ Operate FFS for training of smallholder farmers</li> <li>■ Encourage farmers' regrouping and participation of women.</li> </ul>

Value Chain Function	Challenges	Opportunities	Areas of Intervention
<b>Business-Enabling Environment</b>	<ul style="list-style-type: none"> <li>■ Weak agricultural investment promotion policies</li> <li>■ Inconsistent agricultural policies</li> <li>■ Insufficient coordination among agricultural institutions (governmental and non-governmental)</li> <li>■ Insufficient surveillance over agricultural input markets, leading to unstable prices, and anti-competitive practices</li> <li>■ Absence of funding and insurance services</li> <li>■ Limited role of the private sector in economic activities, due to the absence of an enabling business environment and investment incentives</li> <li>■ Expansion of an unregulated business sector</li> <li>■ Fluctuation in the agricultural sector's contribution to GDP aggravates imbalances in the distribution of the labour force, thereby raising the unemployment rate</li> <li>■ High multi-dimensional levels of poverty (volatility, low real income, and low purchasing power)</li> <li>■ Severe impact of climate change: Iraq is ranked fifth globally, among countries negatively affected by climate change</li> <li>■ Absence of cohesive and sustainable policies to protect agricultural land from encroachments and from a change in designated use, in order to prevent fragmentation</li> <li>■ Multiplicity of legal instruments and regulations</li> <li>■ Inconsistency of agricultural development policies</li> <li>■ Lack of human resources to deal with rapidly changing dynamics, especially in an expanding domestic market</li> <li>■ Challenges in establishing an effective presence in domestic and global markets</li> <li>■ Inadequate technical capacity to provide services to a wide range of value chain actors</li> <li>■ Ineffective communication framework and ICT facilities</li> <li>■ Ineffective M&amp;E mechanisms</li> <li>■ Conflict of interest leading to operational discordance (public sector as opposed to private sector)</li> <li>■ Poor transportation and post-harvest infrastructure (roads, handling facilities, storage)</li> <li>■ Weak marketing arrangements</li> <li>■ Lack of financing</li> <li>■ Lack of security, due to political unrest</li> <li>■ Limited presence of business support services</li> <li>■ Insufficient data availability.</li> </ul>	<ul style="list-style-type: none"> <li>■ Encourage agricultural engineers to participate in the creation of agricultural services</li> <li>■ Provide mentoring, extension and field services for farmers, to improve practices</li> <li>■ Offer job opportunities and enhance cooperation between value chain actors</li> <li>■ Encourage farmers to advocate for better agricultural policies</li> <li>■ Mainstreaming the importance of the agricultural sector with policy/decision makers</li> <li>■ Strategic infrastructure investment projects</li> <li>■ Establishment and strengthening of marketing institutions</li> <li>■ Promotion of traditional and non-traditional credit schemes.</li> </ul>	<ul style="list-style-type: none"> <li>■ Improve support structures and services for the sector</li> <li>■ Improve service delivery and information provision by local extension offices under the DoA</li> <li>■ Encourage establishment of cooperatives and/or forums to enhance coordination and collective work of existing institutes and individuals, in order to provide services to member farmers (i.e. packaging, cooling and marketing services)</li> <li>■ Improve access to business development services</li> <li>■ Build enabling environment</li> <li>■ Improve regulatory framework and ensure that stakeholders understand their rights and duties</li> <li>■ Enhance knowledge of social and environmental standards</li> <li>■ Encourage farmers to advocate for better agricultural policies.</li> </ul>

## Annex 1: Value Chains – Main Constraints and Threats



Source: Own research.

## Annex 2: Value Chain Opportunities



Source: Own research.

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