الجَمعيّـة العِلميّـة المَلكيّـة
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Final Report

Achieving Land Degradation Neutrality Targets through Restoration and Sustainable Management of Degraded Land in Northern Jordan (ALDNT)

Assessment of the Beekeeping Value Chain in the Northern Governorates.

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1 Executive Summary

The project “Achieving Land Degradation Neutrality Targets through Restoration and Sustainable Management of Degraded Land in Northern Jordan (ALDNT)” aims to restore degraded ecosystems in the governorates of Irbid, Ajloun, and Al-Mafraq using beekeeping as a nature-based solution. Beekeeping is recognized as a strategic entry point for promoting ecological and socio-economic resilience in these areas due to unsustainable land use, deforestation, climate-induced pressures, and biodiversity loss.

Beekeeping contributes to land restoration by preserving and regenerating native flora, which are essential for healthy bee populations. As a result, local communities are more likely to conserve forests and rangelands, reduce harmful land-use practices, and use sustainable resources. Further, organic apiculture practices and strategic forage planting support pollination services, improving rural livelihoods and enhancing biodiversity.

The assessment found that, despite its potential, the beekeeping sector in the target areas faces challenges including declining forage diversity, reduced honey yields due to climate change, limited access to modern techniques, and weak market linkages. Addressing these barriers through improved forage management, integrated pest control, better processing standards, and branding strategies will not only strengthen the value chain but also accelerate land rehabilitation.

The report recommends a holistic approach that combines technical capacity building, supportive policy frameworks, and active community involvement. By doing so, the project can scale the impact of apiculture as a land restoration tool and advance Jordan’s Land Degradation Neutrality (LDN) targets through sustainable, community-driven interventions.

١,١ الملخص

يهدف مشروع "تحقيق أهداف تحييد تدهور الأراضي من خلال استصلاح الأراضي المتدهورة وإدارتها المستدامة في شمال الأردن" إلى استعادة النظم البيئية المتدهورة في محافظات إربد وعجلون والمفرق باستخدام تربية النحل كحلٍّ قائم على الطبيعة. تُعتبر تربية النحل مدخلاً استراتيجياً لتعزيز المرونة البيئية والاجتماعية والاقتصادية في هذه المناطق، نظراً للاستخدام غير المستدام للأراضي، وإزالة الغابات، والضغوط الناجمة عن تغير المناخ، وفقدان التنوع البيولوجي.

تساهم تربية النحل في استصلاح الأراضي من خلال الحفاظ على النباتات المحلية وتجديدها، وهي ضرورية لنموّ أعداد نحل سليمة. ونتيجةً لذلك، تزداد قدرة المجتمعات المحلية على الحفاظ على الغابات والمراعي، والحدّ من ممارسات استخدام الأراضي الضارة، واستخدام الموارد المستدامة. علاوةً على ذلك، تدعم ممارسات تربية النحل العضوية وزراعة الأعلاف الاستراتيجية خدمات التلقيح، وتُحسّن سبل العيش الريفية، وتُعزز التنوع البيولوجي.

وجد التقييم أنه على الرغم من إمكاناته، يواجه قطاع تربية النحل في المناطق المستهدفة تحديات، تشمل تراجع تنوع الأعلاف، وانخفاض إنتاج العسل بسبب تغير المناخ، ومحدودية الوصول إلى التقنيات الحديثة، وضعف الروابط السوقية. إن معالجة هذه العوائق من خلال تحسين إدارة الأعلاف، والمكافحة المتكاملة للآفات، وتحسين معايير المعالجة، واستراتيجيات بناء العلامات التجارية، لن يعزز سلسلة القيمة فحسب، بل سيُسرّع أيضًا من إعادة تأهيل الأراضي.

يوصي التقرير باتباع نهج شامل يجمع بين بناء القدرات الفنية، وأطر السياسات الداعمة، والمشاركة المجتمعية الفاعلة. ومن خلال ذلك، يمكن للمشروع توسيع نطاق تأثير تربية النحل كأداة لإعادة تأهيل الأراضي، والنهوض بأهداف الأردن في مجال تحييد تدهور الأراضي (LDN) من خلال تدخلات مستدامة يقودها المجتمع.

2 Introduction

2.1 Role of Beekeeping in Sustainable Land Management

The value chain analysis focuses on beekeeping and highlights how strengthening this sector can contribute to achieving the project's objectives and Land Degradation Neutrality (LDN) targets. By improving production, processing, and market access across the honey value chain, the project promotes sustainable land use practices, supports rural livelihoods, and enhances ecosystem services in target areas.

2.2 Overview of the Beekeeping Sector in Jordan

Recognizing the need for specialized knowledge in apiculture, the University of Jordan integrated beekeeping modules into its graduate Animal Production program in 2018. These courses cover bee biology, hive management, honey extraction, pest control, and pollination, aiming to build institutional expertise in apicultural science and rural extension.

In parallel, the Food and Agriculture Organization (FAO, 2023), in collaboration with the National Agricultural Research Center (NARC) and the Ministry of Agriculture (MoA), has implemented training programs focusing on best beekeeping practices, honey quality control, sensory evaluation, and modern hive technologies. These efforts target smallholder beekeepers, including women in rural areas, to improve product quality, income diversification, and climate resilience.

The Jordanian Beekeepers Association (JBA), established in 1994, plays a central role in technical training and peer exchange, with over 250 registered members. In 2023, Chinese experts led a virtual capacity-building program introducing innovations such as digital hive monitoring and advanced honey-processing methods.

Despite notable advancements, the sector faces challenges including climate variability (e.g., drought, rising temperatures), declining honey yields, pesticide misuse, and limited coordination among value chain actors. A 2023 report by the MoA revealed a 17% decline in honey production compared to 2022, alongside an 18.6% reduction in hive numbers.

Nonetheless, the sector holds strong potential. Jordan currently produces 700–800 tonnes of honey annually, meeting about 70% of domestic demand, and supports over 4,000 beekeepers (though only around 1,400 are formally registered). Pollination services provided by honeybees contribute approximately JD 73.6 million (USD 104 million) annually to national agriculture, exceeding the direct value of honey production.

Opportunities for development include diversifying into high-value bee products (royal jelly, propolis, beeswax, venom), building a national honey brand, improving quality certification systems, and expanding women's and youth participation in production, processing, and marketing.

2.3 Apiculture Component of the ALDNT Project

As part of the "Achieving Land Degradation Neutrality Targets through Restoration and Sustainable Management of Degraded Land in Northern Jordan (ALDNT)" project, the Beekeeping Development and Sustainability component is a four-year initiative with estimated funding of USD 2.5 million. It is supported by the Global Environment Facility (GEF) and coordinated by the Food and Agriculture Organization (FAO, 2023) in partnership with the Ministry of Agriculture (MoA), the National Agricultural Research Center (NARC), and the Jordanian Beekeepers Association (JBA).

This component aims to strengthen the sustainability of the apiculture sector by improving production practices, increasing adaptive capacity to climate risks, and enhancing coordination among stakeholders. It also supports the integration of pollinator services into land-use planning and sustainable resource management policies. Key activities include the introduction of upgraded hive systems, improved queen rearing, product traceability mechanisms, and marketing support.

2.4 ALDNT Project Target Area

The beekeeping value chain consultancy targets the governorates of Ajloun, Irbid, and Mafraq—regions selected for their ecological vulnerability and potential for community-based apiculture. The intervention strategy includes stakeholder mapping, gender-inclusive training design, and the development of market-driven solutions that improve income security and environmental outcomes.

A key goal is to identify barriers to market access, evaluate technical and business support systems, and formulate tailored interventions that contribute to the economic empowerment of beekeepers, especially women and cooperatives in marginalized areas.

2.5 Study Objectives

This study aims to:

- In the target governorates of Irbid, Ajloun, and Mafraq, map and examine the entire beekeeping value chain, including input supply, production, processing, packaging, and marketing.
- Examine how apiculture contributes to biodiversity preservation, climate resilience, and sustainable land management on an ecological and socioeconomic level.
- Determine the obstacles and difficulties that beekeepers and other value chain participants face on a technical, financial, institutional, and market level.

- Analyze youth, gender, and cooperative involvement in the industry while emphasizing prospects for equitable economic empowerment.
- To comprehend the internal and external factors influencing sector performance, do a thorough SWOT analysis.
- Make specific recommendations for value chain upgrading interventions, such as technology adoption, quality control, traceability, branding, and capacity building.
- Make recommendations for investment priorities and enabling policy measures that can improve sector sustainability and alignment with Jordan's LDN commitments.
- Encourage the involvement of stakeholders

The methodology will involve desk research, key informant interviews, focus group discussions, and field visits to assess pre-production, production, and post-production stages. The findings will inform technical recommendations and capacity-building programs, with a strong focus on enhancing sustainability, market linkages, and inclusive participation.

3 Methodology and Data Collection

3.1 Desktop Review

A comprehensive desktop review was conducted to consolidate available knowledge on the beekeeping value chain across Irbid, Ajloun, and Mafraq governorates. This included the analysis of published reports, technical documents, and institutional sources addressing apiculture, rural livelihoods, and land restoration in Jordan.

The review focused on how beekeeping practices contribute directly to Land Degradation Neutrality (LDN) and ecosystem rehabilitation. Beekeeping supports land restoration goals in multiple ways:

- **Pollination enhancement** by honeybees plays a crucial role in regenerating vegetation on degraded land, sustaining native plant diversity and supporting natural reseeding processes.
- **Non-extractive land use**: Beekeeping requires minimal land disturbance and no deforestation, aligning with sustainable land management practices especially in marginal and arid zones.
- **Community-based conservation**: Data from surveyed villages such as *Kufr Asad, Al-Hosn, Anjara, Kufranjah, Sabha,* and *Al-Safawi* confirm that local beekeepers often locate hives near wild vegetation, which promotes protection of native flora and discourages harmful land use patterns.
- **Livelihood stability and reduced pressure on overgrazed land**: Beekeepers from multiple districts indicated that apiculture provides income without needing to cultivate or graze land, thus decreasing degradation drivers.

Several respondents (e.g., from *Saham, Kufranjah, and Hosha*) also noted environmental constraints like herbicide use and road infrastructure as threats to hive health—further reinforcing the need for land management aligned with apiculture.

Moreover, findings from the desk review and field feedback highlight the importance of integrating apiculture into land-use policies, especially in ecologically sensitive areas. The value of beekeeping as a nature-based solution has been acknowledged in regional LDN strategies and by stakeholders including the (FAO, 2023), NARC, and MoA.

Information sources included peer-reviewed articles, (FAO, 2023) technical reports, NARC publications, national action plans, and interviews conducted with beekeepers and cooperatives. These insights formed the evidence base for linking beekeeping to sustainable land restoration outcomes and LDN targets.

3.2 Mixed data collection methodology

The study used a mixed-methods approach comprising both qualitative and quantitative data collection methods and tools. The study began with a desktop review, and the next phases of data collection took place in the field, which involved semi-structured interviews, focus group discussions (FGDs), and electronic questionnaires.

Fieldwork, involving the consultant, took place in selected areas and villages in each of the three governorates - Irbid (Saham, Dair Abi Saeed, Kufr Asad, Jenin Es-Saf, Dhouqra, Al-Kourah), Ajloun (Kufranjah, Rajeb), and Mafraq (Hosha). Stakeholders with different roles along with the beekeeping value chain participated in fieldwork via site visits, in-person interviews, and community meetings.

The interviews primarily focused on key informants: cooperative leaders, beekeepers with some experience, honey producers (private sector), and agricultural officers. The informants were sampled using a simple random selection method to ensure the participants included a balance of geography, experience, and gender representation. Some key informants included female honey producers who were some of the first beekeepers in their communities and interviewees who transitioned into beekeepers in response to community demand.

The FGDs included actors such as private input suppliers, NGO representatives, retailers/wholesalers, and local Directorate of Agriculture (DOA) staff. We aimed to include females in producer and leadership roles through the value chain, and we made special efforts to include women participating in the study.

All qualitative data collected (i.e., interviews and FGDs) were audio recorded, transcribed, and thematically analyzed. We used an inductive code framework to identify significant/recurrent themes and insights, such as:

•Infrastructure challenges (e.g., poor roads, not reliable telecom services),

•Policy barriers (e.g., complexity of licensing and lack of institutional support) , and

•Weakness in cooperative service deliveries (e.g., limited access training, marketing, and equipment).

The analytical process ensured that stakeholder voices directly informed the study's conclusions. For example, the frequent mention of "road and transport conditions" as a barrier confirmed the need for infrastructure support in intervention planning. Similarly, repeated complaints about "licensing complexity" and "delayed inspections" were linked to recommendations on regulatory reform. Lastly, the identification of lack of cooperative support helped shape proposed capacity-building measures for local beekeeper associations.

3.3 Structured Questioners

A data collection tool was developed in close coordination with the project management team to support the assessment of the beekeeping value chain. Trained nominators were selected for each governorate to conduct in-person interviews with relevant stakeholders. Over the data collection period, 32 individuals were interviewed, equally split by gender: 16 men and 16 women.

Table ١ presents the distribution of respondents by governorate and gender

Governorate	Men	Women
Irbid	8	9
Ajloun	2	2
Al-Mafraq	6	5
Total	16	16

"Consultant's Meeting with Target Audience Focus Groups"

- The data reflects an overall gender balance in participation, with Irbid showing the highest number of respondents, followed by Mafraq and Ajloun. Several factors help explain this pattern:

- Expanded Female Involvement in Beekeeping Tasks

In Irbid and parts of Mafraq, women are increasingly involved in hive care, honey processing, and support services—especially in family-run apiaries. Their visibility in such activities was captured more accurately thanks to direct interviews.

- Limitations of Informal Roles in Formal Data

In traditional settings like Al-Mafraq, women's roles often remain informal and unregistered, which may lead to underreporting in official records. However, this survey actively accounted for those roles through context-specific interview design.

- Impact of Methodology

The use of trained local nominators enabled better access to both male and female respondents, helping overcome barriers that often hinder women's participation in data collection efforts, such as mobility restrictions or time availability.

"Consultant's Meeting with Target Audience Focus Groups"

This variation in reported female participation across data collection tools highlights the critical influence of methodology on gender visibility. While structured questionnaires—especially those relying on digital formats—often underreport women's roles due to limited access, social norms, or informal work structures, this study employed face-to-face interviews and local nominators to bridge that gap. These approaches helped surface women's contributions more accurately, particularly in regions like Irbid and Mafraq where women are active in hive care and processing but are not always formally recognized.

The equal gender representation achieved in this data collection phase demonstrates the effectiveness of gender-sensitive design and culturally appropriate tools. It reinforces the importance of adapting research methodologies to local realities in order to generate inclusive, representative findings that inform equitable programming and policy development in the beekeeping value chain.

- Conclusion

The equal representation of men and women in this assessment suggests a significant and growing role for women in Jordan's beekeeping sector. It also highlights the importance of inclusive, gender-sensitive data collection tools to ensure that all contributors across the value chain are adequately represented in policy and program design.

While the data collection process was largely effective in achieving inclusive coverage, it faced several field challenges—such as limited stakeholder availability in remote areas (e.g., Hosha and Rajeb), difficult road access (e.g., Saham and Jenin Es-Saf), and the need for targeted outreach to engage women in conservative communities. These limitations were addressed through flexible scheduling, local coordination, and real-time clarification by trained interviewers, ensuring that data reliability and representation were maintained.

3.4 Semi structured interviews

As part of the qualitative data collection, a total of 129 semi-structured interviews were conducted across the target governorates: Irbid, Ajloun, and Mafraq. These interviews aimed to gather in-depth insights from stakeholders across the beekeeping value chain, including individual beekeepers, cooperative leaders, honey processors, agricultural extension agents, and representatives from local directorates of agriculture.

The interviews followed a flexible questionnaire that enabled participants to reflect on production practices, input access, market linkages, gender dynamics, and training needs, in addition to elaborating on location-specific challenges.

The interviews were conducted in the following villages and districts, as documented in the Excel survey database:

- Irbid: Saham, Dair Abi Saeed, Jenin Es-Saf, Dhouqra, Al-Kourah
- Ajloun: Kufranjah, Rajeb
- Mafraq: Hosha

Table 2 shows the numbers of men and women responding to interviews, by governorate

Governorate	Men	Women
Irbid	22	30
Ajloun	18	15
Al-Mafraq	19	25
Total	59	70

"Consultant's Meeting with Target Audience Focus Groups"

Women represented approximately 54% of all interviewees. Several social and methodological factors explain this distribution:

Active Role of Women in Beekeeping

- In governorates like Irbid and Ajloun, women were found to be actively involved in hive management, honey extraction, and packaging—particularly in family-based operations.

Accessibility Through Field Interviews

- In-person visits enabled access to women in remote areas like Jenin Es-Saf, Kufranjah, and Dair Abi Saeed who might otherwise be excluded from digital tools. This helped capture informal and home-based contributions often led by women.

Regional Labor Structures

- High female participation in Irbid and Ajloun reflects the regional trend where women manage much of the operational labor in small-scale beekeeping.

Seasonal Nature of Men's Participation

- In Al-Mafraq, many men were engaged in seasonal agriculture or off-farm employment, reducing their availability during data collection.

Sampling Bias and Mitigation Measures

- While the sample was broadly representative in gender and geography, certain groups such as youth and migrant workers may have been underrepresented. The field team addressed this by adopting flexible scheduling, coordinating with local associations, and applying purposive sampling techniques to reach marginalized groups.
- Responses in the Excel dataset also revealed recurring structural barriers such as:
- Poor road infrastructure (e.g., in Hosha and Jenin Es-Saf),
- Weak cooperative services,
- Complicated licensing and delayed inspection procedures.

Conclusion

The insights gained from these interviews directly informed the project's intervention priorities. These include:

- Promoting women's leadership in cooperatives,
- Delivering tailored technical training for women's roles in hive care and processing,
- Ensuring equitable access to tools and finance for women-led apiaries.

These gender-responsive actions aim to support an inclusive and sustainable beekeeping value chain in rural Jordan.

3.5 Focus group discussions

To complement the individual interviews, the research team conducted five focus group discussions (FGDs) across the governorates of Irbid, Ajloun, and Al-Mafraq. These sessions were designed to generate in-depth qualitative insights into community-level experiences, group dynamics, and shared challenges in the beekeeping value chain. The discussions included a diverse set of participants such as beekeepers, cooperative members, extension workers, women involved in value-added honey processing, and other local stakeholders.

The FGDs were held in the following villages and districts, as also recorded in the field data collection logs:

- Irbid: Saham, Dair Abi Saeed, Jenin Es-Saf, Dhouqra, Al-Kourah
- Ajloun: Kufranjah, Rajeb
- Al-Mafraq: Hosha

Table 3 presents the gender and geographic distribution of FGD participants:

Governorate	Men	Women
Irbid	35	44

Ajloun	25	30
Al-Mafraq	35	36
Total	59	70

"Consultant's Meeting with Target Audience Focus Groups"

- The data reflects a higher level of female participation (56%) in FGDs, which can be attributed to several key factors:
  1. Inclusive Group Dynamics
     The group setting encouraged open dialogue, particularly among women who may be less likely to speak up in individual interviews. Many shared detailed experiences related to honey extraction, wax production, and home-based packaging practices.
  2. Visibility of Women in Informal Roles
     Women often engage in tasks that are not officially documented—such as preparing beeswax products, maintaining hive cleanliness, and assisting in seasonal labor. These roles were more clearly expressed and acknowledged during collective discussions.
  3. Regional Norms and Accessibility
     Participation varied by region. In Irbid and Ajloun, where family-based apiculture is more common, women were more involved in the value chain. In Al-Mafraq, gender roles are more traditionally defined, yet women still participated actively when invited to speak in a group format.

"Consultant's Meeting with Target Audience Focus Groups"

4. Collective Problem Solving
   FGDs allowed participants to jointly identify barriers and propose solutions to shared challenges such as access to modern equipment, disease control, training gaps, and marketing constraints. Women, in particular, emphasized the need for targeted support in product branding and cooperative participation.

This distribution highlights how focus group discussions, as a participatory and dialogic method, help capture nuanced gender roles especially in informal and home-based contexts that are often overlooked in structured surveys. The findings from Irbid and Ajloun reflect how social norms and labor practices shape women's visibility in the value chain, while the inclusion of women in Mafraq despite cultural limitations demonstrates that with the right methodology, hidden contributions can surface.

These results reinforce the importance of designing gender-sensitive data tools and tailoring interventions to regional dynamics in order to ensure equitable representation and effective policy planning in the beekeeping sector.

Conclusion

The focus group discussions offered concrete insights into the operational challenges and support needs across the beekeeping value chain. Participants consistently highlighted three core issues:

- Inadequate infrastructure, especially poor road access in areas like Hosha and Jenin Es-Saf, which limits market access and transport of equipment.
- Weak performance of local cooperatives, particularly in marketing and training services, which undermines collective bargaining and resource sharing.
- Regulatory burdens, including delayed inspections and complex licensing procedures that restrict formalization of small-scale beekeeping businesses.

In addition, the strong female participation—especially in Ajloun and Irbid—reinforced the need for inclusive, gender-responsive capacity-building programs. Many women requested targeted training in hive maintenance, queen rearing, and post-harvest handling.

These findings inform key recommendations of the study, including:

- Strengthening local cooperative structures to provide better extension support
- Upgrading rural infrastructure in high-production zones
- Simplifying regulatory procedures for small-scale beekeepers
- Expanding training programs tailored to women's technical roles

Such targeted interventions are essential for building a more equitable, efficient, and resilient apiculture sector in Jordan.

3.6Analysis of findings

After completion of the field work, Consultant analyzed the data using developed frameworks to reach the following:

Value chain map: An analysis of the different stages of the value chain was conducted for each sector. This allowed an identification of the challenges and bottleneck processes at each value chain level.

An in-depth analysis of each value chain market sub-systems: An analysis of 3 types of markets were conducted for each sector including local, low-income markets; local middle/high income markets; and the export market. The first two was studied at both sub-national as well as national levels (where feasible), while the third included the most profitable export markets.

The market sub-system analysis included:

- An analysis of market access: The research team identified local constraints to market access, including technological capabilities of producers, available infrastructures, as well as bargaining power and market knowledge.
- Quality management systems: This included an assessment of supply chain management with a focus on primary processes (transformation and creation of value-added products), quality improvement and optimization of distribution processes. Consultant benchmarked existing technology in target area and identified critical gaps in technology in the country that currently constrain quality management systems.

- Business enabling environment: This consists of a legal review within the industry analysis for each sector and the impact of existing laws and regulations on the cooperatives/markets and industry attractiveness.
- A “challenges and opportunities analysis” summarizes finding and assesses the competitiveness of each of the stages of the value chain. Further, a political and economic analysis of the business enabling environment was carried out.

Based on the above-mentioned analysis components, the Consultant developed recommendations to upgrade existing value chain, with a focus on improving the role and capacity of local cooperatives.

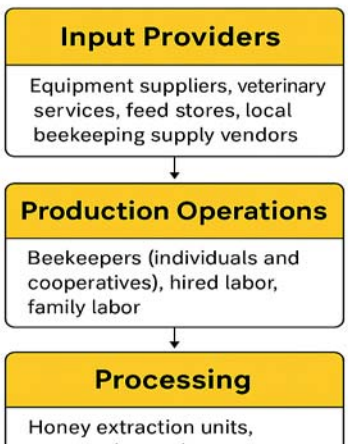
4 Diagnostic Analysis of the Beekeeping Value Chain in Northern Jordan (stakeholders, value chain gap analysis, weaknesses and opportunities)

This chapter provides a diagnostic analysis of the beekeeping value chain in Northern Jordan specifically in Irbid, Ajloun, and Mafraq. The analysis examines key stages of the chain, identifies major stakeholders, evaluates their roles, and highlights constraints and opportunities. The structure mirrors the methodology used for the beekeeping value chain to ensure consistency.

Table 4summary of value chain stakeholder along the different stages

Operation	Input Providers	Production Operations	Processing	Outbound Logistics	Marketing and Sales	Consumer Services
Key Actors	Equipment suppliers, veterinary services, feed stores, local beekeeping supply vendors	Beekeepers (individuals and cooperatives), hired labor, family labor	Honey extraction units, cooperatives, private processors	Transporters, cold storage providers, cooperatives	Wholesalers, retailers, farmer markets, e-commerce, export companies	Supermarkets, specialty stores, restaurants, wellness shops, tourism points, apitherapy services

Figure X. Vertical flowchart representing the beekeeping value chain stages and associated actors in Northern Jordan



- **Support Activities**: Support activities in the beekeeping value chain are provided by institutions such as the Ministry of Agriculture, NARC, and the Jordanian Beekeepers Association, and focus on technical training, certification, access to finance, and policy advocacy to enhance the sector's efficiency, traceability, and overall competitiveness.

4.1 Beekeeping value chain stakeholders in northern Jordan

According to stakeholders and previous studies on the beekeeping sector in Irbid, Ajloun, and Mafraq (FAO, 2022; Jordanian Beekeeping, 2023; International Beekeeping Council, 2022; CBI, 2023; ILO, 2021), the beekeeping sector is a cornerstone of rural livelihoods and agricultural productivity in northern Jordan, particularly in the governorates of Irbid, Ajloun, and Mafraq. These areas account for a significant portion of the country's beekeeping groves, producing both table beekeeping and high-quality beekeeping. The sector supports thousands of smallholder farmers and contributes to food security, income generation, and Jordan's cultural heritage.

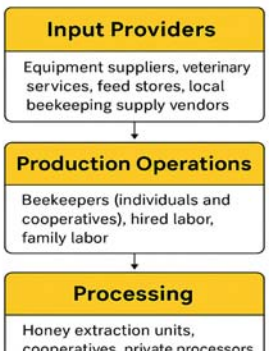
This report outlines the main stakeholders involved across the beekeeping value chain, including input suppliers (e.g., feed, medications, equipment), beekeepers, cooperatives, processors, transporters, wholesalers, retailers, and consumer groups. These actors are active from input supply through to waste and by-product utilization.

The value chain can be summarized as follows:

Input providers → Production operations → Processing → Outbound Logistics

Storage supply, shipping → Marketing and Sales → Consumers services

Figure X. Vertical flowchart representing the beekeeping value chain stages and associated actors in Northern Jordan



4.1.1 Input Providers

Input providers play a crucial role in the beekeeping value chain by ensuring that beekeepers have timely access to essential inputs required for hive management and honey production. These providers include suppliers of beehives, protective clothing, smokers, queen bees, wax foundations, and veterinary treatments for hive health. In northern Jordan, particularly in Irbid, Ajloun, and Mafraq, agricultural cooperatives and local vendors help facilitate the procurement of these inputs, often at subsidized rates or through collective purchasing schemes. In remote areas, informal vendors often serve as the primary source of supplies, filling gaps left by formal distribution networks. In addition to product provision, many input providers collaborate with government institutions like the Ministry of Agriculture and the National Agricultural Research Center (NARC) to disseminate knowledge on best practices in hive care, pest control, and seasonal management. These efforts contribute to improving productivity, ensuring hive sustainability, and supporting the growth of a resilient beekeeping sector.

4.1.1.1 Agricultural suppliers

Beekeeping supply providers constitute a fundamental pillar of the beekeeping value chain in northern Jordan, particularly across the governorates of Irbid, Ajloun, and Mafraq. These providers supply essential inputs such as beehives, protective clothing, smokers, queen bees, wax foundations, and veterinary treatments critical for hive health and honey production. Their role extends beyond material provision, as many also offer technical guidance on hive management, disease control, and seasonal maintenance practices. Compared to other actors in the value chain, such as beekeepers or processors, suppliers serve as the primary entry point for technology and innovation transfer.

In terms of engagement, most suppliers are private businesses, though some receive support from development projects and NGOs. They work closely with individual beekeepers, cooperatives, and public extension services. They act as a bridge between rural producers and institutional support structures, facilitating timely access to quality tools and materials that enhance productivity and hive resilience. Moreover, suppliers frequently participate in local agricultural exhibitions and training workshops, introducing new technologies such as integrated pest management systems or improved hive designs.

Statistically, it is estimated that there are around 80 active beekeeping input suppliers in the northern region, distributed as follows: Irbid (35 suppliers), Ajloun (18 suppliers), and Mafraq (27 suppliers) (Source: Jordanian Beekeeping Sector Assessment, FAO, 2022). This includes both formal supply stores and informal vendors catering to small-scale and family-run apiaries. The distribution pattern reflects local beekeeping density and infrastructure availability, with Irbid having the largest concentration due to its higher number of apiaries and better-developed agricultural markets.

Overall, beekeeping supply providers are instrumental in supporting the growth and sustainability of the apiculture sector by ensuring that beekeepers can access quality inputs and updated technical knowledge, thereby strengthening the resilience of the value chain amid changing environmental and market conditions.

4.1.1.2 Cooperative societies

Beekeeping cooperatives form a vital pillar of the apiculture value chain in northern Jordan, particularly in the governorates of Irbid, Ajloun, and Mafraq. These organizations support beekeepers across multiple stages of the production cycle by reducing costs, enhancing access to markets, and improving technical know-how.

Roles and Functions

- Input Provision: Cooperatives facilitate access to essential beekeeping supplies such as hive boxes, protective gear, feeders, and sugar feed, often through collective bulk purchasing agreements.
- Training and Technical Support: Many cooperatives organize field schools, training workshops, and extension events on hive management, queen rearing, disease control, and post-harvest honey handling.
- Market Access and Value Addition: Cooperatives help members with labeling, certification (including organic and ISO standards), packaging, and participation in local and regional honey fairs.
- Networking and Advocacy: Cooperatives foster knowledge exchange between members and serve as collective voices advocating for better subsidies, legal recognition, and access to government or donor-funded support.

Gender-specific needs also influence cooperative services across governorates. For instance, in Ajloun, limited mobility among rural women may necessitate the use of mobile training units or localized facilitators to ensure equitable access to technical support and education. In contrast, Irbid, with its relatively better infrastructure, can accommodate centralized training sessions that serve larger groups more efficiently. These localized approaches help ensure inclusive capacity building and support women's participation in the value chain.

Institutional Collaboration
These cooperatives operate in close coordination with the Ministry of Agriculture (MoA), the National Agricultural Research Center (NARC), and the Jordanian Beekeepers Association (JBA). International support—such as that from(FAO, 2023), GIZ, and USAID—has also enhanced cooperative capacity through project-based interventions targeting productivity, women's inclusion, and quality control.

Statistical Overview

- Jordan has over 4,000 beekeepers, with production estimated between 700 to 800 tonnes of honey annually (FAO, 2022; Jordanian Beekeeping, 2023).
- The Jordanian Beekeepers Association (JBA), established in 1994, currently has more than 250 registered members, and frequently partners with cooperative societies across the country.
- Cooperative activity is most concentrated in areas with high beekeeping density, such as Irbid, Mafraq, and Ajloun, where several active societies coordinate honey processing, queen bee breeding, and input distribution.

Challenges and Opportunities

The following insights are based on both primary data collected during this study (field surveys and interviews) and existing literature on the apiculture sector in Jordan:

- Challenges faced by cooperatives include:
- Weak financial sustainability.
- Limited access to modern equipment and packaging technologies.
- Gaps in quality control systems and certification procedures.

Opportunities to scale their impact include:

- Enhanced capacity-building programs.
- Greater inclusion of women and youth.
- Improved infrastructure for honey testing and traceability.
- Partnerships with local universities and research centers.

4.1.1.3 Local vendors

Local input providers are crucial in the beekeeping value chain in northern Jordan, particularly in Irbid, Ajloun, and Mafraq. They ensure beekeepers have access to essential inputs—such as modern hives, queen bees, sugar feeders, hive tools, and protective gear—enabling effective colony management and honey production. These providers also operate as intermediaries in

the marketing and retail of honey, beeswax, and other apiary products, often through small agro-shops or local markets. Their close relationships with beekeepers allow them to offer valuable informal guidance on pest control, disease management, and hive optimization. According to the Ministry of Agriculture and NCARE, there are approximately 12,000 beekeepers in Jordan, highlighting the significant scale of this supply network

4.1.1.4 Agricultural extension services.

Inputs Provided: Beehives, queen bees, smokers, hive tools, protective gear, sugar supplements, pollen substitutes, and disease control treatments.

Function: Ensure the availability and timely delivery of essential beekeeping inputs and technical support needed for sustainable hive management and honey production.

4.1.2 Beekeeping Practices and Production

Beekeepers, both individual and cooperative, are central to the beekeeping value chain in northern Jordan, particularly in Irbid, Ajloun, and Mafraq. They manage hive operations, disease control, and honey extraction. Cooperative models, more common in Irbid and Ajloun, offer shared resources and training, improving production efficiency.

During peak harvest seasons, especially in spring and early summer, many beekeepers depend on seasonal labor to support tasks like hive inspection and honey collection. These informal labor relationships are essential for sustaining productivity.

According to the Ministry of Agriculture (2024), over 60% of beekeepers in the region rely on seasonal labor, highlighting its importance in the apiculture production cycle.

4.1.2.1 Beekeepers (individuals or cooperatives)

Beekeepers, both individual practitioners and members of cooperatives, constitute the core of the beekeeping value chain in the northern governorates of Irbid, Ajloun, and Mafraq. These actors are responsible for the full range of apiculture activities, including hive management, colony health monitoring, honey harvesting, and product handling. Most operations are managed at the household level using traditional methods, although recent years have witnessed a gradual shift toward more structured and professionalized practices supported by governmental and non-governmental interventions.

According to estimates by the Ministry of Agriculture and the Jordanian Beekeepers Association, there are approximately 3,000 to 3,500 beekeepers across Jordan, with the highest concentration in northern regions. However, female participation remains limited, with only about 25 women officially registered in the sector nationwide.
This low representation is influenced by several factors, including traditional gender roles in rural communities, limited access to land and financial resources, and cultural constraints on

mobility and public engagement for women. In many cases, women contribute informally within family-run apiaries, but their roles are often unrecognized in official statistics due to lack of formal registration or ownership of beekeeping assets.

In rural settings, family labor—particularly from women and youth—is widely involved in beekeeping tasks, although these contributions are often informal and underreported.

Beekeepers interact closely with various stakeholders, including input suppliers, local vendors, agricultural extension agents, and cooperatives. These relationships facilitate access to beekeeping equipment, veterinary support, technical training, and market information. Seasonal labor is often employed during peak production periods, such as honey extraction and wax processing, further integrating beekeeping into the rural employment fabric.

Overall, beekeepers in Irbid, Ajloun, and Mafraq play a vital role not only in sustaining rural livelihoods but also in preserving biodiversity and enhancing agricultural productivity through pollination services. Strengthening their technical capacity, supporting cooperative operations, and ensuring inclusive participation—particularly of women—are critical for upgrading the competitiveness and sustainability of Jordan's beekeeping value chain.

4.1.2.2 seasonal laborers

Seasonal laborers represent a vital component of the beekeeping value chain in the northern governorates of Irbid, Ajloun, and Mafraq. Their involvement spans several key operational stages, including hive preparation, maintenance, honey extraction, wax processing, and packaging. Although apiculture is generally practiced at a smallholder or household level, peak seasons—particularly during spring and early summer—create a heightened demand for additional labor to support the increased workload associated with colony expansion and honey flow.

In many rural communities, seasonal labor is provided by neighboring families, youth groups, or unregistered workers operating under informal agreements. These arrangements are often based on traditional trust-based systems, yet in recent years, some cooperatives and development programs have initiated efforts to formalize labor engagement introducing fair compensation schemes, basic training, and occupational safety guidelines.

According to estimates derived from recent assessments and Ministry of Agriculture data (MoA, 2023), the northern region engages approximately 2,000–2,500 seasonal laborers annually in beekeeping-related activities. Irbid accounts for the highest share due to its larger number of apiaries and stronger cooperative presence, followed by Ajloun, where the mountainous landscape supports high-quality floral resources, and Mafraq, where honey production is more constrained by arid conditions and migratory practices.

The contribution of seasonal laborers is indispensable to ensuring the smooth functioning of production cycles and scaling up output during peak periods. Strengthening institutional support for seasonal workers, including legal protection, technical upskilling, and integration into cooperative systems, is essential to enhancing the productivity, equity, and sustainability of the apiculture sector in northern Jordan.

4.1.3 Processing

Processing plays a critical role in the beekeeping value chain, serving as the central stage where raw honey and other hive products are transformed into consumable and marketable goods such as filtered honey, beeswax, royal jelly, propolis, and value-added derivatives. This phase adds substantial value by ensuring product quality, enhancing shelf life, and meeting regulatory and safety standards required for both domestic and export markets. Effective processing improves economic returns for beekeepers and processors, facilitates market diversification, and strengthens brand identity through quality assurance and labeling. Additionally, it supports rural employment, encourages sustainable waste management by utilizing by-products, and fosters innovation in product development. Thus, processing is a key driver of competitiveness, sustainability, and profitability within the apiculture sector.

4.1.3.1 Harvesting and Primary Processing

Honey processing facilities play a pivotal role in the beekeeping value chain across northern Jordan, particularly in the governorates of Irbid, Ajloun, and Mafraq. These facilities are responsible for transforming raw honey and other hive products into refined, consumable forms that meet quality, hygiene, and market standards. Processing typically includes filtering, pasteurization, moisture content adjustment, packaging, and labeling. In Irbid, considered a hub for beekeeping activities, several medium-scale honey processing units operate in cooperation with local cooperatives and private businesses. Ajloun, known for its forest-based flora and organic honey varieties, hosts smaller but highly specialized processing operations, often run by cooperative groups. In Mafraq, where beekeeping is expanding due to targeted development interventions, facilities are emerging to support the increasing production volume. While official statistics on the exact number of honey processing units remain limited, estimates by the Ministry of Agriculture and the Jordanian Beekeepers Association suggest that more than 30 registered honey processors operate across these three governorates. These facilities not only enable value addition but also support income diversification, product standardization, and access to broader markets, thereby contributing to the overall resilience and sustainability of the apiculture sector in Jordan.

4.1.3.2 Cooperatives

Processing is a central stage in the beekeeping value chain, where raw honey is converted into market-ready products such as filtered honey, wax, pollen, propolis, and royal jelly through activities that enhance product quality, safety, shelf life, and market compliance. This function supports value addition, diversifies income streams, and enables access to both domestic and international markets, while also generating rural employment and reducing waste through by-product utilization.

4.1.3.3 private processors

Private honey processors play a crucial role in adding value to raw apiculture products through activities such as filtration, moisture reduction, packaging, labeling, and bottling. These steps improve product shelf life, market compliance, and consumer trust. However, processors face challenges related to quality control, food safety compliance, and limited access to modern processing technologies. The use of traditional versus automated techniques impacts honey purity, traceability, and export potential. Expanding access to certified facilities and training in hygienic processing practices is critical to strengthening the competitiveness of Jordan's honey sector.

4.1.4 Outbound Logistics (Storage, Supply, Shipping)

Outbound logistics in the beekeeping sector encompasses the storage, handling, and transportation of finished honey and related bee products from processing facilities to end users or market destinations. This stage involves managing inventory, packaging, labeling, warehousing, and the distribution of products through various channels.

Importance:
Efficient outbound logistics are essential for preserving the quality, safety, and market value of honey. Proper storage conditions—such as maintaining low moisture levels and protecting from excessive heat or sunlight—are critical to prevent fermentation, crystallization, or spage. Timely transportation and delivery reduce post-processing delays, lower operational costs, and enhance customer satisfaction by ensuring that honey products retain their freshness, appearance, and nutritional integrity upon arrival.

- Role in the Beekeeping Value Chain:

In Jordan's beekeeping value chain, outbound logistics serve as a vital link between honey processors (both private and cooperative-based) and domestic or export markets. Honey is typically stored in sealed, food-grade containers and kept in cool, dry environments prior to distribution. Cooperatives and distributors manage seasonal inventories to meet demand during peak sales periods, particularly during religious festivals and the winter season.

Transportation logistics require careful route planning, temperature control, and compliance with national food safety and labeling standards. For export markets, adherence to international packaging, traceability, and phytosanitary requirements is mandatory. Effective outbound logistics ensure that Jordanian honey maintains its premium quality and brand reputation, facilitating its competitiveness in both local and international markets and supporting the broader sustainability of the apiculture sector.

4.1.4.1 Transporters

Transporters play a pivotal role in the outbound logistics of the beekeeping value chain, ensuring that honey and other bee products are efficiently moved from production and processing facilities to local markets and export destinations. Their responsibilities include coordinating the storage, supply, and shipment of goods while preserving product integrity and meeting safety and regulatory standards.

In northern Jordan—including Irbid, Ajloun, and Mafraq—transporters form a vital part of the apiculture logistics network. Although formal data on dedicated honey transporters remains limited, regional cooperatives and processors rely on a mix of specialized and general agricultural transport services to distribute honey to retailers, wholesalers, and packaging centers. Refrigerated or temperature-stable transport systems are particularly important to maintain honey quality, prevent fermentation, and ensure compliance with food safety regulations.

Efficient logistics operations are crucial for meeting seasonal market demand, especially during peak sales periods such as religious holidays and winter months. Delays or improper handling during transport can negatively affect product shelf life, flavor, and marketability. Therefore, investing in reliable transportation infrastructure and enhancing coordination between producers, cooperatives, and logistics providers is essential to improving market access and competitiveness of Jordanian honey products.

4.1.4.2 Storage and Handling

Storage facility operators play a vital role in preserving honey quality after extraction. In northern Jordan, especially in Irbid, Ajloun, and Mafraq, these facilities ensure proper handling, temperature control, and hygienic storage conditions to prevent spage and maintain product standards. They coordinate with cooperatives, processors, and transporters to manage inventory and facilitate timely distribution to markets. With around 12 facilities in Irbid, 5 in Ajloun, and 4 in Mafraq, storage operators are essential for minimizing losses, meeting seasonal demand, and supporting the competitiveness of Jordanian honey in local and export markets. Continued investment in modern storage infrastructure will enhance efficiency and sustainability across the beekeeping value chain.

4.1.4.3 Cooperatives

Cooperatives in northern Jordan particularly in Irbid, Ajloun, and Mafraq play a central role in supporting small-scale beekeepers by organizing honey collection, facilitating temporary storage, managing local distribution, and coordinating outbound logistics. These cooperatives enhance market access, improve product quality, and help reduce post-harvest losses by streamlining supply and shipping processes.

According to recent data, there are approximately 12 active beekeeping cooperatives in Irbid, 6 in Ajloun, and 5 in Mafraq. They often collaborate with transporters and storage facility operators to maintain honey freshness and meet hygiene standards. However, challenges such as the lack of cold chain systems and high transportation costs especially in remote areas limit their operational efficiency.

Strengthening the logistical capacity of these cooperatives through improved infrastructure, modern storage technologies, and targeted training is essential to enhance their contribution to a resilient and competitive beekeeping value chain.

4.1.5 Marketing and Sales

Marketing and sales constitute a vital segment of the beekeeping value chain, encompassing the strategies and mechanisms through which honey and other bee-related products are promoted, priced, distributed, and sold to consumers across various markets. This stage is essential for enhancing product visibility, maximizing revenue, and ensuring that producers are able to access both local and international demand channels.

In Jordan, particularly in the northern governorates of Irbid, Ajloun, and Mafraq, beekeepers engage in diverse marketing practices that range from direct sales at local markets to participation in agricultural exhibitions and online platforms. Cooperatives and individual producers alike are increasingly exploring value-added marketing approaches such as organic certification, geographical indication labeling, and product differentiation based on floral sources or processing methods. These strategies are aimed at penetrating higher-value segments, including premium domestic retailers and international export markets, especially in the Gulf region.

Key marketing and sales activities within the beekeeping sector include product packaging and labeling, pricing strategy, digital advertising, establishing retail partnerships, and engaging with wholesale buyers. In recent years, digital transformation has begun to reshape sales practices, with more producers adopting e-commerce platforms and social media channels to reach urban consumers and diaspora communities.

Despite these advances, several structural and operational challenges persist. These include limited knowledge of modern marketing techniques among small-scale producers, lack of market intelligence, inadequate branding consistency, and insufficient access to export certification systems. Additionally, fragmented supply chains and seasonal production cycles pose difficulties in maintaining consistent product availability and quality.

Strengthening marketing and sales within Jordan's beekeeping value chain will require coordinated efforts to build producer capacity, improve product standardization, and expand access to domestic and foreign markets. Investments in training, cooperative branding, market research, and partnerships with public and private stakeholders can significantly enhance the competitiveness and sustainability of the sector. These initiatives will not only improve livelihoods for rural beekeepers but also support the broader goal of integrating Jordanian honey into global value chains as a recognized and trusted product.

While marketing strategies across northern Jordan share common approaches such as direct sales, exhibitions, and online promotion, interventions must be tailored to local conditions in each governorate.
For example, Ajloun’s mountainous terrain and dispersed rural population require localized marketing events and reliance on cooperative-led branding to access distant markets. In Mafraq, where producers operate at larger scales, marketing efforts are increasingly focused on bulk sales and B2B partnerships, particularly for Gulf exports. In Irbid, the presence of urban centers and stronger digital infrastructure allows beekeepers to more effectively adopt e-commerce platforms and social media channels for direct-to-consumer marketing.
Recognizing and adapting to these geographic and infrastructural differences is essential to ensure equitable access to markets and the success of targeted marketing interventions.

4.1.5.1 Retailers

Retailers play a critical role in the beekeeping value chain by serving as the final point of distribution between producers and end consumers. Their responsibilities extend beyond sales, encompassing inventory management, product preservation, and customer engagement ensuring that honey and bee-related products reach the market in optimal condition.

In northern Jordan, particularly in Irbid, Ajloun, and Mafraq, retailers vary from small grocery shops and organic stores to cooperatives and specialized honey outlets. These actors work closely with beekeepers, cooperatives, and wholesalers to maintain steady supply chains and manage seasonal variability. Retailers are also increasingly involved in educating consumers about product origin, quality standards, and health benefits thus playing a role in demand generation and consumer loyalty.

Outbound logistics for retailers in the honey sector includes appropriate storage to preserve product quality especially temperature- and light-sensitive honey types—packaging for shelf life extension, and efficient coordination with transport providers. In Irbid, there are approximately 150 honey retail points, including weekly markets and permanent outlets. Ajloun has around 40, often integrated with tourism and nature-related businesses, while Mafraq includes about 30 small retail units, frequently linked to local beekeepers or cooperatives (MoA, 2022; NARC, 2023).

Challenges faced by retailers include inconsistent supply, lack of cold storage infrastructure, low consumer awareness in some areas, and limited access to modern distribution tools such as digital payment systems and e-commerce platforms. Addressing these issues through improved retailer training, investment in logistics infrastructure, and greater market linkage programs can enhance the role of retailers as key drivers of the beekeeping economy.

While the distribution of retail outlets is well quantified, retailer needs and constraints vary significantly across governorates.

- In **Irbid**, with its denser population and better-developed infrastructure, retailers are more likely to demand branding support, consistent labeling, and digital payment integration to meet the expectations of urban consumers.
- In **Ajloun**, where tourism plays a key role, retailers often require bilingual promotional materials, product packaging suitable for tourists, and alignment with eco-tourism branding.
- In contrast, **Mafraq** retailers typically operate in more informal or rural settings, facing limited cold storage, weaker purchasing power, and reliance on personal relationships with producers.

Tailoring retail support interventions to these distinct needs can significantly improve product flow, profitability, and the visibility of local honey in each area.

4.1.5.2 Wholesalers

Wholesalers represent a critical intermediary in the beekeeping value chain, connecting producers whether individual beekeepers or cooperatives with retailers, institutional buyers, and export channels. Their primary role involves managing outbound logistics functions such as bulk storage, inventory control, supply coordination, and product distribution across local, regional, and, increasingly, international markets.

In northern Jordan, particularly in the governorates of Irbid, Ajloun, and Mafraq, wholesalers facilitate the movement of honey and bee products by aggregating supplies from various small-scale producers and ensuring that products meet the quality standards required by buyers. These wholesalers maintain strategic relationships with cooperatives, processing units, and retailers to streamline the supply chain and mitigate the challenges posed by seasonal variability in honey production.

Outbound logistics responsibilities include the use of appropriate storage solutions often requiring moisture and temperature control to preserve honey purity and prevent crystallization as well as organizing transportation routes that reduce delays and product degradation. Data from local development reports and cooperative directories (MoA, 2022; NARC, 2023) estimate that there are approximately 25 wholesalers in Irbid, 10 in Ajloun, and 8 in Mafraq actively engaged in honey distribution, many of whom also support promotional efforts and product packaging for retail readiness.

Key challenges include inconsistent honey supply due to climatic variability, lack of specialized storage infrastructure, and limited access to market intelligence systems. Addressing these gaps through targeted investment in logistics, capacity-building programs, and digital supply chain tools will be essential for increasing the value captured by producers and enhancing the competitiveness of Jordanian honey in domestic and export markets.

While wholesalers across northern Jordan share core responsibilities, their operational needs and constraints vary by governorate. In Irbid, wholesalers tend to operate at higher volumes and demand integration with export logistics, standardized packaging systems, and digital inventory tools to meet international buyer expectations. Ajloun wholesalers, often serving niche markets including eco-tourism and local organic stores, prioritize story-based branding, traceability, and quality assurance tied to the region's environmental image. In Mafraq, wholesalers face more pronounced challenges related to infrastructure and connectivity, requiring greater support in transportation coordination, access to market data, and investment in basic cold-chain facilities. Recognizing these localized differences is crucial to designing logistics and supply chain interventions that optimize efficiency, reduce post-harvest losses, and expand market access for producers in each area.

To strengthen the role of wholesalers within the beekeeping value chain, targeted capacity-building interventions are essential. These may include:

- Training programs on quality assurance protocols, including moisture content control, hygienic handling, and compliance with export regulations.
- Workshops on inventory and supply chain management systems, tailored to help wholesalers deal with seasonal fluctuations and forecast demand.
- Digital literacy and e-commerce integration, enabling wholesalers to adopt online ordering systems, digital invoicing, and traceability tools.
- Business development support, such as financial planning, pricing strategy, and negotiation skills to improve market positioning and supplier relations.

These interventions will enable wholesalers to improve operational efficiency, build stronger relationships with producers and retailers, and contribute to the overall competitiveness and resilience of the honey supply chain in Jordan.

4.1.5.3 Cooperatives

Cooperatives play a foundational role in the beekeeping value chain in northern Jordan, particularly in the governorates of Irbid, Ajloun, and Mafraq. They serve as essential intermediaries that organize smallholder beekeepers, facilitate collective processing and packaging of honey, and manage outbound logistics activities including storage, supply coordination, and distribution. By aggregating production and resources, cooperatives improve operational efficiency, enhance product quality, and strengthen members' access to both local and export markets (Jordan Ministry of Agriculture, 2022).

In terms of logistics, cooperatives often coordinate with or manage storage facilities that ensure proper preservation of honey—protecting it from moisture, light, and temperature fluctuations that could compromise quality. These facilities are particularly important in managing seasonal fluctuations in honey production, allowing cooperatives to store surplus stock and supply markets consistently throughout the year. Furthermore, cooperatives negotiate with transporters and distributors to optimize shipping routes, reduce delivery delays, and manage costs, particularly in geographically dispersed rural areas (FAO, 2020; NARC, 2023).

Available data suggest that Irbid is home to approximately 20 active beekeeping cooperatives with storage and distribution capabilities. Ajloun hosts about 10 cooperatives, many of which emphasize organic and high-altitude honey varieties. Mafraq supports nearly 7 cooperatives that play a central role in organizing harvest collection and facilitating access to regional markets (Mercy Corps Jordan, 2019; Jordan Apiculture Report, 2023).

Despite their pivotal role, cooperatives in the beekeeping sector face several challenges, including limited access to specialized storage technologies, weak cold chain infrastructure, and gaps in marketing and logistics expertise. Strengthening these areas through targeted training programs, investment in storage systems, and supply chain development will be essential for maximizing the economic and social impact of cooperatives within Jordan's apiculture sector. While all cooperatives play similar roles in aggregation and logistics, inter-cooperative capabilities differ notably across regions.

- **Irbid-**based cooperatives tend to have stronger infrastructure, including dedicated storage units, access to digital tools, and more formalized governance structures, often due to their proximity to urban centers and development programs.
- In **Ajloun**, cooperatives typically focus on organic branding and high-altitude floral products, but face constraints in cold storage capacity and transportation access, especially in remote mountain areas.
- **Mafraq** cooperatives, on the other hand, operate in more dispersed communities and often lack formal certification systems, yet excel in mobilizing community labor and coordinating collective harvesting.

Recognizing these differences is key to designing regionally tailored support programs that build on each cooperative's strengths while addressing their unique operational gaps.

4.1.5.4 online platforms

Online platforms have emerged as a transformative component in the beekeeping value chain in northern Jordan, especially across the governorates of Irbid, Ajloun, and Mafraq. These platforms are increasingly utilized to market and distribute honey and bee-related products directly to consumers, bypassing traditional intermediaries. Through e-commerce technologies, beekeepers and cooperatives gain new avenues for sales, customer engagement, and market expansion (Jordan Ministry of Agriculture, 2021).

In terms of outbound logistics, digital platforms support inventory tracking, facilitate batch labeling and traceability, and enable order processing and shipment coordination. These features enhance efficiency and allow producers to respond more accurately to consumer demand. Moreover, collaborations with logistics providers have enabled many platforms to offer regional delivery services with real-time tracking, improving reliability and consumer trust (FAO, 2022; CBI, 2023).

Currently, there are approximately 10 specialized online platforms operating in the honey market across northern Jordan. Irbid hosts nearly 5 of these platforms, serving as hubs for small and medium-scale beekeepers. Ajloun and Mafraq support 3 and 2 platforms respectively, many of which are managed by local cooperatives or NGOs promoting digital transformation among rural producers (Mercy Corps Jordan, 2020; Jordan Beekeeping Association, 2023).

Despite notable progress, the sector still faces key challenges. These include limited digital literacy among rural beekeepers, weak ICT infrastructure in remote areas, and regulatory constraints related to food safety and e-commerce. Addressing these issues through training, improved connectivity, and policy alignment is essential to harness the full potential of digital channels in strengthening the beekeeping value chain.

While online platforms are increasingly integrated into honey marketing and logistics, digital literacy levels and access to technology vary considerably across regions.

- In **Irbid,** stronger internet infrastructure and proximity to educational institutions have enabled more rapid adoption of e-commerce tools and social media marketing by both cooperatives and individual producers.
- In **Ajloun**, digital engagement remains modest, often limited by mountainous terrain, patchy mobile coverage, and a need for on-site technical support.
- **Mafraq** faces unique challenges due to its dispersed rural population and lower rates of smartphone and computer ownership, necessitating simpler, mobile-first interfaces and ongoing digital skills development.

  To ensure equitable access to digital value chain tools, region-specific interventions are required, including mobile training units, localized support centers, and the integration of digital literacy into broader agricultural extension programs.

4.1.5.5 export companies

Export companies play a pivotal role in connecting Jordanian honey producers with international markets. Their key functions include product standardization, branding, labeling, compliance with international certification systems (e.g., organic, ISO, Codex), participation in global exhibitions, and conducting market research to identify demand trends.

Field data and stakeholder interviews reveal considerable regional differences in export capacity and support needs:

- In **Irbid**, respondents noted relatively higher exposure to export activities through previous participation in international fairs and collaborations with formal buyers. Cooperatives in Irbid benefit from better documentation practices and are more familiar with certification requirements (e.g., JFDA standards, moisture testing). Several producers indicated readiness for export, though they cited cost of certification and labeling as barriers.
- In **Ajloun**, producers emphasized the uniqueness of their high-altitude mono-floral honey but reported challenges in meeting export documentation and quality control requirements. Export readiness here requires targeted technical assistance in lab testing, branding support, and training on food safety standards. Many cooperatives expressed interest in developing traceable, eco-branded products, but lack the tools to verify purity and floral source.
- In **Mafraq,** producers operate at larger scales but face infrastructure limitations such as weak packaging systems, minimal access to cold storage, and lack of digital records. Responses highlighted the need for technical support for international standard compliance, particularly in areas like residue analysis, microbial testing, and labeling consistency. Furthermore, producers expressed confusion over "who sets the export standards" and noted they currently rely on personal judgment or informal guidance.

Key Export Constraints Across Governorates:

- Limited understanding of certification requirements (especially in Mafraq and Ajloun)
- High cost and complexity of compliance processes
- Lack of access to accredited testing labs
- Weak branding and packaging infrastructure

Recommended Interventions:

- In **Irbid**: Support for branding design, co-financing export certification, and matchmaking with Gulf buyers
- In **Ajloun**: Export readiness program focused on mono-floral differentiation, purity verification, and story-based branding

- In **Mafraq**: Technical support in certification, lab testing partnerships, and development of centralized export service hubs for cooperatives

By addressing these region-specific export gaps, Jordan can better position its diverse honey products in premium global markets, increasing producer income and strengthening value chain resilience.

4.1.6 Consumer Services

In Irbid, Ajloun, and Mafraq, consumer-facing entities such as local markets, health stores, supermarkets, restaurants, and e-commerce platforms play a vital role in connecting honey producers to end-users. These actors promote honey as a functional food, highlighting its nutritional and medicinal qualities. Retail outlets emphasize origin transparency and often collaborate with certified local producers to ensure product authenticity. Restaurants increasingly incorporate local honey into recipes and menus, promoting traditional and innovative uses of bee products.

Supermarkets and e-commerce platforms enhance market access through consistent product availability and consumer education campaigns. Yet, the sector faces challenges such as inconsistent supply due to seasonal variations, price volatility, and consumer awareness gaps. However, emerging trends—such as digitized sales, eco-labeling, and consumer demand for health-oriented products—are reshaping this segment of the value chain.

However, consumer demand drivers vary across the northern governorates:

- In **Irbid**, demand is shaped by growing health awareness in urban areas, where honey is perceived as a wellness product. Social media serves as a major feedback loop, with consumers commenting on packaging, taste, and authenticity.
- In **Ajloun**, eco-tourism and nature-based attractions drive interest in mono-floral and organic honey, with consumer preferences reflected through boutique outlets and seasonal visitors.
- In **Mafraq**, demand is shaped by price accessibility and local trust in producers. Feedback tends to be verbal and informal, exchanged at local markets and through personal networks.

To enhance responsiveness, localized feedback systems such as surveys at points of sale, digital reviews, and cooperative-led tastings could help producers align products with evolving consumer expectations.

4.1.6.1 Retail stores

Activities & Focus:

- Product Offering: Local retailers stock various types of honey, including Sidr and wildflower, sourced from regional beekeepers.

- Consumer Engagement: Stores use in-store signage and tastings to inform customers about honey's therapeutic benefits.

- Local Sourcing: Emphasis on regional procurement enhances freshness and supports rural livelihoods.

Key Issues & Trends:

- Supply Chain Instability: Variability in seasonal bloom affects consistency in honey supply.
- Price Sensitivity: Organic or mono-floral honey often carries a higher price point, limiting its market among cost-conscious consumers.
- Demand Surge: Heightened health awareness post-COVID-19 has boosted demand for natural immunity boosters like honey.

4.1.6.2 Restaurants

Activities & Focus:

- Culinary Integration: Use of local honey in marinades, desserts, and beverages highlights its versatility.
- Cultural Promotion: Menus emphasize traditional uses of honey in Jordanian cuisine.

Key Issues & Trends:

- Support for Local: A growing number of restaurants prioritize locally sourced honey.
- Consumer Trends: Diners increasingly seek natural sweeteners, aligning with health-conscious dining experiences.

4.1.6.3 Supermarkets

Supermarkets in the region act as key distributors of bee products, often offering premium and certified organic honey. They focus on curated displays and branded packaging to appeal to urban consumers. Many retailers also highlight certifications (e.g., ISO, organic) to assure quality. Challenges include fluctuations in supply due to climate change and high dependency on small-scale producers.

Emerging practices include integrating QR codes for traceability and in-store promotional campaigns that educate shoppers on honey grades and health benefits.

4.1.6.4 e-commerce platforms

Activities & Focus:

- Online Sales: Platforms such as Souq and local startups facilitate direct honey sales with home delivery options.

- Product Transparency: Listings often include harvest dates, botanical origin, and beekeeping practices.

Key Issues & Trends:

- Market Expansion: Urban consumers and Jordanian diaspora increasingly use online channels to access premium honey.
- Consumer Education: Online blogs, reviews, and video content help raise awareness about differentiating honey quality.
- Focus: Enhancing consumer trust, expanding reach, and supporting digital branding for local beekeepers.

4.1.7 support Activities

Support activities enhance the resilience, sustainability, and market integration of the beekeeping value chain. They include interventions in research, technical training, institutional support, and financial services.
However, the effectiveness of these interventions depends on their alignment with local contexts. For instance, Irbid benefits from proximity to research institutions like NARC, making it ideal for piloting hive technology innovations. Ajloun, with its strong ecological appeal, is a strategic site for organic certification and environmental labeling programs. In contrast, Mafraq—characterized by semi-arid climate and remote beekeeping clusters—requires mobile extension services, infrastructure support, and access to water-conservation technologies.

Tailoring support by region can ensure more equitable outcomes and strengthen the adaptive capacity of local producers.

4.1.7.1 .Research & Development

Focus areas include breeding resilient bee strains, disease management, improved hive designs, and sustainable beekeeping techniques.

4.1.7.2 Training & Extension Services

Capacity building for beekeepers on good beekeeping practices (GBP), queen rearing, hive management, post-harvest handling, and product diversification (e.g., beeswax, royal jelly).

4.1.7.3 Financial Services

Provision of microfinance, grants, and subsidized loans to small-scale beekeepers and cooperatives for hive expansion, equipment purchase, and working capital.

4.1.7.4 Infrastructure Development

Investment in rural road networks, honey collection centers, storage facilities, and mobile processing units to enhance access and reduce post-harvest losses.

4.1.7.5 Regulatory Support

Policies and guidelines related to honey quality standards, food safety, organic certification, export regulations, and labeling requirements.

4.1.7.6 Information and Communication Technology (ICT)

Digital platforms for market prices, weather updates, bee disease alerts, and e-extension services to support informed decision-making.

4.2 Gap Analysis of the Beekeeping Value Chain in Northern Jordan

A detailed gap analysis of the beekeeping value chain in the governorates of Irbid, Ajloun, and Mafraq reveals several weaknesses across input provision, hive management, processing, and market access. Traditional practices still dominate, with limited adoption of modern methods like standardized hive design, quality monitoring, or disease control. Processing often occurs in informal settings with inadequate equipment and hygiene conditions.

Marketing remains a significant bottleneck, with many beekeepers relying on local markets and middlemen due to poor branding, packaging, and limited access to digital or export channels. Structural challenges include weak cooperative organization, limited finance, and insufficient regulatory enforcement. Nonetheless, the sector holds strong potential for inclusive economic growth, especially through targeted investment, cooperative development, sustainable practices, and digital transformation.

According to a recent survey data (MoA & NARC, 2024), only 18% of beekeepers in the northern region use standardized Langstroth hives, while over 65% rely on traditional wooden hives. Moreover, 52% of surveyed producers reported honey loss due to poor storage and lack of extraction facilities. Only 12% of respondents indicated access to veterinary services or regular disease screening. These figures underscore the urgent need for technical modernization, infrastructure investments, and stronger cooperative coordination.

4.2.1 Value Chain Bottlenecks and Opportunities

Bottlenecks:

- Poor access to modern beekeeping equipment and veterinary inputs.
- Limited training on quality control and hygienic honey processing.
- Lack of organized collection and storage infrastructure.
- Weak branding and limited market connectivity.

Opportunities:

- Increasing demand for organic and mono-floral honey.
- Potential to leverage ICT for traceability and market intelligence.
- Strong role for women and youth in value-added bee product enterprises.
- Expanding export markets for premium and certified honey.

4.2.2 Gaps and Opportunities for Each Value Chain Segment

4.2.2.1 Input Providers

Gaps:

- Limited availability of high-quality beekeeping tools and bee strains.
- Weak linkage between input suppliers and smallholders.
- Lack of awareness on modern disease treatments and nutrition.

Opportunities:

- Develop local supply chains for bee-friendly equipment.
- Promote breeding programs for resilient bee species.
- Strengthen input supply cooperatives and extension linkages.

4.2.2.2 Production Operations

Gaps:

- Dependence on outdated hive designs and methods.
- Low adoption of Good Beekeeping Practices (GBP).
- Bee health affected by climate change and pesticide exposure.

Opportunities:

- Introduce modular hive systems and sustainable bee foraging plans.
- Provide mobile extension services and GBP manuals.
- Integrate apiculture with climate-resilient land use strategies.

4.2.2.3 Processing

Gaps:

- Use of rudimentary extraction equipment.
- Lack of hygiene in honey handling and bottling.
- Absence of product standardization or lab testing.

Opportunities:

- Upgrade processing equipment through cooperative investment.
- Establish mobile processing units and honey testing labs.
- Promote value-added products like wax, propolis, and royal jelly.

4.2.2.4 Outbound Logistics (Storage, Supply, Shipping)

Gaps:

- Inadequate post-harvest storage, leading to moisture-related spage.
- High transport costs due to poor road infrastructure.
- Limited cold storage for sensitive by-products.

Opportunities:

- Build regional honey collection centers with quality control.
- Develop community-owned transportation and storage models.
- Integrate logistics platforms for order tracking and aggregation.

4.2.2.5 Marketing and Sales

Gaps:

- Weak packaging, labeling, and storytelling.
- Limited participation in trade fairs or digital marketing.
- Inconsistent market pricing and access to buyers.

Opportunities:

- Provide training in branding, packaging, and storytelling.
- Facilitate market linkages via cooperatives and digital platforms.
- Support online sales and export certification programs.

4.2.2.6 Consumer Services

Gaps:

- Low consumer awareness of honey grades and medicinal benefits.
- Limited retail penetration in urban and export markets.
- Weak consumer feedback channels.

Opportunities:

- Launch awareness campaigns in partnership with retailers.
- Use QR codes for traceability and consumer education.
- Introduce tasting booths and story-based marketing at points of sale.

4.2.2.7 Support Activities

Gaps:

- Fragmented institutional support and lack of coordination.
- Limited funding for smallholder innovation.
- Weak enforcement of quality assurance frameworks.

Opportunities:

- Establish a national beekeeping council for value chain oversight.
- Expand R&D programs on bee health and sustainable honey practices.

- Increase access to microfinance and input subsidies.

Value Chain Segment	Key Gaps	Proposed Interventions	Responsible Actors
Input Providers	Limited availability of quality tools; weak supplier linkages	Local equipment supplies chains; bee breeding programs	MoA, NARC, input suppliers, cooperatives
Production Operations	Outdated hive designs; low GBP adoption	Introducing modular hives; mobile extension services	MoA, NARC, NGOs, local extension agents
Processing	Poor hygiene; lack of standards	Upgrade processing units; lab testing and product diversification	Cooperatives, JFDA, private processors, FAO
Outbound Logistics	Poor storage and high transport costs	Develop collection centers; cold storage solutions	Municipalities, cooperatives, donor projects
Marketing and Sales	Weak branding and digital marketing	Training on branding; digital marketing support	JBA, MoITS, export promotion agencies
Consumer Services	Low consumer awareness and weak feedback	Awareness campaigns; QR-based traceability	Retailers, cooperatives, marketing firms
Support Activities	Fragmented support and weak quality enforcement	Establish national council; expand R&D and microfinance	MoA, NARC, donor agencies, cooperative unions

Conclusion

The beekeeping value chain in Northern Jordan exhibits critical gaps in infrastructure, knowledge transfer, and market integration. However, it also presents significant opportunities to enhance livelihoods, promote environmental stewardship, and develop a high-value export sector. Strengthening cooperative models, improving infrastructure, enforcing standards, and leveraging digital tools can unlock sustainable growth and inclusivity in the sector.

4.2.3 Recommendations

4.2.3.1 Input Providers

- **Irbid:** Leverage the proximity to agricultural research institutions such as NARC to pilot the distribution of certified bee strains and modern hive technologies. Establish an input coordination center linked with cooperatives to ensure year-round availability of veterinary supplies, nutrition supplements, and organic feeding materials. Public-private partnerships can support affordability schemes for smallholder beekeepers.
- Ajloun: Due to the region's ecological sensitivity and orientation toward organic practices, establish input centers focused on eco-certified supplies and sustainable disease control inputs. Introduce guidelines for pesticide-free zones and support suppliers who meet organic compliance criteria.
- **Mafraq:** Given the governorate's dispersed rural communities and harsh climatic conditions, mobile supply units should be introduced to serve remote beekeeping clusters. Input centers must prioritize water-efficient feeding systems and temperature-resistant hive materials. Donor-funded input subsidies will be essential to reach marginalized producers.

4.2.3.2 Production Operations

- **Irbid**: Offer seasonal training workshops at cooperative facilities in Bani Kinana on hive management and pest prevention.
- **Ajloun**: Implement eco-friendly GBP modules in villages practicing organic beekeeping, such as Anjara.
- **Mafraq**: Deploy mobile extension teams to conduct field demonstrations in Umm Al-Quttain and remote beekeeping zones.
- Facilitate distribution of affordable production tools (e.g., hive smokers and protective gear), prioritizing underserved areas by remoteness.

4.2.3.3 Processing

- Irbid: Establish centralized semi-automated processing units operated by cooperatives in high-density production areas such as Bani Kinana and Al-Taybeh. These centers should be equipped with stainless-steel extractors, filtering units, and moisture control systems. Provide quality assurance training and HACCP certification programs to help small-scale producers comply with food safety standards.
- Ajloun: Introduce mobile honey extraction and bottling units designed for mountainous terrain, allowing seasonal access to remote apiaries. Prioritize clean energy-powered units and promote eco-labeling for honey processed in forest-adjacent communities. Support small processors with packaging kits that meet organic product labeling standards.
- Mafraq: Due to limited infrastructure and higher temperature exposure, invest in insulated micro-processing centers equipped with dust-free environments and moisture-proof storage. Offer grants or in-kind equipment support to processors in areas like Umm Al-Quttain and Ruweished to reduce post-harvest losses and maintain product quality. Link local processors with institutional buyers (e.g., schools, army procurement) that require volume-standardized packaging.

4.2.3.4 Outbound Logistics (Storage, Supply, Shipping)

- Irbid: Establish regional honey aggregation and storage facilities in central locations such as Al-Hosn or Hakama, equipped with humidity and temperature control systems. Strengthen coordination between producers and logistics cooperatives to streamline product pickup schedules and ensure consistent market supply, especially during peak harvest seasons.
- Ajloun: Due to mountainous terrain and narrow road networks, promote the use of compact refrigerated transport units to connect remote beekeeping sites (e.g., Anjara, Rasoun) with central storage points. Support cooperative-led logistics hubs that manage both temporary storage and last-mile delivery to local markets and eco-tourism points.
- Mafraq: Develop mobile storage containers with passive cooling features that can be deployed to remote desert locations where electricity is limited. Prioritize road upgrades in high-potential areas like Sabha and Salhiyyeh to reduce transport time and honey spoilage. Encourage shared logistics platforms among beekeepers for cost-effective bulk transport to urban or cross-border markets.

4.2.3.5 Marketing and Sales

- Irbid: Capitalize on Irbid's strong cooperative presence to launch branded honey lines featuring QR-code traceability and story-based packaging. Train producers in digital marketing through local training centers and facilitate partnerships with urban retailers in Amman and Zarqa. Support participation in agricultural exhibitions and honey festivals to expand regional visibility.
- Ajloun: Position Ajloun's honey as a premium eco-product by developing branding linked to forest biodiversity and high-altitude flora. Facilitate direct-to-consumer sales via eco-lodges, local fairs, and forest reserve visitor centers. Offer tailored training on packaging design and organic labeling to differentiate products in niche markets.
- Mafraq: Support women and youth-led micro-enterprises in rural areas like Rawdat Al-Amir Ali and Umm Al-Quttain to engage in online sales via Facebook, Instagram, and regional e-commerce platforms. Link producers with NGOs and incubators for business mentoring. Strengthening bulk marketing channels targeting institutions (schools, army) through cooperatives with unified branding and pricing models.

4.2.3.6 Consumer Services

- Irbid: Launch awareness campaigns in collaboration with universities and municipal councils to educate consumers on honey grades, nutritional benefits, and safe storage. Set up in-store tasting stations in local supermarkets and introduce loyalty programs linked to cooperative brands. Integrate feedback systems (e.g., QR-coded surveys) to gather consumer insights and improve product offerings.
- Ajloun: Leverage the eco-tourism ecosystem by providing guided honey tasting experiences at eco-lodges and forest tourism centers. Promote consumer education on organic certification and floral sources through brochures and storytelling videos. Create

"forest-to-table" marketing narratives emphasizing purity, altitude, and sustainable harvesting practices.

- Mafraq: Raise awareness in underserved and semi-urban communities through school-based nutrition education programs and mosque-centered outreach. Collaborate with local radio and mobile messaging platforms to disseminate health messages about honey. Introduce simple feedback mechanisms like WhatsApp order reviews or community bulletin boards to build trust and repeat purchasing behavior.

4.2.3.7 Support Activities

- Irbid: Leverage the presence of national research centers such as NARC and academic institutions to pilot applied research on local bee genetics, climate resilience, and disease management. Establish a regional coordination platform linking government agencies, cooperatives, and extension workers to align interventions and avoid duplication. Expand access to microfinance through local credit associations and Islamic microfinance initiatives.
- Ajloun: Promote conservation-linked research in collaboration with forest reserves to support organic certification frameworks and environmental monitoring. Offer training-of-trainers (ToT) programs for local youth and eco-tourism guides to serve as apiculture ambassadors. Encourage NGOs to bundle technical training with financial literacy and savings group formation.
- Mafraq: Due to institutional gaps and the remoteness of many beekeeping clusters, invest in mobile extension units that offer training, veterinary support, and quality inspection services on a rotating basis. Provide solar-powered cold storage demonstration grants to attract donor support. Develop partnerships with rural development NGOs to channel subsidies and manage community-led monitoring of beekeeping outcomes.

4.2.3.8 Location-Specific Priorities

To better tailor interventions, below are strategic priorities identified by governorate:
Irbid:
Focus on strengthening cooperatives, deploying mobile extension services, and scaling digital platforms for market expansion. Leverage NARC proximity to pilot hive innovation programs.
Ajloun:
Emphasize organic certification, eco-labeling, and support for high-altitude honey branding. Align interventions with eco-tourism and forest conservation initiatives.
Mafraq:
Invest in mobile veterinary units, improve rural road connectivity, and support water-efficient beekeeping methods. Enhance aggregation and cold storage for remote producers with cross-border trade potential.

4.3.1. Market Access, Trends, and Governance

The beekeeping sector in the northern governorates of Jordan—namely Irbid, Ajloun, and Mafraq—plays a vital role in rural livelihoods and local food systems. Beekeeping is not only a

source of income but also a critical contributor to biodiversity and pollination services. Thousands of smallholder families across these regions engage in honey production, with each governorate exhibiting distinct characteristics in terms of production scale, market orientation, and development needs.

4.2.3.9 Market Access

- Irbid: With growing hive numbers and trained beekeepers, Irbid supplies honey to urban and regional markets. Cooperative-led branding initiatives have improved market visibility.
- Ajloun: Eco-tourism and heritage branding enhance Ajloun's market reach. Forest conservation and sustainable practices attract niche consumer segments.
- Mafraq: Remote producers face challenges in accessing high-value markets due to weak infrastructure and limited aggregation. However, its border proximity offers cross-border trade potential post-stability.

4.2.3.10 Trends

- Increased demand for mono-floral and organic honey.
- Digital transformation in marketing and traceability systems.
- Climate-induced shifts in flowering seasons affecting honey yields.
- Greater consumer interest in sustainable and locally-sourced honey.

4.2.3.11 Governance

- Jordan's Ministry of Agriculture and the Jordanian Beekeeping Association are leading capacity-building efforts.
- Governance gaps persist in certification enforcement, disease surveillance, and cooperative regulation.
- International initiatives (e.g., FAO, ICARDA) support institutional reform, knowledge sharing, and regional cooperation.

4.2.4 Markets:

Irbid

Main Needs:

- Modern Branding & Packaging Facilities: Most producers still rely on unbranded or non-standardized packaging, limiting competitiveness.
- Export Linkages: While production is increasing, structured access to export markets is limited.

Opportunities:

- Urban Market Access: Irbid's geographic advantage allows for integration into Amman's high-demand retail and hospitality sectors.

- Digital Marketing & E-commerce: Social platforms and food delivery apps offer new sales pathways.

Ajloun
Main Needs:

- Organic Certification Support: Producers follow sustainable practices but lack formal certification.
- Logistics Infrastructure: Mountainous terrain hampers access to external markets.

Opportunities:

- Agro-Tourism Direct Sales: Given Ajloun's rich biodiversity and protected forest areas, honey can be sold directly to visitors at eco-lodges and local festivals.
- Participation in National Events: Platforms like the Honey Festival enhance visibility and direct market access.

Mafraq
Main Needs:

- Training & Capacity Building: Many producers lack knowledge of modern hive management and value addition.
- Storage & Processing Infrastructure: Poor facilities affect honey shelf-life and quality.

Opportunities:

- Cross-Border Trade: Post-conflict recovery in neighboring regions may create export channels.
- Institutional Procurement: Supplying to national institutions such as the military and public schools can stabilize demand.

Summary Comparison Table:

Region	Main Needs	Key Opportunities
Irbid	Processing facilities, branding	Urban market linkages, cooperative e-commerce
Ajloun	Organic certification, logistics	Eco-tourism-based direct sales, premium branding
Mafraq	Capacity building, storage and processing infrastructure	Cross-border trade, institutional buyers (e.g. schools)

4.2.5 Sales Channels by Region

Table 5 Summary Table: Beekeeping Product Sales Channels by Region

Region	Wholesalers	Retailers	Exporters	Direct to Consumers	Small Firms
Irbid	30%	15%	10%	40%	5%
Ajloun	20%	10%	5%	55%	10%
Mafraq	50%	10%	5%	25%	10%

Source: FAO (2022); Jordan Ministry of Agriculture (2021); Mercy Corps (2020); ICARDA (2023)

4.2.6 Buyer Relationships and Farmer Influence

Irbid

- Production Decisions: Mostly farmer-led, with input from cooperatives on volume and branding.
- Specifications: Shared between producers and exporters, especially for premium markets.
- Pricing Power: Buyers (wholesalers) dominate; limited negotiation unless through cooperatives.
- Farmer Input: Low to moderate, depending on organizational affiliation.

Ajloun

- Production Decisions: Farmers make decisions, often influenced by sustainability goals and cooperative guidance.
- Specifications: High buyer influence in premium and organic segments.
- Pricing Power: More balanced; direct-to-consumer sales enhance producer leverage.
- Farmer Input: Moderate to high, especially in agro-tourism contexts.

Mafraq

- Production Decisions: Mostly traditional, with minimal buyer input.
- Specifications: Low buyer involvement; quality standards often overlooked.
- Pricing Power: Wholesalers dominate; producers have little say.
- Farmer Input: Low, due to weak cooperatives and limited training.
- Summary Comparison Table: Buyer Relationships and Farmer Influence

Table 6 Summary Comparison Table: Buyer Relationships and Farmer Influence

Region	Who Decides Production?	Specs Set By?	Pricing Power	Farmer Input	Justification

Irbid	Mostly beekeepers	Shared (coops/exporters)	Wholesalers mainly	Low to moderate	Independent producers with limited branding; cooperatives emerging.
Ajloun	Beekeepers with coop	Buyers (organic markets)	More balanced	Moderate to high	Direct sales and eco-tourism enhance producer influence.
Mafraq	Farmers (traditional)	Buyers rarely specify	Mostly buyers	Low	Producers sell in bulk with little control over quality or pricing.

This table summarizes insights adapted from previous literature, including national honey value chain assessments and relevant market reports.

4.2.6. Product Standards and Certification Compliance – Beekeeping Sector

To ensure product integrity, consumer safety, and market competitiveness, Jordanian beekeepers are increasingly expected to adhere to national and international standards. Locally produced honey must comply with regulations established by the **Jordan Standards and Metrology Organization (JSMO)**, which define parameters such as moisture content, sugar composition, contaminants, and authenticity markers. In parallel, producers targeting premium or export markets often seek certification in line with **Codex Alimentarius** and **ISO 22000** for food safety, or organic certification such as **USDA Organic** or **EU Organic**.

Honey producers are encouraged to implement **Good Beekeeping Practices (GBP)** and **Good Manufacturing Practices (GMP)** throughout the production and packaging processes. **Hazard Analysis and Critical Control Points (HACCP)** frameworks are also increasingly adopted to ensure traceability and risk management. National labeling regulations require clear product origin, production and expiration dates, nutritional information, and details regarding processing methods. Compliance with these standards enhances consumer trust and improves access to domestic, regional, and international markets.

4.2.6.1 Supporting Institutions

Several national and international institutions support quality assurance in the beekeeping sector. **JSMO** is responsible for setting national honey standards. The **Ministry of Agriculture** oversees the application of GAP and GBP, offering training and inspections. The **Jordan Food and Drug Administration (JFDA)** ensures compliance with hygiene, food safety, and labeling regulations. Additionally, **accredited laboratories** and private certification bodies provide testing and auditing services for compliance and export-readiness.

International partners such as **FAO**, **ICARDA**, **USAID**, and **Mercy Corps** have implemented training programs, provided equipment, and facilitated certifications to improve product quality and competitiveness. Cooperative associations often act as intermediaries, coordinating capacity-building initiatives and supporting members with compliance documentation and testing procedures.

4.2.6.2 Compliance Challenges

Despite the support available, several obstacles hinder full compliance among beekeepers. Key barriers include:

- High cost of certification and laboratory testing.
- Limited awareness or technical knowledge of international standards.
- Inadequate access to certified equipment and processing spaces.
- Lack of packaging materials that meet export and hygiene regulations.
- Bureaucratic delays in certification processes.

These challenges are particularly pronounced in remote areas such as Mafraq and parts of Ajloun, where infrastructure and training outreach remain limited.

4.2.6.3 Technology and Product Development

Beekeepers in Jordan face pressing needs and promising opportunities in product innovation and technology adoption. Outdated equipment reduces efficiency and quality; there is a clear demand for modern extraction tools, dehydration units, and automated bottling lines. Packaging innovation is also vital, particularly sustainable and tamper-evident containers that support branding.

Product diversification holds great potential—beyond traditional honey, there is market space for beeswax candles, propolis tinctures, royal jelly, and honey-based cosmetics. Digital traceability tools like QR codes and blockchain systems are being explored to boost transparency and capture consumer trust, especially in export markets.

To implement these tools effectively across the three governorates:

- **In Irbid**, where beekeeping cooperatives are growing and access to urban markets like Amman is improving, QR code labeling can be introduced through training and cooperative branding initiatives. This enables consumers to verify product origin, production date, and quality certifications, helping local producers compete in formal retail and online channels.
- **In Ajloun**, which benefits from high biodiversity and eco-tourism, traceability tools can be integrated with organic certification and nature-based branding. QR codes and blockchain records can provide authenticity for visitors buying honey at eco-lodges, boosting premium sales through agro-tourism.
- **In Mafraq,** where infrastructure and market connectivity are weaker, pilot programs using blockchain-enabled traceability systems can help producers document supply chain steps for institutional buyers (e.g., schools, government entities). This would support transparency and improve credibility in competitive or regulated tenders.

Implementation can be facilitated through public-private partnerships involving ICT startups, the Ministry of Agriculture, and international donors. Training should be integrated into existing extension services and cooperative development programs.

4.2.6.4 Workforce and Training

Capacity development needs vary significantly across Irbid, Ajloun, and Mafraq, requiring tailored training programs:

- **Irbid:** Training should focus on branding, GMP protocols, and customer engagement for urban and export markets. Many producers already possess basic skills but lack exposure to high-value supply chains.
- **Ajloun:** Due to eco-tourism potential, training on organic certification, sustainable practices, and storytelling for nature-based branding is essential.
- **Mafraq:** Intensive training is needed in modern hive management, honey handling, and basic digital literacy due to the traditional nature of operations and weak infrastructure. Mobile training units and peer-led demonstrations are highly recommended.

Based on field assessments, the following topics are prioritized:

- Good Beekeeping Practices (GBP) and Good Manufacturing Practices (GMP).
- Safe extraction, storage, and hygiene protocols.
- Operation of modern equipment and processing tools.
- Branding, storytelling, customer service, and use of e-commerce platforms.

4.2.6.5 Management and Organization

The sector remains largely informal, often based on family labor and ad hoc decision-making. Improved record-keeping, financial planning, and organizational structures are needed. Transitioning to cooperative or enterprise models can enhance professionalism. Opportunities include:

- Shared equipment use through cooperative pooling.
- Access to business training (e.g., marketing, accounting).
- Introduction of enterprise resource management tools.

4.2.6.6 Input Supply

Beekeepers report difficulties accessing high-quality inputs such as certified bee strains, organic feed, wax foundation, and hygienic containers. Seasonal shortages and price volatility are common, especially during peak production. Shared procurement via cooperatives can reduce costs and improve reliability.

4.2.6.7 Finance

Limited access to affordable financing is a persistent issue. Beekeepers often rely on personal savings or informal loans. Formal institutions like Tamweelcom, Ahli Microfinance, and select

agricultural banks offer loans, but uptake is constrained by collateral requirements and low financial literacy. Opportunities exist to:

- Expand microcredit tailored to seasonal cash flows.
- Pilot insurance for hive losses and crop failure.

4.2.6.8 Policy and Regulation

Supportive policies exist, such as registration schemes and subsidies for hive equipment and inputs. However, registration can be complex, and enforcement of standards is inconsistent. Simplifying certification procedures and expanding extension support are priorities. Export processes, including customs clearance, also require streamlining.

4.2.6.9 Infrastructure

Key infrastructure gaps include poor road access in rural areas, limited storage facilities with temperature control, and unstable electricity. These constraints hinder quality maintenance and market access. Initiatives are underway to:

- Promote shared cold storage facilities.
- Invest in solar-powered systems.
- Improve road infrastructure through public-private partnerships.

4.2.6.10 Business Membership Organizations

Several cooperatives and associations support the sector. These include the Jordanian Beekeeping Cooperative Union, Irbid Beekeepers Cooperative, Ajloun Beekeeping Association, and Mafraq Agricultural Cooperative. Their services range from collective input purchasing and training to export facilitation and policy advocacy. Challenges include limited resources, weak governance, and low membership in some areas. Enhancing their capabilities could significantly improve sector-wide performance.

5 Beekeeping Value Chain Flow

5.1 SWOT Analysis

This SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis synthesizes findings from field surveys, focus group discussions, and stakeholder interviews conducted in Irbid, Ajloun, and Mafraq. While several factors are cross-cutting, regional differences are highlighted to support localized intervention design.

Strengths

- **Irbid:** High concentration of organized beekeepers and proximity to Amman provides market leverage. Cooperative branding efforts are gaining traction.
- **Ajloun:** Rich biodiversity and forest ecosystems offer ideal conditions for mono-floral and organic honey. Strong cultural heritage enhances product appeal.

- **Mafraq:** Availability of large tracts of land and lower labor costs enable expansion. Border proximity supports potential cross-border trade post-stability.

Weaknesses

- **Irbid:** Reliance on traditional packaging and lack of export-grade standards undermine competitiveness.
- **Ajloun:** Difficult terrain and poor infrastructure limit logistics and input delivery. Organic practices exist but certification is lacking.
- **Mafraq:** Low beekeeper capacity and limited access to modern tools reduce productivity. Weak coordination among producers persists.

Opportunities

- **Irbid**: Urban retail integration via digital platforms, especially targeting Amman's hospitality sector.
- **Ajloun:** Eco-tourism channels and national festivals offer high-margin direct sales options.
- **Mafraq:** Institutional procurement (schools, military) and future cross-border exports can stabilize demand.

Threats

All Regions:

- Influx of low-cost, adulterated honey affects market trust.
- Rising climate variability is disrupting flowering patterns and colony health.
- Disease spread and weak veterinary services remain unresolved.
- Local market saturation and pricing volatility constrain income stability.

5.2Challenges and Opportunities in the Beekeeping Value Chain

Inputs and Hive Management

Challenges	Potential Solutions	Potential Interventions
Low hive productivity and limited GBP adoption	Expand access to training through cooperatives and extension agents	Implement field schools and peer-learning groups in remote areas
High input costs (feed, equipment)	Create shared procurement schemes	Enable cooperatives to bulk purchase and distribute high-quality inputs

Processing and Quality Control

Challenges	Potential Solutions	Potential Interventions
Inadequate extraction and bottling equipment	Promote access to modern tools through equipment rental schemes	Support cooperatives in establishing shared processing facilities
Limited lab testing and certification	Enhance access to certified testing labs	Partner with universities and private labs to reduce testing costs for smallholders

Marketing

Challenges	Potential Solutions	Potential Interventions
Weak consumer awareness of honey quality	Launch awareness campaigns via cooperatives and retailers	Train producers in branding and product storytelling
Inability to access new markets	Improve packaging and digital presence	Provide training in e-commerce and certification processes

Opportunities

- Investment in high-value honey products (e.g., mono-floral, organic, medicinal) can elevate price points and diversify demand.
- Increasing consumer demand for traceable and sustainably produced food opens opportunities for QR-based transparency tools.
- Agro-tourism integration (e.g., honey tasting, apiary visits) can supplement beekeeper income and market exposure.

5.3 Conclusion

Jordan's beekeeping sector holds significant potential as a contributor to rural livelihoods, ecological balance, and value-added economic growth. While numerous challenges persist—such as low productivity, weak quality control, and limited market access—ongoing investments by government, cooperatives, and development partners offer a promising pathway forward.

To unlock the full potential of the sector, targeted interventions are needed across the value chain, from input provision and training to post-harvest handling and marketing. Strengthening cooperatives, enhancing infrastructure, introducing modern technologies, and supporting producers in certification and branding will be essential. Moreover, integrating beekeeping into rural tourism, diversifying product lines, and leveraging digital sales channels can amplify the sector's impact on **income** generation and job creation across Irbid, Ajloun, and Mafraq.

With sustained attention to quality, innovation, and market integration, Jordan's beekeeping value chain can evolve into a high-value, export-ready sector grounded in sustainability and community resilience.

6 Capacity needs and recommendations for implementing marketing access and training needs for the local NGOs and smallholder farmers report

6.1 Capacity and Training Needs Across the Beekeeping Value Chain

This section outlines capacity gaps, training requirements, core topics, and relevant target groups across key segments of the beekeeping value chain.

Value Chain Segment	Identified Capacity Needs	Training Needs	Training Topics	Target Groups
Input Supply	Limited access to certified bee strains and equipment	Input sourcing, hive construction	- Queen bee rearing - Equipment use and maintenance - Disease management	Smallholder beekeepers, agri-input suppliers, NGOs
Hive Management	Traditional practices and low productivity	Good Beekeeping Practices (GBP)	- Hive inspection and maintenance - Bee nutrition - Integrated pest management	Beekeepers, extension agents
Post-Harvest Handling	Contamination and poor storage of honey	Harvesting and hygienic handling	- Safe extraction - Moisture control - Clean packaging and storage	Beekeepers, cooperatives, processors
Processing	Lack of modern extraction tools	Quality assurance and food safety	- Filtration techniques - HACCP basics - Labeling and traceability	Local processors, cooperatives, NGOs
Marketing and Sales	Weak branding, low visibility in markets	Marketing and negotiation skills	- Product differentiation - Digital promotion - Pricing strategies	Beekeepers, cooperative members, NGOs
Distribution and Retail	Fragmented market channels	Market linkage development	- Contracting models - Transport logistics - Retail partnerships	Farmer groups, processors, NGOs

6.2 Capacity Needs and Recommendations for Implementing Market Access Improvements

Improving market access for beekeepers requires stronger vertical coordination with buyers and processors, and better horizontal integration among producers.

Vertical Linkages

Identified Needs	Recommendations
Limited engagement with formal buyers	Establish contract-based relationships via cooperatives
Inconsistent honey quality	Facilitate organic, fair trade, and ISO certification schemes
Weak market data and pricing visibility	Develop mobile-accessible honey price and buyer information systems

Horizontal Linkages

Identified Needs	Recommendations
Disorganized small-scale producer networks	Formalize and strengthen beekeeper associations and cooperatives
Lack of technical knowledge exchange	Set up peer learning platforms and apiary field schools
Individualized sales	Promote cooperative honey aggregation and joint branding

6.3 Recommendations

The following recommendations are tailored to the specific conditions in Irbid, Ajloun, and Mafraq, based on field findings and stakeholder consultations. They also aim to align with Land Degradation Neutrality (LDN) targets by enhancing sustainable land use, biodiversity, and rural livelihoods through nature-positive apiculture practices.

1. Capacity Building

- **Irbid:** Develop advanced modules on honey quality standards, digital marketing, and cooperative branding to leverage access to urban markets.
- **Ajloun:** Provide training on organic certification, biodiversity conservation, and eco-tourism-linked sales to capitalize on the governorate's forest ecosystems.
- **Mafraq:** Focus on basic beekeeping practices, equipment use, and financial literacy to uplift remote, underserved producers.

These trainings promote land stewardship, reduce pressure on degraded lands, and support biodiversity by strengthening pollinator populations.

2. Institutional Strengthening

- Support the formation and governance of cooperatives in Irbid and Mafraq, enabling joint marketing and input procurement.
- Train cooperative leaders on transparency, inclusive decision-making, and sustainable resource use.
- Strengthened institutions can organize land-use decisions, reduce over-exploitation, and promote landscape restoration through coordinated beekeeping zones.

3. Market Access and Linkages

- Establish digital sales platforms in Irbid and Amman to connect producers with hig demand buyers.
- Organize eco-fairs and branding events in Ajloun to showcase forest-friendly honey products.
- Facilitate institutional procurement in Mafraq (e.g., schools, food programs) to stabilize rural income.
- Improved market access reduces the need for unsustainable coping strategies, supporting economic resilience on marginal lands.

4. Policy Support and Advocacy

- Advocate for streamlined organic certification in Ajloun, and subsidized modern equipment in Mafraq.
- Encourage government support for mobile extension services in Irbid to reach peri urban beekeepers.
- Such policies incentivize sustainable production and lower the environmental footprint of apiculture practices.

5. Monitoring and Evaluation

- Track progress using localized indicators: yield per hive, honey purity, training participation, and access to finance.
- Introduce feedback loops through QR-coded labels and consumer reviews, enabling data-driven improvement.

7 Recommended Interventions for Developing the Beekeeping Value Chain in Ajloun, Irbid, and Mafraq

7.1 Prioritized List of Proposed Interventions

Intervention	Target Governorates	Technical & Economic Description

Establishment of Honey Testing and Certification Laboratories	Ajloun, Irbid, Mafraq	Technically, these labs ensure compliance with export standards (moisture, sugar content, contamination). Economically, they add value by enabling access to premium and international markets, thus increasing producer income and reducing rejection rates.
Strengthening Beekeepers' Cooperatives	All	Technically, cooperatives facilitate joint training, input procurement, and knowledge transfer. Economically, they lower individual production costs, increase bargaining power, and create collective branding opportunities.
Development of Local Processing and Storage Units	Ajloun, Mafraq	Equipping rural sites with extraction and storage tools reduces post-harvest loss. Technically, this ensures hygiene, traceability, and shelf-life. Economically, it enables local value-addition and job creation.
Mobile Advisory and Market Information System	Irbid, Mafraq	Providing real-time alerts via SMS/apps (on diseases, weather, prices) empowers decision-making. Technically, it improves risk management. Economically, it increases market responsiveness and reduces dependency on middlemen.
Farmer Field Schools for Good Beekeeping Practices	All	These practical trainings enhance skills in pest control, queen rearing, and sustainable hive management. Technically, they improve colony survival. Economically, they increase honey yields and reduce vet/medicine costs.
Cooperative-Owned Packaging and Branding Facilities	Ajloun, Irbid	Modern units support tamper-proof, labeled packaging and traceable barcodes. Technically, they standardize quality. Economically, they position products for tourism, niche organic, and urban e-commerce markets.

7.2 Proposed Interventions in Irbid, Ajloun, and Mafraq

7.2.1 Intervention Name: Prioritized Interventions Summary

Sustainability Model	Governorate(s)	Description	Intervention Name
Fee-for-service model with ministry oversight and donor support.	Ajloun, Irbid, Mafraq	Regional labs to test purity, residues, and labeling compliance based on Codex/JSMO standards.	Establishment of Honey Testing and Certification Laboratories

Membership dues, joint marketing income, and cooperative reinvestment.	All	Support for formation, training, and governance of beekeeper cooperatives.	Strengthening Beekeepersâ€™ Cooperatives
Cost recovery through processing fees and donor subsidies.	Ajloun, Mafraq	Equip rural units for hygienic extraction, filtering, and safe honey storage.	Development of Local Processing and Storage Units
Low-cost SMS subscription model with agriculture extension integration.	Irbid, Mafraq	Provide real-time updates on prices, disease outbreaks, and weather.	Mobile Advisory and Market Information System
Public extension budget + project-based training delivery.	All	Hands-on training in hive care, queen rearing, and organic treatment.	Farmer Field Schools for Good Beekeeping Practices
Packaging fees and cooperative ownership model with business training.	Ajloun, Irbid	Units to enable traceable packaging, shelf-life extension, and regional branding.	Cooperative-owned Packaging and Branding Facilities

7.3 Recommendations

To develop a resilient and competitive value chain in Irbid, Ajloun, and Mafraq, the following three interventions are prioritized. These were selected based on technical relevance, cost-efficiency, implementation feasibility, and alignment with local needs and LDN (Land Degradation Neutrality) goals.

Priority	Intervention	Target Governorates	Justification	Timeline	Estimated Cost (USD)	Key Implementing Partners
1	Establishment of Honey Testing and Certification Laboratories	Irbid, Ajloun, Mafraq	Ensures compliance with Codex/JSMO standards, enhances quality, enables export readiness	Medium-term (1.5–2 years)	450,000–600,000	Ministry of Agriculture, JSMO, universities, donors
2	Cooperative-Owned Packaging and Branding Facilities	Irbid, Ajloun	Fills critical packaging and labeling gap; improves shelf-life and access to	Short to medium-term (1–1.5 years)	150,000–250,000	Beekeeper cooperatives, municipalities, SME support programs

			premium markets			
3	Farmer Field Schools for Good Beekeeping Practices (GBP)	All (Irbid, Ajloun, Mafraq)	Improves hive management, productivity, and resilience to disease and climate stressors	Short-term (6–12 months)	60,000–80,000/year	Extension services, NGOs, agricultural colleges

Additional Recommendations

- Begin with one pilot site per governorate before scaling up nationally.
- Integrate traceability tools (e.g., QR codes) into packaging interventions for transparency.
- Promote financial sustainability by linking to national SME support schemes and cost-sharing models.
- Align with land restoration strategies by prioritizing interventions in degraded or climate-affected zones.

8 Chapter Five: Market Access Policy Report for the Beekeeping Value Chain

This chapter provides a policy assessment of barriers that hinder market access for smallholder beekeepers in the governorates of Ajloun, Irbid, and Mafraq. It highlights key structural, regulatory, and institutional constraints, and offers evidence-based policy recommendations to promote integration of honey producers into formal and high-value markets.

8.1 Policy Assessment: Barriers to Market Access

The policy and regulatory environment governing Jordan's beekeeping sector presents mixed performance. While certain frameworks exist (e.g., licensing, hygiene guidelines, and cooperative support laws), enforcement and practical access remain limited in target regions.

Policy Domain	Assessment Summary	Regional Implication
Honey Product Standards	National standards for honey purity and labeling exist but are not widely adopted.	In Ajloun, producers lack access to certification bodies; many sell without compliance.
Licensing & Market Access	Licensing procedures are complex and inconsistent across municipalities.	In Mafraq, informal sales prevail due to the absence of local policy enforcement.
Cooperative Regulation	Cooperative law allows group marketing and resource pooling, but implementation is weak.	In Irbid, most beekeepers are not part of registered cooperatives.

Financial Support Policies	Agricultural credit schemes and grants exist but are not tailored to beekeepers.	Across all regions, loan access is hindered by lack of collateral and sector-specific programs.

8.2 Policy Recommendations

To effectively address structural constraints and market access barriers in the beekeeping sector across Ajloun, Irbid, and Mafraq, this section outlines a prioritized set of actionable policy recommendations. Each proposed intervention has been ranked based on urgency, feasibility, and its potential to empower smallholder beekeepers. The table below summarizes these interventions, specifying implementation timelines, lead actors, and region-specific challenges to ensure practical and context-driven policy uptake.

Priority	Policy Domain	Proposed Action
1	Institutional & Regulatory	Adopt and enforce a national honey grading and labeling standard aligned with Codex Alimentarius and JSMO.
2	Institutional & Regulatory	Introduce simplified, low-cost licensing procedures for small-scale honey sales and processing.
3	Organizational Capacity	Provide targeted training for cooperatives on governance, transparency, and business planning.
4	Market Intelligence	Develop a national honey market information system (SMS/app-based) for prices, demand, and quality standards.
5	Infrastructure	Establish community-level honey collection and cold storage centers with hygienic extraction tools.
6	Financial Access	Expand microfinance loan products for beekeepers with grace periods and group guarantees.

8.3 Conclusion

Addressing market access challenges in the beekeeping value chain of **Ajloun, Irbid, and Mafraq** requires an integrated policy response that aligns legal, financial, and institutional frameworks with the realities of smallholder producers. Building a more inclusive, transparent, and resilient marketing environment—anchored by cooperative strength, rural infrastructure, and smart regulation—can significantly boost honey sector competitiveness in northern Jordan.

Timeline	Responsible Actors	Key Intervention
Medium-term (2 years)	Ministry of Agriculture, JSMO, Universities	Establish regional honey testing & certification labs
Medium-term (2 years)	MoA, Municipalities, Donors	Build rural storage & processing centers
Short-term (1 year)	MoITS, Chambers of Commerce, Private Sector	Launch digital market information platform
Medium-term (1–2 years)	CBJ, MFIs, MoA, Private Insurers	Expand tailored microfinance & insurance schemes

Short-term (1 year)	Cooperative Directorate, NGOs, MoSD	Strengthen beekeeper cooperatives via training & legal support
Short to Medium-term (1–2 years)	MoA, JSMO, Parliament	Implement national honey grading & labeling standards

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