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FARM to FORK ACADEMY

National policy on sustainable food systems and livelihoods in rural

-Policy recommendations -

North Macedonia

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RURAL DEVELOPMENT NETWORK OF NORTH MACEDONIA

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Executive Summary

This policy recommendation document has been developed within the framework of the regional initiative Farm to Fork Academy for Green Western Balkans – Our Shared European Future, which aims to support the transition toward sustainable food systems in line with the European Union's Green Deal and Common Agricultural Policy (CAP) objectives. The overall purpose of the project is to build national and regional capacities to assess and improve food value chains through participatory, evidence-based policymaking that promotes economic viability, social inclusion, and environmental sustainability.

In this context, the present document focuses on the honey value chain in North Macedonia as a representative example to demonstrate the practical application of sustainable food value chain analysis and policy design. While previous stages of the project included broader value chain mapping and analysis for both the grape/wine and honey sectors, this document narrows its scope to honey production in order to illustrate how national strategies can be shaped using the FAO's ten principles of Sustainable Food Value Chain Development (SFVCD), particularly the first phase: Measuring Performances.

The honey sector plays a vital role in North Macedonia's rural economy and environmental landscape. Beekeeping contributes to crop productivity through pollination and offers livelihood opportunities, especially in mountainous and remote areas. However, the sector faces multiple challenges, including climate vulnerability, fragmented production, limited market integration, unfair trade practices. Through a participatory methodology involving national expert consultations, stakeholder workshops, and review of national statistics and reports, this document evaluates the economic, social, and environmental dimensions of sustainability within the honey value chain.

Policy recommendations for the honey value chain include improving income tracking, supporting inclusive participation, and promoting environmentally sustainable practices. Key actions involve setting performance indicators, encouraging certification and value addition, and strengthening producer organizations to ensure fair benefits and long-term resilience.

The findings aim to inform policymakers on concrete, evidence-based interventions that can strengthen the position of small producers, improve value creation, and align national food chain development efforts with EU accession goals and international sustainability standards. Focusing on the honey value chain, this document also provides a replicable model for analyzing and improving other value chains in the future.

I. Introduction

This policy recommendation document has been prepared within the framework of the regional initiative Farm to Fork Academy for Green Western Balkans – Our Shared European Future, which supports the alignment of Western Balkan countries with the European Union's Green Deal and the Common Agricultural Policy (CAP) objectives. The overarching aim of the initiative is to strengthen the capacity of national stakeholders to design evidence-based policies for sustainable food systems, through participatory processes and the application of internationally recognized methodologies.

In line with this aim, the present document focuses specifically on the honey value chain in North Macedonia. While earlier stages of the project explored multiple value chains of strategic relevance (including grape/wine and honey), this document narrows its scope to honey as a practical case study for applying the FAO's "Developing Sustainable Food Value Chains: Guiding Principles." In particular, the analysis emphasizes the Measuring Performances phase, which assesses economic, social, and environmental sustainability dimensions.

Beekeeping is a significant sector in North Macedonia's rural economy and ecological system. It contributes not only through the direct production of honey and related products but also indirectly by enhancing agricultural productivity through pollination. The sector has strong potential for sustainable growth, particularly in high-altitude and marginal rural areas, but it also faces persistent challenges—ranging from climate variability and low productivity to limited market access and weak producer organization. Addressing these challenges requires an integrated approach that considers both the structural weaknesses of the sector and the policy instruments available to support its development.

The analysis presented here draws on a combination of the previous stage national expert report, stakeholder consultations, workshop discussions, and secondary data. It applies the FAO framework to assess the sustainability of the honey value chain and identify policy entry points to enhance its performance. Though the document focuses on a single value chain, the approach and findings are intended to inform broader national strategies for sustainable food chain development and provide a replicable model for other sectors.

In doing so, this document contributes to the ongoing efforts of North Macedonia and its regional partners to strengthen food system resilience, support rural livelihoods, and accelerate the green transition in line with European integration priorities.

The document is structured to guide through a clear and logical progression from context to analysis and actionable policy recommendations. After the introduction containing the background and objectives of the document, the next section outlines the methodological approach, detailing the application of the FAO framework and the participatory processes used during stakeholder engagement. Then, an overview of the national food value chain context is provided, with a specific emphasis on the honey sector. The next section presents an analysis across the three sustainability dimensions—economic, social, and environmental, followed by targeted national policy recommendations, with the aim of strengthening the resilience and sustainability of the honey value chain. The key findings and highlights are summarized in the last section, emphasizing their relevance for broader national food system strategies.

II. Methodology

This policy recommendation integrates the **FAO's 10 Principles of Sustainable Food Value Chain Development (SFVCD)** as outlined in the FAO manual *"Developing Sustainable Food Value Chains – Guiding Principles*" (FAO, 2014). These principles serve as a structured framework to analyse and guide the development of sustainable food value chains in the six Western Balkan (6WB) countries, adapted to national contexts.
Recognizing the uniqueness of each food value chain, the FAO framework divides the ten interrelated principles into three progressive and iterative phases:

1. **Write here-Measuring Performance (Principles 1–3):**
- *Economic Sustainability (profitability and long-term viability for all stakeholders)*
- *Social Sustainability (equity, inclusivity, and social acceptability)*
- *Environmental Sustainability (resource protection and minimal ecological harm)*

2. **Understanding Performance (Principles 4–6):**
- *Root cause analysis of underperformance*
- *Stakeholder behaviour and governance*
- *Alignment with end-market demands*

3. **Improving Performance (Principles 7–10):**
- *Strategic planning and upgrading*
- *Scalability*
- *Inclusive stakeholder engagement across sectors*

For the current policy phase, the methodology focuses primarily on **Phase 1: Measuring Performance,** reflecting the current policy readiness of 6WB countries. These first three SFVCD principles focus on measuring value chain performance through the lens of the triple bottom line: economic, social, and environmental sustainability (FAO, 2014). These dimensions follow a natural order of priority. Economically, the value chain must ensure sustained or improved profitability for all stakeholders; otherwise, it lacks short-term viability. Socially, it must promote inclusiveness and equitable value distribution while avoiding unacceptable practices like child labour or unsafe working conditions, which are essential for medium-term sustainability. Environmentally, the chain must add value without depleting natural resources, a requirement for long-term sustainability. Although these aspects are addressed separately for clarity, they often overlap in practice, with trade-offs needed to meet evolving market standards that encompass all three. Increasingly, social and environmental performance is not only a regulatory requirement but also a strategic advantage, as it can improve market access, compliance, and competitiveness through differentiation (FAO, 2014).
This emphasis aligns with ongoing EU accession processes and recent policy developments, such as the EU Common Agricultural Policy Strategic Plan (2023–2027) and the focus and objectives of the regional Farm to Fork Academy for Green Western Balkans initiative. The national expert together with the Rural Development Network of the Republic of North

Macedonia (RDN) have completed key foundational tasks, including value chain mapping and assessments of sustainability and rural development capacities. The leading background document is the document and materials from the previous stage of the Participatory CSOs and stakeholder consultation and dialogue toward strengthening the position of farmers in the value chain – national report North Macedonia (RDN, 2024). As part of the Farm to Fork Academy project, this stage of the assignment focused on identifying the challenges and success factors for advancing the green transition in agriculture, with particular attention to strengthening the position of agricultural producers in value chains—a key strategic objective under the EU Common Agricultural Policy. Through a qualitative consultative process involving five stakeholder workshops and 104 participants (Sept–Nov 2024), insights were gathered to inform policy directions in North Macedonia using SWOT analysis and identification of Solutions and Recommendations, oriented questions centred on fairer trade practices, improving sustainability, and enhancing market access, particularly in the grape/wine and honey sectors.

In this document, to support the development of national policies for sustainable food chains within the Farm to Fork Academy project, a structured multi-step process was implemented, grounded in the FAO's "Measuring Performances" phase of sustainable food value chain development and the guidelines provided by the regional expert (Stipešević, 2025). The three sustainability pillars are considered both individually and in overlap, acknowledging necessary trade-offs and synergies. Their integrated application ensures compliance with evolving market standards and promotes value creation through social and environmental sustainability. Several steps are taken into consideration and followed (Stipešević, 2025).

First, the national expert and RDN reviewed the "National Farmer's Position in Value Chains" report (RDN, 2024) highlighting economic, social, and environmental impacts using a color-coded method. Each impact area was then evaluated for its level of sustainability using defined criteria and scored on a 1 to 3 scale (1- Minimum score: element is not ensuring, or even decreasing sustainability; 2 - Medium score: element is neither detrimental nor supportive for sustainability; 3 - Maximum score: element is improving sustainability). Where information was insufficient, experts sought additional data and identified opportunities for improvement, often drawn from existing SWOT analyses and the materials from the consultative workshops. These evaluations informed the reorganization of key elements into national policy proposals, emphasizing areas like economic viability, social inclusion, and environmental protection. Final assessments addressed broader EU "Farm to Fork" strategy goals, including biodiversity, climate adaptation, food security, and affordability. The final step involved aligning recommendations with existing national policies and legal frameworks, with the potential to propose regulatory changes where needed.

In line with the overall project scope and to demonstrate the applicability of the methodology, this policy recommendation document focuses exclusively on the **honey value chain**, using it as a representative example to explore key sustainability challenges and policy solutions. This targeted approach allows for a deeper, context-specific analysis that can be replicated or adapted for other value chains in future national strategies.

This methodological focus informs the development of **national food chain development strategies**, offering a baseline framework for policy recommendations, thus allowing for future integration of advanced SFVCD principles from Phases 2 and 3.

III. National food value chain analysis

The honey value chains prioritized in this policy document was identified through a comprehensive selection process based on background research on the national agricultural sector, alignment with the interests of RDN constituents, and coordination with consultative workshop participants (RDN, 2024). This targeted focus ensures that the policy recommendations are grounded in sectoral relevance and stakeholder priorities, forming a strong basis for developing sustainable food value chain strategies that align with both national goals and EU policy frameworks.

Beekeeping holds significant economic and ecological importance in North Macedonia, contributing not only through the production of honey and other bee products but, more importantly, by enhancing crop yields through pollination. The value of agricultural output supported by pollination far exceeds the direct value of bee products, underscoring the sector's strategic relevance. Beekeeping is especially vital in hilly and mountainous regions, where alternative agricultural activities are limited, offering a viable livelihood option in areas prone to depopulation. The National Strategy for Agriculture and Rural Development 2021–2027 (MAFWE, 2021) recognizes this potential and outlines the need to further support and intensify beekeeping in the coming years.

The number of bee colonies reported varies across sources. According to the State Statistical Office (SSO, 2024), the number of bee families ranged from 52,897 to 92,968 between 2012 and 2021. However, more recent data from the Food and Veterinary Agency (in SSO, 2024) indicate a sharp increase, with 290,879 beehives reported in 2022 and 306,415 in 2023. Beekeeping is predominantly small-scale and individual, with 4,913 of 4,916 farms run by individual owners (SSO, 2017). Only 2% of beekeepers manage more than 150 colonies and are considered professionals, while nearly half are hobbyists maintaining between 20 and 50 colonies. Additionally, only 16.5% practice migratory beekeeping, while the majority operate stationary apiaries.

Honey production has fluctuated over the past decade, ranging from 500 to 1,000 tons annually (Spatial Plan, 2023). This variability is largely attributed to climate change, which affects both the flowering patterns of nectar-bearing plants and the survival of bee colonies. Significant winter losses of bee populations have been recorded, prompting the National Strategy for Agriculture and Rural Development to advocate for the restoration of bee stocks and wider distribution of hives, especially using local subspecies like Apis mellifera macedonica, known for its resilience to environmental stressors (MAFWE, 2021).

Organic beekeeping presents an opportunity for sustainable growth in the sector. In 2023, there were 10,800 organic beehives in the country, about 9% of the national total, with nearly half still in the conversion phase. Organic honey production increased from 29,705 kilograms in 2020 to 59,152 kilograms in 2021, of which 27,042 kilograms were still under conversion (AAEM, 2022), indicating rising interest in certified sustainable practices.

Despite the sector's growth potential, the trade balance for honey remains negative. In 2023, North Macedonia exported 105,700 kilograms of natural honey worth €480,000, while importing 267,000 kilograms valued at €838,000 (SSO, 2024). This imbalance points to a market gap that could be addressed through increased domestic production and improved competitiveness of local honey producers.

The honey value chain in North Macedonia begins with input supply, which includes the procurement of bee families, hives, beekeeping equipment, medications, and supplementary feed. This stage is often supported by small local suppliers and is crucial for both new and expanding apiaries.

Next is the primary production stage, where individual beekeepers, mostly small-scale or hobbyist farmers, manage bee colonies for honey production. Activities include hive maintenance, disease control, seasonal migration (for those practicing mobile beekeeping), and honey harvesting. Climate conditions, altitude, and flora availability significantly influence productivity at this stage.

Following production, honey moves into post-harvest handling, including extraction, filtering, storage, and packaging. Depending on the scale, most producers process honey at the farm level. The next phase is marketing and distribution. Small producers often sell directly to consumers via direct and farm-gate sales, local markets, or fairs. Medium to larger producers may access specialty stores, or wholesale buyers and retail chains, and a few engage in export, primarily of niche or organic honey.

Support services, including government subsidies, veterinary support, training programs, certification schemes, and producer associations, play a cross-cutting role throughout the chain. These services help address key constraints such as product quality, certification, and market access. Finally, end consumers purchase honey for personal consumption, as dominant market segment, as well as for use in food processing and the health and wellness sector.

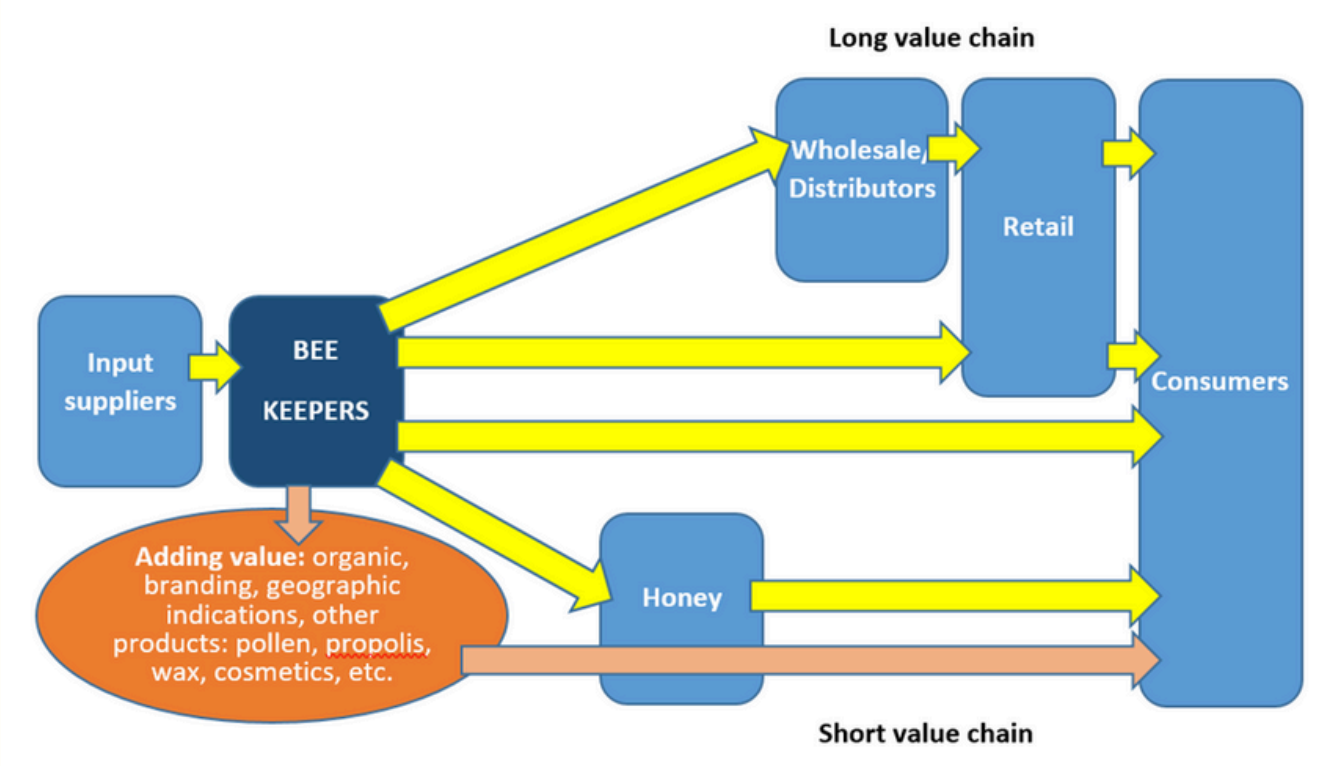


Figure 1. Honey value chain in North Macedonia

Source: Own elaboration based on workshops' discussions (RDN, 2024)

Honey production in North Macedonia is supported through various government payment measures aimed at encouraging beekeeping. Beekeepers with at least 10 bee families are eligible for direct financial support, receiving 600 MKD per hive for those with 10 to 50 bee families, and 800 MKD per hive for those with more than 50. To qualify, producers must be registered or must have delivered honey to an approved processing facility. In addition, beekeepers are entitled to subsidized laboratory analyses of the physical and chemical properties of their honey, supporting quality assurance. Furthermore, registered bee farms located in settlements above 700 meters in altitude benefit from a 15% increase in subsidies, recognizing the additional challenges and environmental benefits associated with high-altitude beekeeping.

Given the sector's environmental significance, economic potential, and social relevance in rural areas, the honey value chain was selected as a strategic focus for this policy document. The inclusion of this value chain allows for targeted analysis of the challenges beekeepers face, especially at the producer level, and informs policy recommendations aimed at improving sustainability, increasing domestic supply, and enhancing the overall resilience of rural livelihoods.

National policy context

These findings and the analysis provided in the next section can provide a valuable contribution towards a sustainable honey value chain, to reinforce the national policy in line with the European Commission's Farm to Fork Strategy and provide grounds for actionable recommendations.

The national policy framework in North Macedonia is based on the Law on Agriculture and Rural Development (2010) as a cornerstone document. The current key strategic document is the National Strategy on Agriculture and Rural Development (NARDS) for 2021-2027. NARDS 2021-2027 is highly aligned with the goals of the EU's Common Agricultural Policy (CAP) framework and focuses on three strategic areas:

- improving the competitiveness and income sustainability of agricultural holdings,
- promoting environmental practices that contribute to climate change mitigation and adaptation, and
- ensuring sustainable rural development.

Modernizing the sector by enhancing and sharing knowledge, innovation and digitalization in agriculture and rural areas and by encouraging their acceptance by farmers and other stakeholders in the sector is a cross-cutting goal.

The three strategic goals are further detailed through nine specific objectives, each closely aligned with the nine priorities of the EU Common Agricultural Policy (CAP). The first strategic goal aims to improve the competitiveness and income sustainability of agricultural holdings through objectives that focus on sustainable income, market orientation, and farmers' positions in value chains. The second strategic goal centers on promoting environmental practices for climate change mitigation and adaptation, encouraging efficient use of natural resources, and protecting biodiversity.

The third strategic goal is dedicated to ensuring sustainable rural development, with objectives targeting the attraction of young farmers, the promotion of employment and local growth, and addressing societal demands related to food safety, sustainability, and animal welfare. These goals are closely aligned with the nine priorities of the EU Common Agricultural Policy (CAP). The table below outlines the strategic and specific goals of the NARDS 2021-2027.

Table 1. NARDS 2021-2027 Strategic and specific objectives

Strategic goals	Specific objectives
Improving the competitiveness and income sustainability of agricultural holdings	SO1 - to support sustainable income of agricultural holdings due to their contribution in improvement of food security;
	SO2 - to strengthen market orientation and to increase competitiveness with a special focus on research, technology and digitalization;
	SO3 - to improve the position of farmers in agricultural products value chains;
Promoting environmental practices that contribute to climate change mitigation and adaptation	SO4 - to contribute to climate change mitigation and adaptation, as well as to greater use of sustainable energy;
	SO5 - to encourage sustainable development and efficient management of natural resources, such as water, soil and air;
	SO6 - to contribute to biodiversity protection, improvement of ecosystem services and to preservation of natural habitats and landscape;
Ensuring sustainable rural development	SO7 - to attract young farmers and to facilitate the businesses creation in rural areas;
	SO8 - to promote employment, growth, social inclusion and local development in rural areas, including bio-economy and sustainable forestry; and
	SO9 - to improve agriculture's response to societal demands for food safety, nutritional composition, food sustainability, food waste and animal welfare

Source: NARDS 2021-2027 (2021)

NARDS 2021-2027 emphasizes the need for investment in research and extension services to improve adaptive capacities and provide advisory support to farmers. However, the SWOT analysis of the strategy highlights key weaknesses, including insufficient advisory services and a lack of training resources for sustainable production, with the impacts of climate change being identified as one of the major threats, along with the structural deficiencies and market limitations.

Alongside NARDS 2021-2027, the Instrument for Pre-Accession Rural Development Programme 2021-2027 (IPARD III) focus on several key objectives for rural development. These include enhancing the viability and competitiveness of farms, as well as strengthening the agricultural and food processing sectors. Another objective is to restore, preserve, and enhance ecosystems that are dependent on agriculture, fisheries, and forestry. The programme also aims to promote balanced territorial development in rural areas, ensuring sustainable growth across different regions. Finally, it emphasizes the transfer of knowledge and innovation in agriculture, forestry, and rural areas, fostering continuous improvement and adaptation within these sectors.Horizontally, the Programme prioritizes support for projects led by women and young entrepreneurs, active agricultural holdings, environmentally beneficial activities, innovations, job creation, collective investments, rural and mountainous area diversification, rural tourism, cultural heritage preservation, and the strengthening of human capital and business development in rural areas.

IV. Analysis of performance (economic, social, environmental)

The detailed report on the national farmer's position in value chains (RDN, 2024) along with other secondary sources provided grounds for a structured analytical exercise of the honey value chain performance through the three sustainability dimensions (economic, social, and environmental), with a specific focus on evaluating the level of sustainability (short-, mid-, or long-term viability) based on the data available. The scored evaluation of the Measuring Performances Phase across the three sustainability dimensions is assessed based on the data provided in the consultative workshops and literature review using the following scale:

- Minimum Score 1: Element decreases or harms sustainability
- Medium Score 2: Element has neutral or mixed effect on sustainability
- Maximum Score 3: Element clearly supports or enhances sustainability

Economic impact – short-term sustainability

The described challenges and opportunities faced by local agricultural producers encompass a variety of economic and structural difficulties. One significant issue is the low purchase prices affecting beekeepers. At the same time, input costs have increased across production, transport, packaging, and materials. Market access is limited, as most sales occur through local events and direct transactions, reflecting a lack of well-developed marketing and distribution channels. Unfair competition from imported, low-quality honey further weakens the position of local producers. Labour shortages and increasing labour costs are also major concerns. Many producers struggle to access affordable financing due to collateral requirements and unfavourable credit conditions. Investment in the sector

remains limited, and much of the infrastructure is outdated. Furthermore, the level of professional beekeepers is low, largely because many individuals engage in beekeeping only on a part-time basis.

- **Sustainability assessment (short-term): partially sustainable.**

Economic sustainability is partially at risk. Without systemic intervention, most actors may not sustain the production cycle profitably on the longer run. Some may continue, but only as supplemental income or through informal coping strategies.

Table 2. Economic sustainability performance evaluation

Element	Evaluation	Assessment
Income creation	Incomes are under pressure from low purchase prices and rising costs.	**1**
Income level	Relatively low and unstable; farmers often report minimal profit margins.	**2**
Profitability	Profitability is weak; margins squeezed due to high input costs and unfair competition.	**1**
Access to finance	Difficult due to lack of collateral; most rely on high-interest short-term loans.	**1**
Market access	Limited and informal; direct sales and local fairs dominate, with little institutional support.	**2**
Value addition (e.g. Branding)	Some potential shown through local branding (e.g. Mariovski honey), but not yet scaled up.	**2**
Employment / job stability	Beekeeping often part-time; seasonal labour scarce and expensive.	**2**

Social impact – mid-term sustainability

The medium-term sustainability from a social impact perspective reveals several pressing challenges and limited opportunities. In terms of inclusiveness and equitability, there are constrained market opportunities and an unequal distribution of value, with older farmers dominating the sector and limited youth engagement. Outmigration and aging pose significant concerns, as rural youth continue to leave, resulting in depopulation of rural areas and erosion of traditional knowledge. Institutional dynamics are also challenging, marked by a weak cooperative culture and a general distrust in institutions. There is a clear lack of engagement in cooperative efforts and persistent distrust in formal systems. There are no reports of explicitly unsafe practices, and farmers in general apply good agricultural practices. There is room for improvement in education and advisory services, with limited access to training and need for more intensive communication of relevant policies. Farmers often feel marginalized in terms of added value distribution, lacking bargaining power in price-setting mechanisms. Although some initiatives aimed at branding and product differentiation exist, progress remains slow and fragmented.

- **Sustainability assessment (medium-term): partially sustainable.**

Mid-term sustainability within the honey value chain may be at risk unless greater efforts are made to invest in human capital, strengthen institutional support, and improve rural livelihoods. Although some initiatives are underway, the long-term success of the sector depends on more coordinated actions. This includes expanding access to technical training, and advisory services tailored to beekeeping and honey production, as well as provision of suitable technical literature available in mother tongue. Building trust in local institutions and encouraging the formation of cooperatives or producer groups can help improve collaboration and market access. Engaging youth and creating equitable opportunities within the value chain is also crucial to address ongoing challenges such as aging populations and rural outmigration.

Table 3. Social sustainability performance evaluation

Element	Evaluation	Assessment
Inclusiveness (youth, women)	Aging population, youth reluctant to stay or participate in agriculture.	**1**
Equitability / value distribution	Farmers lack bargaining power; disproportionate value captured by middlemen or buyers.	**1**
Working conditions	Acceptable in most cases, but rising labour costs and shortages cause stress and workload overload.	**2**
Social institutions & cooperatives	Some progress in building trust and collaboration culture, still no formal wider spread cooperative models.	**2**
Harmful practices	No major unacceptable practices.	**3**
Access to social infrastructure	Limited quality of life and access to rural infrastructure (physical infrastructure, healthcare, education, social activites etc); relatively good internet connectivity in rural	**2**
Cultural and social norm compatibility	Production generally respects local traditions and cultural preferences.	**3**

Environmental impact – long-term sustainability

The honey value chain faces several long-term environmental challenges that could significantly affect its sustainability. Climate change is already having a visible impact, with documented shifts in harvest cycles and notable reductions in productivity, particularly due to recurring droughts and forest fires. These environmental stressors are placing added pressure on beekeeping and honey production.

Pollution and biodiversity loss are also emerging concerns. Bees are increasingly exposed to pesticides, and together with reduced diversity are contributing to the decline in pollinator health and overall ecosystem balance. Soil and water degradation are additional issues overall affecting the sector.

There are certain positive environmental practices within the sector, such as organic production methods, but other such as sustainable land management strategies are still not systemically planned or taking place. There are indications pointing to climate-related impacts, such as lower yields, earlier flowering, and bee health issues. There is no evidence of systematic monitoring or mitigation and adaptation measures being implemented. Furthermore, there has been no reported uptake of climate-smart or low-emission technologies, indicating a need for greater awareness, support, and investment to address these pressing environmental concerns.

- **Sustainability assessment (long-term): not yet sustainable.**

Environmental challenges such as prolonged droughts, and biodiversity loss are becoming increasingly apparent within the honey value chain, and although these issues are concerning, current responses appear limited and fragmented. There is growing awareness of the impact of environmental degradation on beekeeping and honey production, but there is still a lack of comprehensive strategies to manage these challenges effectively.
At present, systematic data collection related to soil health, biodiversity, and climate-related impacts remains very limited. Additionally, adaptation practices such as crop/tree diversification, soil improvement techniques, integrated pest management, agroforestry and many other potential strategies have not been widely adopted or promoted. Without stronger environmental monitoring and targeted support for sustainable practices, the long-term environmental resilience of the honey value chain may be difficult to ensure. However, with appropriate investment in climate adaptation, ecological restoration, and sustainable land use, there is potential to gradually enhance environmental sustainability and reduce vulnerability across the sector.

Table 4. Environmental sustainability performance evaluation

Element	Evaluation	Assessment
Soil quality	Evidence of degradation; no practices mentioned to restore or protect soil health.	**1**
Water availability & quality	Concerns over water scarcity and quality; lacking monitoring or management systems in place.	**1**
Air pollution	Not directly addressed, but proximity to quarries and pesticide use could be a concern.	**2**
Biodiversity (flora/fauna)	Negative impact noted (e.g. loss of flower diversity, pollinator decline).	**1**
Climate adaptation / resilience	High awareness, but little evidence of structured adaptation plans or supporting capacity building and advisory services.	**1**
Waste management	No information and low interest/awareness on waste (e.g. from packaging), agrochemical residues, or organic waste handling.	**1**
Green practices (e.g., organic)	Increasing adoption; interest in organic production and branding, major issue is the still underdeveloped market.	**2**

The following summary table presents an integrated evaluation of the economic, social, and environmental sustainability performance of the current honey value chains, based on the available from the stakeholders' consultations and value chain diagnostics. The scoring reflects how well each dimension contributes to the overall viability and resilience of the value chain in the short, medium, and long term.

Table 5. Summary evaluation of the honey value chain sustainability performance across the economic, social, and environmental dimensions

Dimension	Overall assessment	Interpretation
Economic	1-2 (minimum to medium)	Current value chain structure is not financially viable for most farmers
Social	2 (medium)	Some elements are neutral or improving, but inclusion and equity need major work
Environmental	1-2 (minimum to medium)	Long-term sustainability is at risk due to degradation and lack of adaptation

The economic dimension indicates a minimum to medium score, indicating serious structural weaknesses. Farmers face consistently low producer prices, rising input costs, limited market access, and lack of bargaining power, all of which make it difficult to maintain profitability or reinvest in production. Most farmers are not economically sustainable beyond a single production cycle, especially if left without external financial or policy support.

The social dimension is assessed with a medium score. The sector suffers from significant challenges: youth are leaving agriculture, women's participation remains low, and services in rural areas are underdeveloped. The lack of equity in value distribution and institutional distrust further threaten the long-term social viability of the honey value chain. However, some emerging practices such as branding, local product identity, and cooperative discussions provide moderate support for inclusive development if adequately supported.

The environmental dimension also indicates a minimum to medium score, as current practices are contributing to long-term degradation if not directed more towards sustainability. There is indication of declining soil quality, reduced biodiversity, pesticide-related risks to pollinators, and insufficient adaptation to climate change. Farmers are aware of the problems, but the adoption of sustainable practices remains low due to lack of knowledge, training, support services and incentives.

V. National policy recommendations for sustainable food chains

The honey value chain plays a meaningful role in advancing sustainable food systems, aligning closely with the main requirements for sustainable food systems contained in the EU "Farm to Fork" strategy. First, to address environmental impacts, adopting agro-ecological practices like crop diversification, reduced chemical inputs, and organic farming, alongside improved water management and habitat conservation, is critical. Second, integrating (agro)forestry systems and planting nectar-rich trees can enhance pollinator habitats and stabilize honey production. Public education campaigns can raise awareness of the importance of ecological conservation. Third, in the face of climate change, the honey sector is vulnerable to extreme weather and shifting patterns, emphasizing the need for climate-smart agriculture, improved infrastructure, adaptive technologies, and farmer training to build resilience and maintain productivity. Fourth, the honey value chain can support improved nutrition and public health by offering a natural, nutrient-rich food source. Strengthening food safety standards, promoting healthy diets, and supporting local honey production can enhance food security and equitable access, particularly in rural or underserved areas. Finally, in promoting economic fairness and affordability, the honey sector must address price volatility and unequal profit distribution. Fair pricing mechanisms, enhanced market transparency, and support for cooperatives and small-scale producers can improve income stability and ensure that sustainable honey remains affordable to consumers, at the same time generating fair returns. Together, these targeted interventions could make the honey value chain a concrete and scalable example of how agri-food systems can be transformed to be more sustainable, inclusive and resilient.

Framework improvement policy recommendations for the honey value chain

The honey value chain holds significant potential for contributing to sustainable rural development, environmental conservation, and food system resilience. However, realizing this potential requires targeted policy interventions that address existing gaps and enhance the overall performance and sustainability of the chain. The following framework improvement policy recommendations are proposed to guide national and local stakeholders in strengthening economic viability, promoting social inclusion and ensuring environmental protection across all stages of honey production, processing, and marketing.

Economic sustainability (short-term viability)

- Introduce a standardized income tracking tool for beekeepers and honey value chain actors: track honey yields, input costs (e.g., hive maintenance, transport), and sales (raw vs. processed).
- Map income distribution along the honey value chain: identify who earns what portion of the final honey retail price (e.g., beekeeper, aggregator, packager, retailer).

- Establish some key performance indicators, such as income growth (%) of beekeepers over on short and mid-term period, and cost of production per kg of honey versus the market price.
- Monitor market access improvements by tracking the number of new buyers (e.g., local, regional, international), product certifications (organic, traceability systems), honey-based product diversification (wax, propolis, cosmetics).
- Conduct cost-benefit analyses of branding initiatives (e.g., geographic origin labeling or eco-labeling) or value-added processing (e.g., creamed honey, flavored honey, etc.).

Social sustainability (mid-term viability)

- Conduct surveys to capture data on income from beekeeping, labor time by family members, seasonal variability and other key information.
- Track key social indicators, including proportion of honey value retained by primary producers, proportion of households reporting income stability or improvement from honey over short and mid-term period, proportion youth and women as beekeepers and in leadership roles in honey associations.
- Monitor social acceptability, safety and labor standards
- Assess impact of cooperatives/producers' organizations, for example, through income differential between members and non-members, as well as transparency and inclusiveness in honey price-setting and decision-making
- Monitor education and skills levels, digital literacy, access to extension services, or training programs

Environmental sustainability (long-term viability)

- Introduce/regularly update baseline and monitor environmental indicators, such as for instance pollinator biodiversity (number of bee species, hive productivity, colony collapse incidents), floral resource health, pesticide residues in honey or bee mortality data
- Promote sustainable beekeeping practices, such as organic production, afforestation with appropriate tree species, agroforestry models that integrate nectar-rich plants, strategies to reduce pressure on single ecosystems
- Link environmental metrics to market incentives, such as eco-certifications, green branding, etc.

VI. Conclusion

The honey value chain involves a diverse set of actors including beekeepers, input suppliers, processors, traders, and retailers, each contributing to the flow of products from hive to market. Beekeeping is often a low-cost, climate-resilient activity that supports rural livelihoods, particularly in areas with limited agricultural potential. The value of honey extends beyond the raw product to by-products such as beeswax, propolis, and royal jelly, which offer opportunities for diversification and value addition. Despite its potential, the honey value chain is often constrained by low productivity, weak market linkages, unfair practices (such as fake honey and unfair competition practices), limited access to quality inputs, constraining regulative framework, etc. Strengthening this chain through improved infrastructure, certification, and cooperative models can enhance incomes, promote biodiversity, and contribute to sustainable rural development.

Applying a structured sustainability framework to the honey value chain enables a more evidence-based, inclusive, and impact-oriented approach to value chain development. Such framework supports more informed decision-making for policymakers, development partners, producer organizations, and private sector actors by identifying specific economic, social, and environmental gaps and proposing actionable recommendations. Strengthening income tracking, improving representation of marginalized groups, and monitoring environmental performance not only enhances the resilience of honey producers, but also contributes to long-term viability of the entire value chain. In addition, the use of key performance indicators and standardized tools and monitoring practices ensures that progress can be measured consistently over time. This allows for adaptive management and the ability to target interventions more effectively.

The proposed framework improvement policy recommendations have been tailored to the honey value chain, but its structure and indicators are broadly applicable across a wide range of other agricultural value chains. The three-tiered sustainability approach encompassing the economic, social, and environmental dimensions provides a flexible and holistic methodology. With adapting specific metrics to the unique dynamics of each specific value chain, stakeholders can systematically identify gaps, track improvements, and design interventions that are both context-relevant and impact-driven.

VII. References

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