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Economic Determinants of the Honey Market in Poland

Piotr Semkiw and Dariusz Gerula *

Apiculture Division, The National Institute of Horticultural Research, Konstytucji 3 Maja 1/3, 96-100 Skierniewice, Poland; piotr.semkiw@inhort.pl
* Correspondence: dariusz.gerula@inhort.pl

Abstract

The aim of this study was to analyse the economic conditions of the beekeeping sector in Poland between 2019 and 2024, with particular emphasis on production costs, price formation mechanisms, the foreign trade balance, and the structure of honey supply. The analysis was based on data from public institutions, beekeeping organisations, individual beekeepers, and the authors' own research and analyses. The results indicate a clear increase in domestic honey production, which reached 31 thousand tonnes in 2024, confirming the growing potential of the sector. Poland is among the largest honey producers in the European Union. The market structure is dominated by direct sales; however, as production scale increases, wholesale channels become more important. Apiary size remains a key factor influencing unit costs and profitability—commercial apiaries benefit from economies of scale, while smaller operations have limited investment capacity. During the analysed period, the sector faced significant cost pressures driven by high inflation and rising prices of beekeeping production inputs. The market analysis shows increasing competitive pressure, particularly in the wholesale segment, intensified by low-priced imported honey. The oversupply of popular honey types reduces profitability and weakens beekeepers' bargaining position. The future development of the sector should focus on increasing the added value of production, diversifying distribution channels, expanding premium segments, and building strong and competitive brands. Ensuring the stability of the sector is crucial not only for the agri-food economy but also for ecosystem balance and food security. In this context, proactive measures and the consideration of appropriate market protection instruments are essential to mitigate the effects of market imbalances and enhance the sector's resilience to future economic shocks.

Keywords: apiculture; honey market; production costs; foreign trade; Poland; competitiveness

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1. Introduction

The honey market in Poland represents a significant and growing segment of the agri-food sector. Its specific characteristics stem from both natural conditions—such as the seasonality of nectar plant flowering, weather patterns, climate change, and the condition of bee colonies [1–6]—and economic factors, including production costs, price levels, supply-demand relations, and foreign trade.

Poland is one of the leading honey producers in the European Union, with nearly 100,000 people engaged in beekeeping and approximately 2.4 million bee colonies [7]. The sector is dominated by small, family-run apiaries, which preserve traditional production methods, ensure high product quality, and contribute to the social and environmental functions of rural areas [8]. Alongside them, larger commercial apiaries (over 80 colonies)

operate with a more market-oriented approach, strengthening domestic honey supply, professionalising the industry, and increasing its competitiveness [7].

The structural diversity of the sector affects production costs, producers' bargaining power, and their position in the value chain. It also entails certain limitations, such as reduced investment capacity and difficulties in achieving economies of scale, which may raise unit production costs and constrain global competitiveness [9,10]. At the same time, this diversity creates opportunities for sectoral development by influencing price formation, supply stability, and integration into international trade.

The authors of this study have conducted extensive research on the Polish beekeeping sector and its market environment [11–26]. Their dual expertise—as researchers and as practitioners managing commercial apiaries—enables a comprehensive analysis of the factors shaping market dynamics, competitiveness, and stability.

In recent years, the Polish honey sector has faced several economic challenges that significantly impact its performance and growth potential. One of the most critical is the influx of cheap, mass-produced honey from non-EU countries, which reshapes competitive conditions, exerts downward pressure on prices, and reduces profitability. This has forced many producers to adopt adaptive strategies, including price adjustments and changes in production scale [7,10,27].

Similar trends are observed across the EU, where domestic production covers only about 60% of demand, making the market heavily reliant on imports. Imported honey, often priced at around €1.4 per kilogram, undercuts European producers and may constitute dumping [28]. Rising production costs—with feed prices increasing by an average of 62% between 2021 and 2023, alongside higher energy, transport, and material costs—further squeeze margins. The situation is compounded by post-pandemic declines in honey consumption and insufficient market controls, allowing substandard products to enter the market.

Contrary to claims of insufficient domestic production [29], growing honey output indicates that Poland is approaching self-sufficiency. However, excessive imports, particularly from non-EU countries, have contributed to oversupply, while per capita honey consumption remains low [30,31]. Although no significant decline has yet been recorded in official statistics, early signs of stagnation are evident, including a slowdown in the establishment of new apiaries—a key growth indicator in the post-EU accession period [7]. These structural shifts reflect both rising competitive pressure and the sector's need to adapt to changing market realities. At the same time, they present opportunities for innovation, quality improvement, and export growth, which could strengthen Poland's position in the global honey market [10,29].

Future development will depend on protecting the domestic market, intensifying promotional activities, and highlighting the high quality of Polish honey. Diversification of sales channels—particularly direct sales—and growing consumer interest in natural and regional products [31,32] will be crucial. The anticipated rise in global demand for natural products, including honey [33], and the implementation of the "Breakfast Directive" which enhances labelling transparency and consumer trust [34], also represent important opportunities.

In the analysis of agricultural markets, an important theoretical reference point is the concept of sustainable development [35,36]. This perspective emphasises the need to integrate economic, environmental, and social dimensions, which is particularly relevant in the case of the beekeeping sector, combining food production, ecosystem services, and a significant contribution to the local economy. The literature indicates that the assessment of beekeeping development should take into account both the economic stability of apiaries and their role in maintaining bee populations and providing environmental services,

especially in the context of increasing import pressure and climate change. In this study, the concept of sustainable development serves as an interpretative framework for analysing the costs, prices, and supply structure of honey production in Poland.

Despite the significant role of beekeeping in the food system, both in Poland and across the European Union, relatively few studies provide a detailed analysis of the honey market. Existing economic assessments are fragmented and typically rely on aggregated data. An additional limitation is the lack of up-to-date and comparable EU-level statistics—in many databases, the most recent complete information refers to 2022—which makes it difficult to evaluate current trends and conduct meaningful international comparisons. In this context, there is a clear need for studies that integrate cost, price, structural and market data. The present research addresses this gap by offering the comprehensive analysis of the economic determinants of the honey market in Poland for the years 2019–2024.

In light of these limitations, the aim of this study was to provide a comprehensive and up-to-date analysis of the economic conditions of the honey market in Poland, based on the combination of primary data, cost and price information, and institutional data. The contribution of this work lies not only in presenting the most recent cost and structural data, but also in integrating them with an analysis of foreign trade and market developments. This approach goes beyond most previous studies and allows for a more precise identification of the challenges facing the Polish beekeeping sector.

2. Materials and Methods

The study draws on data collected as part of the authors' own annual analyses of the beekeeping sector conducted between 2019 and 2024. These data were sourced from a variety of institutional sources and included information obtained from the National Support Centre for Agriculture (KOWR) and the Agency for Restructuring and Modernisation of Agriculture (ARiMR), collected within the framework of interventions in the beekeeping sector and provided annually by regional beekeeping organisations. In addition, supplementary data were gathered from individual beekeepers in 2023 and 2024 (1467 beekeepers in 2023 and 1589 in 2024). The beekeeping organisations serving as data sources represented approximately 50,000 beekeepers managing around 1.5 million bee colonies. Additional information was obtained from the Ministry of Agriculture and Rural Development and the Central Statistical Office of Poland (GUS). The dataset was further complemented by market analyses, which included assessments of production cost structures and honey price levels in both wholesale and retail markets. All calculations were based on an exchange rate of 1 EUR = 4.2586 PLN, according to the NBP exchange rate as of 1 October 2025.

The collected data were subjected to descriptive analysis, including the calculation of basic statistics such as mean values and percentage indicators. Comparative analyses were conducted between commercial and non-commercial apiaries, voivodeships, and sales channels. The data were compiled on an annual basis and presented graphically in the form of charts. The analysis of prices and production costs was carried out in accordance with the methodological assumptions used in national apicultural sector studies [13], taking into account a uniform structure of cost categories calculated per bee colony and cost values appropriate for each year. Foreign trade data were analysed based on the trade balance, import and export volumes, and unit values. All calculations were performed using Microsoft Excel 365.

3. Results

3.1. Honey Production Potential and Dynamics

Analysis of data from 2019 to 2024 indicates a clear upward trend in honey production, despite a temporary decline observed in 2020 (Figure 1). Over the study period, total pro-

duction increased from 18,118.5 tonnes in 2019 to 31,005.1 tonnes in 2024. Both hobbyist and commercial apiaries recorded growth in production volumes, with the per-unit productivity of commercial operations remaining significantly higher throughout the analysed period.

A detailed analysis of the 2024 data indicates a clear regional differentiation in the production potential of the beekeeping sector in Poland (Table 1). The highest honey production was recorded in the Lublin Voivodeship, where it reached 4870.8 tonnes, confirming the dominant position of this region in the national supply structure. The leading regions also include Wielkopolskie, Warmińsko-mazurskie, Małopolskie and Mazowieckie, which together account for a significant share of the national supply. High production levels are also characteristic of the Dolnośląskie, and Kujawsko-pomorskie regions, which results from both favourable forage conditions and the large number of operating apiaries. In voivodeships with smaller production scales, such as Świętokrzyskie, Opolskie and Podlaskie, honey output is significantly lower, and beekeeping activity usually has a more local character. These regions also show clear differences in productivity between commercial and non-commercial apiaries, reflecting varying levels of production professionalisation.

Table 1. Honey production in Poland by voivodeship in 2024—yields in non-commercial and commercial apiaries and total production.

Voivodeship	Honey Production		
	Non-Commercial Apiaries (kg Per Bee Colony)	Commercial Apiaries (kg Per Bee Colony)	Total Honey Production (t)
Lubelskie	22	41	4870.8
Wielkopolskie	20	25	3408.2
Warmińsko—mazurskie	16	25	2101.2
Małopolskie	14	21	2001.2
Mazowieckie	17	24	1971.4
Dolnośląskie	18	27	1861.3
Podkarpackie	14	28	1855.8
Kujawsko—pomorskie	26	33	1852.6
Śląskie	14	28	1770.3
Pomorskie	20	25	1214.4
Łódzkie	17	25	1207.7
Zachodniopomorskie	18	27	1235.8
Lubuskie	25	31	1194.0
Świętokrzyskie	12	22	1026.0
Opolskie	21	28	806.5
Podlaskie	16	21	581.1
Average/Total [1]	18	31	31,005.1 [2]

[1] Average (columns 1–2)/Total (column 3); [2] The value also includes data provided by one nationwide beekeeping organisation.

The collected data indicate that honey production in Poland is concentrated in several main regions, and differences in output levels result from both environmental potential and the scale of beekeeping activity. The noticeable productivity advantage of commercial apiaries indicates the growing role of professional beekeeping in the national honey sector.

3.2. Cost Determinants and Production Efficiency (Main Cost Categories; Cost Changes over Time)

During the analysed period, a consistent increase in the cost of maintaining a single bee colony in hobbyist apiaries was recorded, with a particularly pronounced growth rate observed after 2021 (Figure 2). This increase affected all major categories of expenditure, indicating rising economic burdens associated with operating small-scale apiaries. The unit

cost of honey production in these operations remained higher than in commercial apiaries, reflecting their different cost structure and the absence of economies of scale.

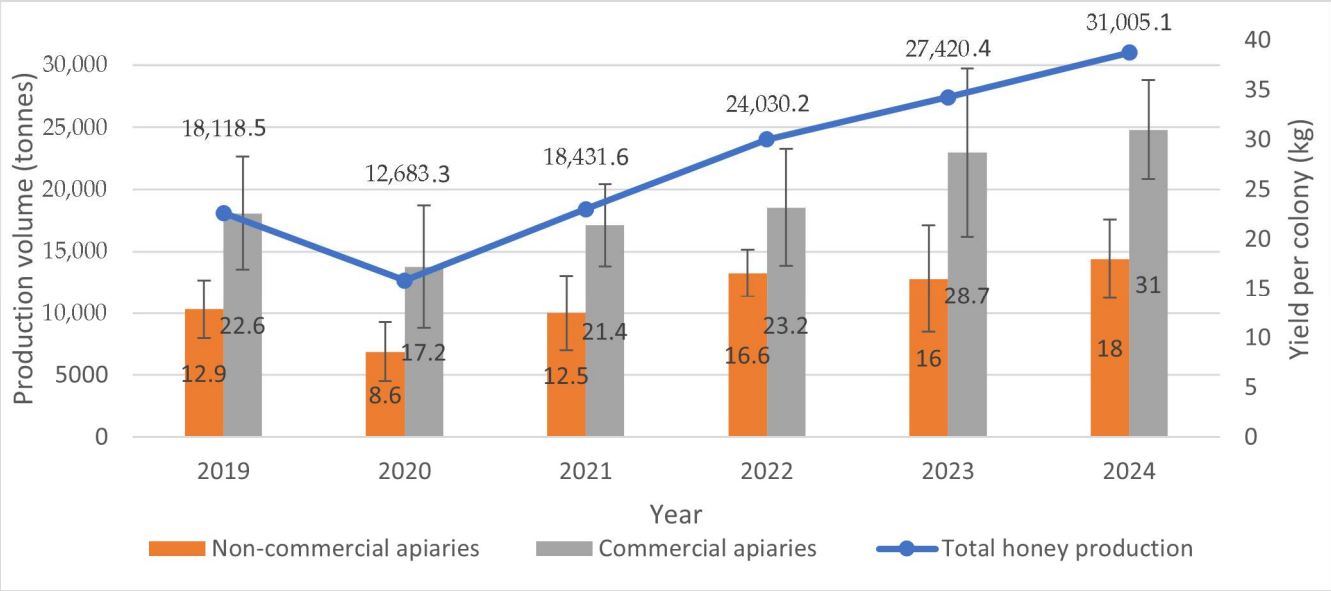

Figure 1. Total honey production in Poland in 2019–2024 and its structure by type of apiary.

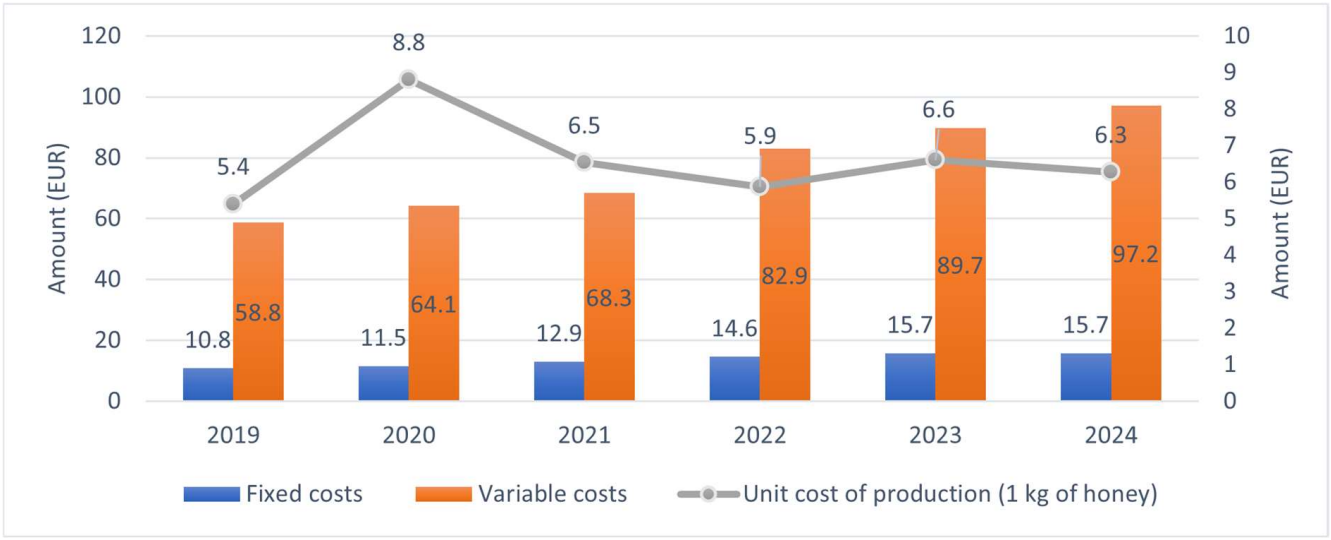

Figure 2. Changes in the cost of maintaining one bee colony and the unit cost of honey production (1 kg) in non-commercial apiaries between 2019 and 2024.

In the case of commercial apiaries, the data also indicate a clear increase in costs throughout the analysed period, with the most dynamic changes occurring after 2021 (Figure 3). At the same time, the unit cost of production remained lower than in non-commercial apiaries, which results from differences in cost structure conditions. Over the analysed years, a reduction in the gap between total costs and unit costs was also observed, reflecting the growing importance of variable costs in the expenditure structure of commercial beekeeping operations.

Using the example of the cost structure per bee colony in 2024, detailed differences between hobbyist (non-commercial) and commercial apiaries are presented (Table 2). In hobbyist apiaries, variable costs dominate, accounting for more than four-fifths of total expenditures and consisting primarily of labour costs, feeding of bee colonies, purchase of

queen bees, veterinary treatment, and transportation. Fixed costs are of lesser importance and are mainly limited to the depreciation of hives and beekeeping equipment.

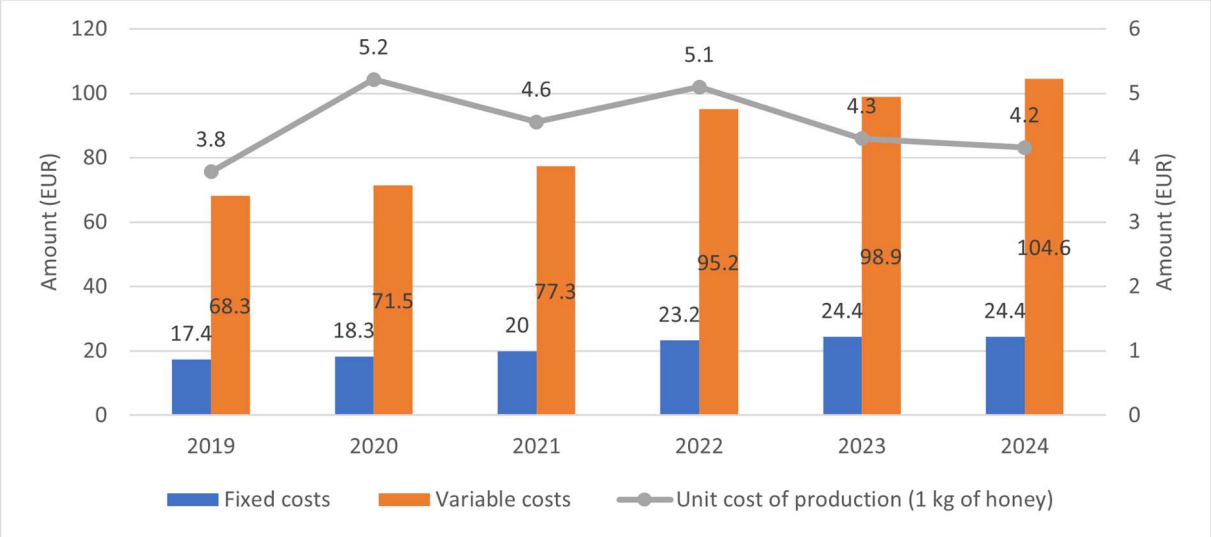

Figure 3. Changes in the cost of maintaining one bee colony and the unit cost of honey production (1 kg) in commercial apiaries between 2019 and 2024.

Table 2. Detailed breakdown of the main production costs per one bee colony in 2024 (EUR).

Breakdown of Costs		Type of Beekeeping Farms			
		Non-Commercial	Share (%)	Commercial	Share (%)
Fixed costs	Depreciation—beehive	12.9	11.4	12.9	10
	Depreciation—equipment	2.8	2.5	5.6	4.4
	Depreciation—processing facility	–	–	4.7	3.6
	Apiary site lease	–	–	1.2	0.9
	Total fixed costs	15.7	13.9	24.4	18.9
Variable costs	Feeding	14.1	12.5	14.1	10.9
	Foundation wax	3.5	3.1	4.2	3.3
	Queen bees	5.5	4.9	8.2	6.4
	Veterinary treatments	4.3	3.8	4.3	3.4
	Transport	4.8	4.2	15.6	12.1
	Electricity	2.7	2.4	5.4	4.2
	Labour	59.9	53.1	48.0	37.2
	Materials and other expenses	2.3	2.1	4.7	3.6
	Total variable costs	97.2	86.1	104.6	81.1
Total costs		112.9	100	129	100

In commercial apiaries, the cost structure is more balanced. The share of fixed costs is significantly higher than in hobbyist apiaries and includes not only the depreciation of hives and equipment but also the depreciation of the beekeeping facility and land lease costs. Among variable costs, labour expenditures are the most significant component, while transportation, electricity, and the purchase of queen bees also represent important cost items.

A comparison of both types of beekeeping activity indicates that larger-scale operations are associated with higher total costs and a greater share of fixed costs, reflecting the investment-oriented nature of commercial apiaries and their different operational model.

3.3. Market Dynamics, Honey Price Formation, and Sales Structure Across Distribution Channels

An analysis was conducted of the price formation of the main honey varieties produced in Poland, aggregated into the following categories: multifloral and rapeseed; acacia, linden, and buckwheat; honeydew from coniferous trees; and heather honey, over the period 2019–2024. The analysis covers three primary distribution channels: direct sales (conducted by beekeepers), wholesale sales (including honey purchasing by intermediaries), and retail sales (carried out by retail outlets).

The prices of multifloral and rapeseed honey in both direct and retail sales showed a clear upward trend. A different pattern was observed in wholesale prices—after an increase in 2019–2022, reaching 3.4 EUR/kg, a decline followed, with prices dropping to 2.5 EUR/kg in 2023–2024. The trade margin systematically increased during the analysed period, rising from 54% in 2019 to 69% in 2024, indicating a widening gap between purchase and selling prices along the distribution chain (Figure 4).

Figure 4. Sales prices of multifloral and rapeseed honey across different distribution channels and the gross trade margin in 2019–2024.

The sales prices of acacia, linden, and buckwheat honey showed clear variation depending on the distribution channel (Figure 5). In the case of retail sales, a consistent price increase was observed throughout the analysed period, reflecting the growing market value of these types of honey and changes in costs at the final stages of the supply chain. Direct sales prices, referring to honey offered by beekeepers directly from apiaries, also exhibited an upward trend, although their growth rate was lower than in retail trade. Wholesale prices were characterised by greater volatility—after an initial increase in the early years of the analysed period, they stabilised and showed a downward trend in the final phase.

The analysed period also recorded a systematic increase in trade margins, particularly evident in the final years of the study, indicating a growing difference between purchase and selling prices in intermediate and retail distribution channels. The price structure across individual distribution channels confirms the differentiated dynamics of the acacia, linden, and buckwheat honey market as well as changes in the distribution of value added along the supply chain.

The sales prices of honeydew honey from coniferous trees were also characterised by significant variation depending on the distribution channel and by fluctuations over time (Figure 6). The highest price levels were recorded in retail sales, where a consistent upward trend was observed throughout the analysed period. Direct sales prices—referring to honey offered to consumers by beekeepers directly from apiaries—also increased, although

their growth rate was slightly lower than in retail trade. Wholesale prices showed greater volatility—after a period of growth in the early years of the analysis, a phase of stabilisation followed, and a downward trend was observed in the final stage. These changes were accompanied by a moderate increase in trade margins.

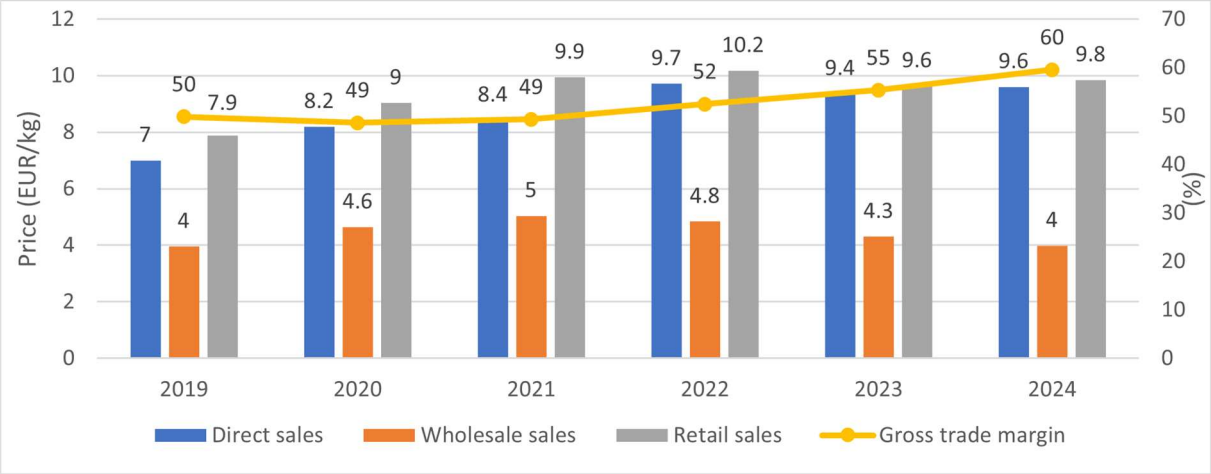

Figure 5. Sales prices of acacia, linden, and buckwheat honey across different distribution channels and the gross trade margin in 2019–2024.

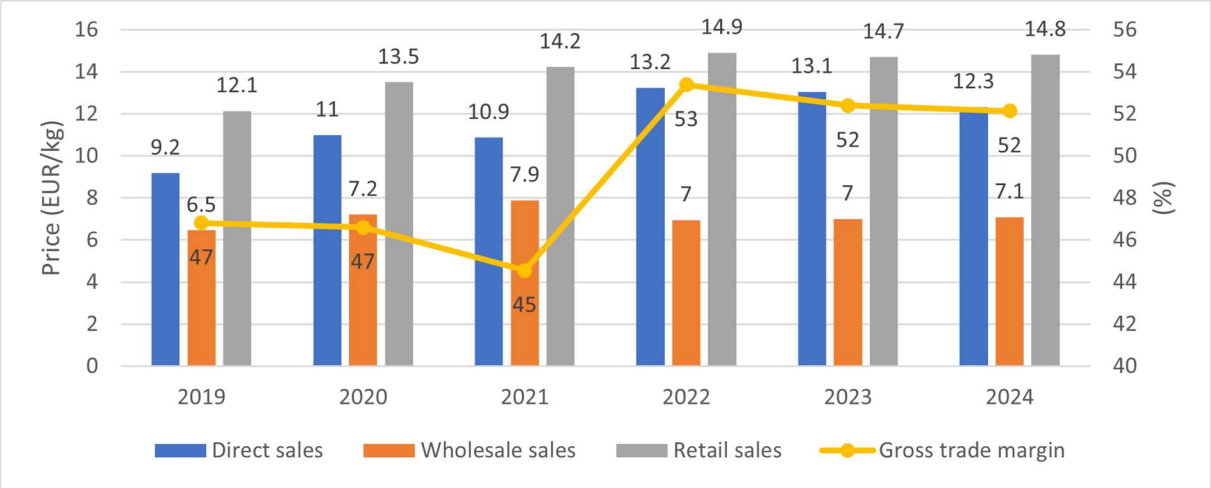

Figure 6. Sales prices of coniferous honeydew honey across different distribution channels and the gross trade margin in 2019–2024.

The sales prices of heather honey were significantly higher than those of other honey varieties, which results from its unique properties, limited supply, and high market value (Figure 7). Across all distribution channels, prices remained relatively high, with the highest levels traditionally recorded in retail sales, which showed a clear upward trend throughout the analysed period. Direct sales—referring to honey offered directly to consumers by beekeepers—were also characterised by rising prices, although their growth rate was moderate. Wholesale prices remained considerably lower than retail prices, and their dynamics were more volatile—after an initial increase, a period of stabilisation followed, and in the final phase of the analysis a downward trend was observed. During the analysed period, the trade margin declined, indicating a narrowing difference between purchase and retail prices. This may have resulted both from rising raw material costs at earlier stages of the supply chain and from the need to adjust pricing strategies to changing market and demand conditions. Despite the decrease in margins, the high price level of heather honey

was maintained throughout the analysed period, underscoring its importance within the structure of the domestic apicultural products market.

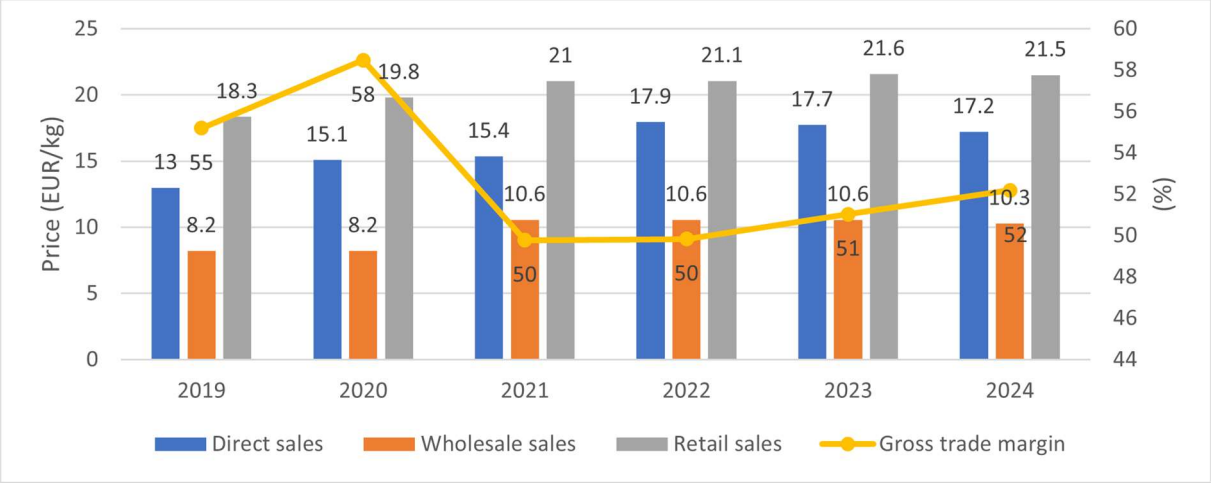

Figure 7. Sales prices of heather honey across different distribution channels and the gross trade margin in 2019–2024.

Domestic honey production in Poland is directed primarily towards direct sales. In 2019, direct sales accounted for 87.7% of total honey supply, while the remaining 12.3% was delivered to wholesale buyers. In 2020, its share reached the highest level of the analysed period—89.4%. In 2021, direct sales remained at the 2019 level, accounting for 87.7% of total honey supply. From 2022 onwards, a slight decline in the share of direct sales was observed, stabilising at around 85%. The same value persisted in 2023, indicating the stability of the market structure. In 2024, the share of direct sales increased slightly to 86%, while wholesale sales accounted for 14% of domestic supply.

3.4. Foreign Trade and Supply Balance (Import and Export Volumes and Directions; Trade Balance)

Foreign trade in the Polish honey market in the years 2019–2024 was characterised by a persistent predominance of imports over exports, resulting in a consistently negative trade balance throughout the analysed period (Table 3). Both the volume and value of exports and imports showed noticeable fluctuations during this time. The initial years of the analysis were marked by a relatively high level of imports compared with exports, which determined a significant difference in the value of foreign trade. The largest trade balance deficit was recorded in 2021, followed by its gradual reduction in subsequent years. From 2022 onwards, a decline in both the volume and value of exports and imports was observed, with imports remaining at a higher level than exports. During the analysed period, the unit price of honey in foreign trade also changed. The export price showed an upward trend and reached a significantly higher level in the second half of the period than at the beginning, while the unit price of imported honey remained stable and significantly lower than the export price.

As a result, Poland remained a net importer of honey throughout the analysed period, and the trade balance stayed negative regardless of changes in trade volumes and unit prices of exports and imports.

Foreign trade included exchanges with both European Union countries (Intra-EU) and non-EU countries (Extra-EU) (Table 4). During the analysed period, EU markets remained the dominant export destination, accounting for the vast majority of honey exported abroad in terms of both volume and value. Exports to EU countries showed fluctuations over time, reaching their highest values in the first half of the analysed period before gradually

declining. Exports to non-EU countries were significantly smaller in quantitative terms, although their unit value was considerably higher than that of intra-EU deliveries.

Table 3. Foreign trade in honey in Poland in 2019–2024—volume, value, unit value and trade balance.

Year	Exports			Imports			Trade Balance (Exports—Imports)
	Volume (Tonnes)	Value (th. EUR)	Unit Value (EUR/kg)	Volume (Tonnes)	Value (th. EUR)	Unit Value (EUR/kg)	Value (th. EUR)
2019	16,837.2	38,996.6	2.3	29,802.3	56,694.0	1.9	−17,697.4
2020	24,890.7	54,873.8	2.2	37,453.5	69,271.1	1.8	−14,397.3
2021	18,773.1	52,817.4	2.8	37,614.8	77,080.5	2.0	−24,263.1
2022	15,046.7	49,574.5	3.3	31,842.6	67,800.1	2.1	−18,225.6
2023	13,984.1	39,438.2	2.8	27,202.2	52,391.1	1.9	−12,952.9
2024	12,239.0	34,425.6	2.8	26,585.6	47,131.1	1.8	−12,705.5

Table 4. Foreign trade in honey in Poland by geographical direction (Intra-EU and Extra-EU), 2019–2024—volume, value and unit value.

Honey Trade		Trade Indicators	Year					
			2019	2020	2021	2022	2023	2024
Exports	Intra-EU	Volume (tonnes)	16,680.0	21,216.7	17,798.7	13,453.2	12,788.7	10,840.5
		Value (th. EUR)	38,172.3	45,776.3	48,783.2	43,023.8	34,044.6	28,180.9
		Unit value (EUR/kg)	2.3	2.2	2.7	3.2	2.7	2.6
	Extra-EU	Volume (tonnes)	157.2	3674.1	974.4	1593.5	1195.4	1398.5
		Value (th. EUR)	824.3	9097.6	4034.2	6550.7	5393.6	6244.7
		Unit value (EUR/kg)	5.2	2.5	4.1	4.1	4.5	4.5
Imports	Intra-EU	Volume (tonnes)	4165.8	5252.5	4059.0	2661.8	2456.8	4573.8
		Value (th. EUR)	15,364.1	17,696.4	16,616.7	10,941.8	8518.4	15,342.9
		Unit value (EUR/kg)	3.7	3.4	4.1	4.1	3.5	3.4
	Extra-EU	Volume (tonnes)	25,636.5	32,200.9	33,555.8	29,180.7	24,745.4	22,011.8
		Value (th. EUR)	41,329.9	51,574.7	60,463.8	56,858.4	43,872.8	31,788.2
		Unit value (EUR/kg)	1.6	1.6	1.8	1.9	1.8	1.4

On the import side, the geographical structure was the opposite—imports of honey from outside the European Union dominated, representing the majority of total import volume throughout the analysed period. Imports from third countries remained relatively stable, and their unit price was lower than that of supplies from EU countries. In contrast, imports from EU member states were smaller in scale and exhibited greater fluctuations over time.

Unit prices of honey in foreign trade varied depending on the direction of trade. Exports to non-EU countries achieved higher unit values than intra-EU exports, while imports from third countries were characterised by the lowest unit prices in the analysed period. These differences persisted throughout the study period, reflecting the diversified geographical structure of honey trade.

The geographical structure of honey imports to Poland in 2024 was characterised by a high degree of concentration, with a clear dominance of two main suppliers—China and Ukraine—which together accounted for the vast majority of total import volume

(Figure 8). Imports from China were characterised by the lowest unit price among all sources, reflecting their quantitative and cost-related specificity. Ukraine ranked second in terms of importance in the import structure, and its supplies were characterised by a slightly higher unit value.

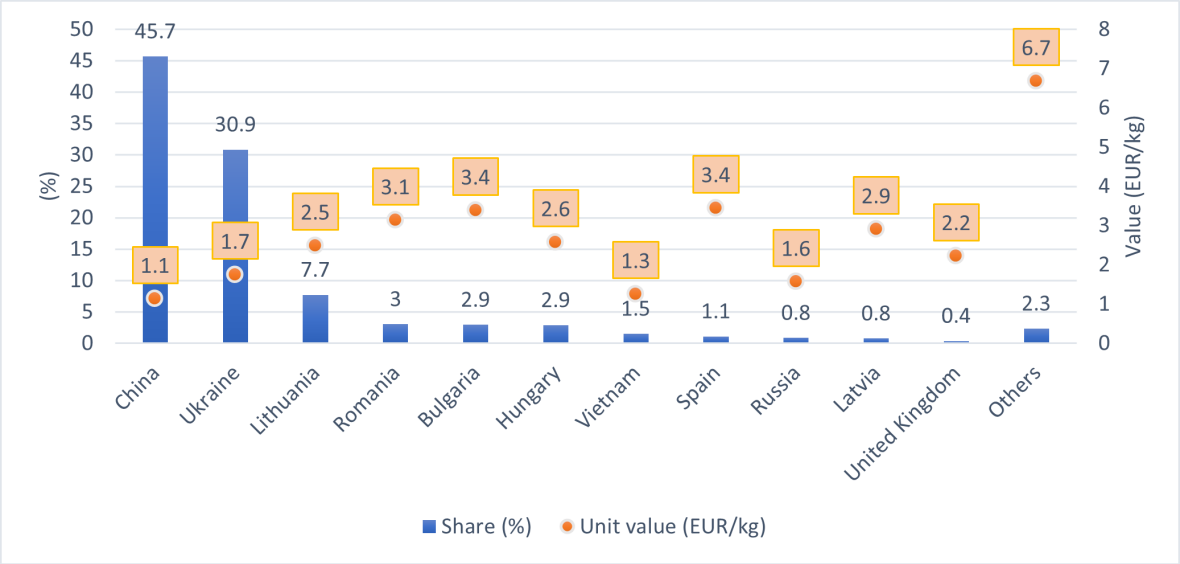

Figure 8. Geographical structure and unit prices of honey imports to Poland in 2024.

A smaller share of imports originated from European Union member states such as Lithuania, Romania, Bulgaria, Hungary, and Spain. Honey imported from these countries was generally characterised by a higher unit price than that imported from China and Ukraine, indicating different quality or structural characteristics of the deliveries. Small quantities of honey also came from third countries, including Vietnam, while other sources had marginal significance in the overall import structure, accounting for only a small percentage of the imported product.

The geographical structure of honey exports from Poland in 2024 showed considerable diversification, with a dominant share of markets in European Union member states (Figure 9). The most important destination for Polish honey was Germany, which accounted for the largest share of total exports while maintaining a relatively high unit price. Italy also held a significant position, ranking second in terms of export share, although its unit price was lower than that of exports to the German market.

Other European countries, such as Greece, Spain, France, Bulgaria, and Romania, also played an important role in the export structure. Although their shares were smaller, they remained significant in aggregate terms. Exports to non-EU markets, including the United Kingdom and the United States, were characterised by distinctly higher unit prices, which distinguished these destinations from the others. Other export destinations had limited significance in the geographical structure of exports, accounting for only a small share of the total volume.

3.5. Supply Structure: Domestic Production and Honey Trade Balance

Honey supply on the domestic market in Poland showed a clear upward trend in the years 2019–2024 (Table 5). The total amount of honey available on the market increased from 31.1 thousand tonnes in 2019 to 45.4 thousand tonnes in 2024. The volume of supply was shaped by both domestic production and foreign trade, with imports playing a significant role, as they exceeded exports throughout the analysed period and constituted an important source of supply.

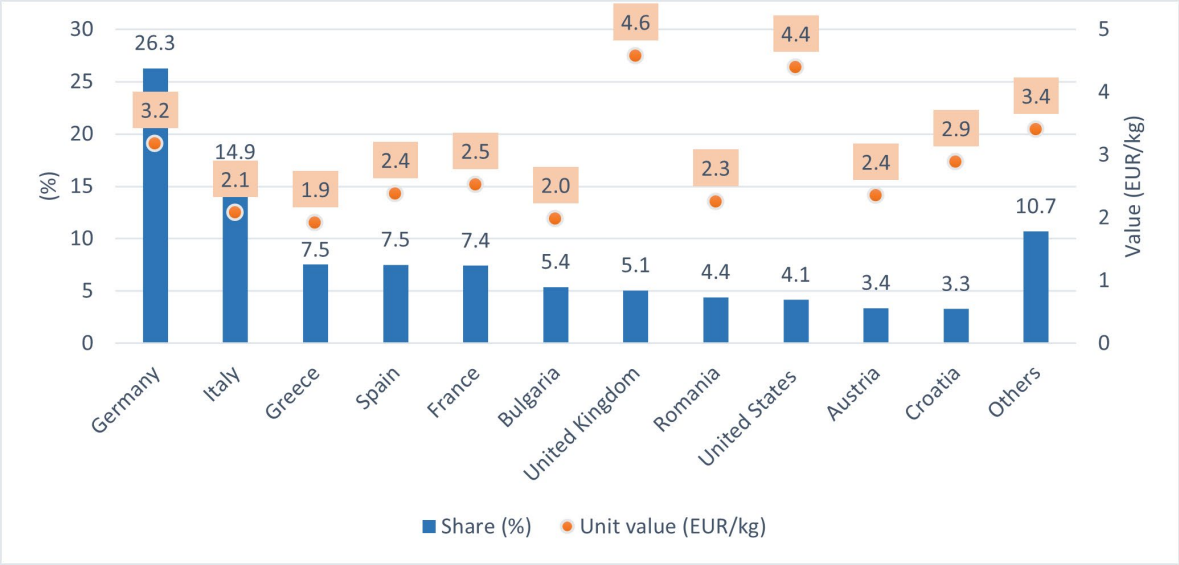

Figure 9. Geographical structure and unit prices of honey exports from Poland in 2024.

Table 5. Honey supply on the domestic market in Poland in 2019–2024.

Year	Trade Balance of Honey (Imports—Exports) (th. Tonnes)	Domestic Honey Production (th. Tonnes)	Market Supply of Honey (th. Tonnes)	Population (Millions)	Honey Supply Per Capita (kg)
2019	13.0	18.1	31.1	38.4	0.8
2020	12.6	12.7	25.2	38.1	0.7
2021	18.8	18.4	37.3	37.9	1.0
2022	16.8	24.0	40.8	37.8	1.1
2023	13.2	27.4	40.6	37.6	1.1
2024	14.3	31.0	45.4	37.5	1.2

The persistent predominance of imports over exports contributed to the gradual increase in the amount of honey available on the domestic market. During the analysed period, honey supply per capita also increased—from 0.8 kg in 2019 to 1.2 kg in 2024—mainly as a result of the growth in total honey supply. The population decline during this period slightly amplified this effect.

4. Discussion

The interpretation of the results allows for an in-depth analysis of the economic conditions shaping the beekeeping sector in Poland, as well as the identification of its main challenges and development opportunities in a changing market environment. The results clearly indicate a transformation of the market structure—from a relatively stable balance between production and demand to a situation of growing supply and increasing competitive pressure. Such a broad shift, although partly noted in the literature, has not yet been described in a comprehensive way [25,26,28]. This study and the earlier publication constitute two complementary sources of knowledge describing both the structural conditions and the current economic processes in the beekeeping sector [7]. Combining the data presented in the earlier work with the up-to-date results of cost, production, and market analyses presented in this article enables a broader and more coherent understanding of the mechanisms shaping the situation of the beekeeping sector in Poland. The complementary nature of both studies allows for a more comprehensive interpretation of observed trends and for the identification of factors influencing the functioning and development of the sector.

Analysis of data from 2019 to 2024 shows a clear increase in domestic honey production, which reached about 31,000 tonnes in 2024. This trend confirms the growing potential of the sector and the increasing importance of beekeeping in Polish agriculture and the agri-food economy. Poland is currently among the largest honey producers in the European Union—alongside Romania, Germany, Hungary, and Spain—and its share in total EU production continues to grow [27,37]. At the same time, these results differ from some earlier analyses suggesting shortages in domestic supply [29], instead indicating a phenomenon of oversupply relative to domestic demand. This represents an important refinement of previous interpretations.

A key feature of the Polish market remains the dominance of direct sales, which account for most of the domestic supply and represent the main distribution channel for honey. This model, based on direct producer-consumer relationships, allows beekeepers to achieve higher margins and maintain greater control over pricing [10]. However, as production volumes grow, wholesale trade is becoming increasingly important. For larger beekeeping operations, which cannot sell all their output through direct sales, wholesale channels often become a major or even dominant means of distribution. Differences in sales strategies reflect structural differences within the sector—including apiary size, organisation, and access to buyers. It is worth noting that 24% of honey consumers purchase it in supermarkets [30]. Such differentiation in market structure reflects the concept of "dual segmentation" characteristic of agriculture, in which channels generating high added value for producers coexist with markets dominated by the stronger side—in this case by wholesalers and retail chains [38,39].

Apiary size remains one of the most important factors influencing the economic performance of beekeeping operations. Larger apiaries benefit from economies of scale—they produce more, use equipment more efficiently, and reduce unit production costs. Smaller operations, although more flexible and with easier access to direct sales, have limited investment capacity [7]. The profitability threshold depends on many factors, such as the organisational model, access to nectar sources, and the sales channels used. The type of beekeeping operation is also important—migratory apiaries, by producing higher-value monofloral honeys, generally achieve higher productivity and income than stationary ones [10]. The results of this study, however, indicate that macroeconomic pressures may substantially weaken the traditional economies of scale. This constitutes an important refinement of earlier research, which highlighted the advantages of commercial apiaries but did not account for the effects of strong external shocks.

Profitability is influenced not only by price levels but also by the cost structure. Variable costs—including labour, transport, feeding, and bee treatment—account for the largest share. Unit production costs are lower in commercial apiaries. Between 2021 and 2023, the sector faced strong cost pressures due to high inflation and rising prices of beekeeping production inputs [25,26]. Although inflation decreased in 2024, the cumulative effect of earlier increases kept costs at a high level, limiting profit margins and investment capacity [40].

Since 2022, price conditions in the wholesale segment have deteriorated. A decline in honey purchase prices, combined with an increase in trade margins from 54% to 69%, indicates a shift in added value toward intermediaries and retailers [26]. This weakens beekeepers' bargaining power and increases pressure on profitability. Large differences between wholesale and retail prices—especially for common honeys such as multifloral and rapeseed—highlight the importance of factors such as production scale, type of beekeeping operation, and sales channels. At current production costs and volumes, profitability is difficult to achieve based on prices offered by honey buyers. Such an asymmetry in bargaining power is widely discussed in the economics of food supply chains and reflects

the increasing concentration of the retail sector, which further weakens the economic position of producers [39].

The COVID-19 pandemic had a limited impact on the functioning of the beekeeping sector in Poland. The dominance of family labour and low dependence on external labour allowed most operations to continue without major disruptions. Although honey production in 2020 was the lowest among the years studied, this was not due to restrictions caused by the spread of SARS-CoV-2. Instead, significant winter losses (20.2%) and very unfavourable weather conditions contributed to a decline in honey production in many regions. Additionally, summer nectar flows (e.g., from linden and buckwheat) were poor, further deepening the production decline [24]. These findings confirm that the beekeeping sector—due to its labour structure and low dependence on institutional factors—is nevertheless more sensitive to environmental conditions and the health status of bee colonies [2,4–6,41].

The crisis, however, highlighted the importance of well-developed sales channels. Enterprises with extensive distribution networks benefited from increased demand, as 32% of Polish consumers increased their honey consumption during the pandemic [30,42]. At the same time, foreign trade reached a record level, and honey exports were the highest in history. It should be noted, however, that a significant share of honey traded internationally consisted of imported raw material, due to limited domestic supply during that period.

Foreign trade is one of the key factors shaping the sector's situation. Poland is a net importer of honey, with a large share of imports coming from China and Ukraine, typically at low unit prices. This creates competitive pressure in the wholesale segment and limits opportunities to increase income for domestic producers. At the same time, exports to premium markets such as the United Kingdom and the United States allow higher unit prices and represent an important growth opportunity. Competitive advantages based on quality, standardisation, certification, and geographical indication can serve as effective responses to price competition [27].

Within the European Union, the Polish beekeeping sector follows broader market trends. The EU's self-sufficiency level in honey is around 63%, meaning that imports remain a permanent part of supply [37]. The EU trade balance is negative, and honey from third countries—mainly China and Ukraine—is significantly cheaper, increasing competitive pressure and making it more difficult to pass production costs on to consumers. Another challenge is the concentration of retail trade and the growing bargaining power of large retail chains. Poland has a growing resource base and a strong share of direct sales, but maintaining and strengthening its competitive position depends on increasing the added value of production and better tailoring the offer to diverse demand segments [28,33].

The increase in honey supply per capita reflects the growing scale of total supply, resulting from both higher domestic production and imports. However, this indicator does not directly reflect consumption—some honey remains unsold or is exported. Limited domestic market absorption leads to a structural oversupply, which destabilises price relationships and increases competitive pressure. Before 2021, the honey market in Poland was more stable, with per capita supply at 0.7–0.8 kg. After 2021, it exceeded 1 kg, and a population decline of about 900,000 people between 2019 and 2024 further deepened the oversupply problem [43]. This situation was worsened by a post-pandemic decline in consumers' purchasing power, which limited demand growth despite increasing supply. It is also worth noting that honey—despite its nutritional and health benefits—is not a basic necessity [30].

A common mistake in honey market analyses is equating total supply with consumption, which leads to a misrepresentation of actual demand [28,29,33]. Supply includes both domestic production and the trade balance (imports minus exports), not just the amount

actually consumed by consumers. Assessing the market situation is further complicated by the lack of data on stock levels, which can be significant and affect supply-demand dynamics when sales opportunities are limited. The estimated production of around 31,000 tonnes in 2024, combined with relatively low consumption, suggests that domestic supply in the popular honey segment largely meets internal demand. However, a market deficit may occur in the case of monofloral honeys with higher market value, whose supply remains limited in some years.

The findings of this study therefore indicate the need for a more cautious interpretation of per capita supply indicators, which in some earlier studies were treated as a proxy for consumption—leading to overestimated assessments of demand.

Thus, the key challenge for the sector is not a shortage of production but a structural oversupply in the popular honey segment, resulting from both increased domestic supply and the inflow of low-priced imported honey. Oversupply leads to price pressure, worsens conditions in the wholesale segment, and reduces the profitability of large beekeeping operations—trends clearly visible in the results since 2022.

Further development of the sector should focus not on simply increasing production volume but on effectively managing existing supply through diversification of distribution channels, development of premium segments, building strong brands, and intensifying marketing activities [27]. Strengthening the sector's position also requires organisational and institutional measures. Establishing producer groups, developing common quality standards, improving logistics, and conducting joint promotional activities can increase producers' bargaining power against intermediaries and retail chains [33]. Regulatory measures to improve market transparency and enforce product quality—such as aligning national regulations with the so-called "Breakfast Directive"—are also important [34]. Public support, including sectoral interventions, can further support the modernization of apiaries, improve their competitiveness, and contribute to the sustainable development of the entire sector [7,8].

In a broader perspective, these findings are consistent with theoretical assumptions in agricultural economics, which emphasise that the long-term stability of the sector depends not only on production volume but also on effective supply management, the bargaining power of producers, and the mechanisms through which value added is distributed [44,45].

The findings of this study have important implications for public policy and market regulation. The identified oversupply of popular honey varieties and the growing asymmetry in bargaining power indicate the need for measures that strengthen the position of producers and improve market transparency, particularly in the context of implementing Directive (EU) 2024/1438 [34]. These results are also relevant for assessing food self-sufficiency: misinterpreting per capita supply as a measure of consumption leads to overestimated assessments of actual demand, especially in light of increasing imports from third countries. The findings further show that the long-term stability of the sector requires strengthening its resilience to environmental factors and developing sales channels that generate higher added value. In this context, organisational initiatives among producers, improved quality standards, and policy instruments supporting modernisation and sustainable sector development are of particular importance.

A valuable and desirable extension of this study would be the construction of a synthetic measure enabling cross-country comparisons of the economic condition of the beekeeping sector. However, developing such an index requires detailed, up-to-date and comparable data, while information on production costs, prices, trading margins and supply structure is available only for Poland, as it was collected and compiled within this study. EU-level data remain highly aggregated and outdated, which prevents the application of multicriteria methods and limits the possibility of reliable international

comparisons. The development of more detailed and regularly updated datasets represents an important and promising direction for future research.

5. Conclusions

The Polish beekeeping sector has significant production potential and plays an important role in the national economy. However, its further development requires structural and economic adjustments that will support the stabilisation of its competitive position amid growing market challenges.

A major problem facing the sector is the oversupply of popular types of honey in a context of limited domestic market absorption and pressure from low-priced imports. This leads to declining production profitability and a weakening of beekeepers' economic position. Actions aimed at restoring market balance and strengthening the sector's resilience are therefore necessary.

The long-term competitiveness of the sector will depend on its ability to make better use of existing resources and increase the added value of production. In addition to focusing development strategies on improving quality, better aligning supply with demand structure, and making more effective use of export potential, promotional and educational initiatives are also crucial. These can raise consumer awareness of the health and environmental benefits of honey, which may help boost domestic demand.

The stability of the beekeeping sector has implications that go beyond honey production itself—it directly affects ecosystem functioning, plant pollination processes, and food security. If market factors lead to imbalances, reduced domestic production, and lower profitability, the use of appropriate market protection instruments should be considered. It is crucial to take preventive action to avoid a situation where intervention occurs only at the point of deep crisis, when its consequences are difficult to reverse and far more severe than the short-term benefits resulting from trade in cheaper raw materials.

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