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Research Article

Determination of the Factors Affecting the Honey Production Per Coloney in Bingöl Beekeeping Enterprises

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Abstract: This study was carried out to determine the factors affecting the honey yield per colony in beekeeping enterprises in Bingöl province by regression analysis. The number of enterprises to be surveyed with the "proportional sampling method" was determined as 87 in the province of Bingöl. "T test", "Anova", "Chi-square", "Correlation and Regression" analyzes were used to evaluate the data. According to the research findings; the average age of the surveyed beekeepers was 46.14 years and the average beekeeping period was 15.5 years. The average number of hives owned by beekeepers was 219.5, while the average honey yield per beehive was calculated as 11.4 kg^{-1}. The coefficients of the variables in the model were found to be statistically significant. The R^2 value, which determines the explanatory power of the model, was found to be 0.323 and the adjusted R^2 value was found to be 0.203. The way beekeeping is done, the profession and the variables of getting information from PIKOM are determined as the variables that affect the honey yield. As a result; in conclusion; it has been concluded that there is an increase in honey yield per colony of the enterprises that are made by wandering beekeeping, beekeeping is done for the main income, the Caucasian bee race is used, the enterprises that receive training, support and information about beekeeping from picom and that are members of the union and that produce queen bees.. Considering Türkiye's ecological richness and existing rural economic conditions together, beekeeping; it should be done in an organizational, conscious and sustainable structure.

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1. Introduction

Beekeeping is a significant agricultural endeavor, particularly for the low-income settlements located in or near forests that have limited or no land. Also, it has socioeconomic significance in that it doesn't require additional labor or capital, is an agricultural activity that anybody can engage in, makes the best use of the family workforce, and produces money quickly (Küçük et al., 2022). Beekeeping is a significant agricultural activity, as evidenced by its low capital requirements, ability to generate the

farmer's primary and/or secondary source of income, role in the production of foods high in nutrients, contribution to alternative medical practices, assessment of unprocessed agricultural areas, and environmental sustainability due to its role in pollination (Günbey, 2007; Kızılaslan and Kızılaslan, 2007; Uzundumlu et al., 2011; Karakaya and Kızıloğlu, 2015; Aksoy et al., 2017; Terin et al., 2018; TEPGE, 2021). Türkiye is very fortunate to have the natural resources needed for beekeeping because of the following reasons.

- High honey yield,
- Existence of large flora areas,
- Experiencing the seasons suitable for flowering throughout the year,
- The existing topographic structure,
- Cultivation of common fruit species such as almonds and citrus,
- Cultivation of industrial plants such as cotton and sunflower,
- Owning high plateaus,
- Presence of meadows and pastures sufficiently,
- Developed pulse fields and forage crops cultivation,
- Many different types of trees and various scrubs (such as chestnut, acacia, linden, oleaster, eucalyptus, rhododendron) and pine forests.

The type and quantity of honey are also greatly influenced by the presence of such a diverse range of flora. Beekeeping has been one of Anatolia's oldest and most widely practiced production branches as a result of these regional characteristics (Burucu and Gülse Bal, 2017). The Turkish Statistical Institute (TUIK) reports that 96.344 tons of honey were produced in Türkiye in 2021. The results show that Türkiye now has 8984676 colonies, a rise of 2.87 percent over the previous year. The yield of honey increased by 19.40% from the previous year to 13.17 kg colony^{-1} (Table 1).

Table 1. Statistics on beekeeping in the world and Türkiye

Beekeeping statistics (2021)	Number of colonies (pieces)	Honey production (tonnes)	Honey yield (kg colony^{-1})
World	101624052	177194436	17.44
Türkiye	8733394	96344	11.03
Türkiye (2022)	8984676	118297	13.17
Index (2021=100)	102.87	122.78	119.40

In 2021, Türkiye will have a total of 8.7 million beehives. With 949 thousand hives, Muğla takes the top spot with a 10.8% part of all the beehives in Türkiye. Ordu is in second place with 604 thousand hives and a 6.9% stake, and Adana is in third place with 481 thousand hives. With a ratio of 5.5, it is ranked third. On the other hand, the province of Bingöl comes in at number thirteen with 157 thousand hives, or 1.8% of all the hives in Türkiye (Kadiroglu, 2022). When examining the province-based honey output, Bingöl has a 52.4% share of the total 1724 tons of honey produced in the TRB-1 region in 2021, placing it first overall. In 2021, the province of Bingöl produced 11 kg^{-1} of honey (TEPGE, 2022).

It has been concluded in many previous studies that honey yield should be increased in order for the beekeeping activity in Türkiye to reach the real value in the world (Çeliker, 2002; Fıratlı et al., 2005; Soysal et al., 2005; Kekeçoğlu et al., 2007; Parlakay et al., 2008; Sezgin and Kara, 2011; Uzundumlu et al., 2011; Aksoy and Öztürk, 2012; Söğüt et al., 2019a; Söğüt et al., 2019b). As a result, regression analysis was used in this study to identify the variables influencing honey yield per hive in beekeeping operations in the Bingöl province. The study's findings are believed to be crucial in illuminating the research that must be done in order to boost honey yield in Türkiye.

2. Material and Methods

In order to conduct this study, primary data were collected in March 2021 from 87 producers who were members of the Bingöl Provincial Beekeepers' Association. The provincial and district directorates of agriculture, online resources, general knowledge gathered from domestic and international sources, and relevant statistical data served as the study's secondary sources. By using the proportional sampling technique, sample volume was calculated (Newbold, 1995).

$$n = \frac{Np(1-p)}{(N-1)\sigma_{\hat{p}x}^{2} + p(1-p)} \quad (1)$$

Where;

n: Sample volume, N: Number of businesses in the population, p: the ratio of producers who have sufficient knowledge about beekeeping, (0.50 taken to reach the maximum sample volume), α_{px}^2: It gives the variance (0.0026).

Throughout the province, there are 857 beekeepers that are members of the union. 87 were found to be the sample size, with a 90% confidence range and a 10% error. Due to missing data in one questionnaire, 95 questionnaires were created, of which 94 were examined. This is a 10% increase in the total number of questionnaires. T.R. Bingöl University Scientific Research and Publication Ethics Committee has decided that it is suitable for research ethics for the study with the number 92342550/044/8375.

2.1. Linear regression analysis

Regression analysis uses data from any source to investigate the connection between the dependent variable and the independent variable or variables (Kutlar, 2009). Linear regression is used when there is a linear relationship between the variables. There is just one independent variable in the simplest linear model. According to this model, whether the value of the independent variable rises or falls, the real mean of the dependent variable changes at a constant pace (Oztürk, 2013). "Typically, x is used to represent the independent variable. It is the (explanatory) variable that is the cause of y or is considered to effect it, but is unaffected by any other variables. The standard symbol for the dependent variable is y. It is the variable that, depending on the variable X, can change or be influenced (explained). It's odd how many dependent variables there are. There may be more than one independent variable, though. In a simple linear regression analysis, there is only one independent variable (Anonymous, 2012; Oztürk, 2013). The independent variables listed below contribute to an explanation of honey yield per hive in the beekeeping industry.

$$V = f(ES, AGE, PE, BMP, P, RACE, NEH, QBRP, BW, ES, MS, SS, PIKOM, QBP) \quad (2)$$

In the equation: ES: Educational Status (years), AGE: Farmer age (years), PE: Professional Experience (years), BMP: Beekeeping Main Profession (Yes:1, No:0), P: Purpose (main livelihood:1, others:0), RACE: Race used (other races:1, caucasian:0), NEH: Number of Existing Hives (pieces), QBRP: Queen Bee Replacement Period (years), BW: Beekeeping Way (Migratory:1, Stationary:0), ES: Education Status (Yes:1 No:0), MS: Membership Status: (Yes:1 No:0), SS: Support Status: (Yes:1 No:0), PIKOM: The status of getting information from Pikom (Yes:1 No:0), QBR: Queen Bee Rearing (Yes:1 No:0)

The regression equation of the model is given below.

$$V=\beta_0+ESX_1+AGEX_2+PEX_3+BMPX_4+PX_5+RACEX_6+NEHX_7+QBRPX_8+BWX_9+ESX_{10}+MSX_{11}+SSX_{12}+PIKOMX_{13}+QBRX_{14}+\epsilon \quad (3)$$

2.2. Correlation analysis

It is a statistical technique used to establish the existence of a linear relationship between two numerical data and, if so, its strength and direction. If the data is regularly distributed, the "Pearson correlation coefficient" is used; otherwise, the "Spearman Rank correlation coefficient" is used. The p value needs to be lower than 0.05 in order to be considered as a correlation coefficient. If the correlation coefficient is negative, the two variables are said to have an inverse relationship, which means that when one variable rises, the other falls. It is said that "when one variable increases, the other increases" if the correlation coefficient is positive.

The following values are taken into account when interpreting the correlation coefficient (r). “If r<0.2, very weak correlation or no correlation between 0.2-0.4 weak correlation. Moderate correlation between 0.4-0.6 High correlation between, 0.6-0.8 0.8> is very high correlation” (Tatlıdil, 2008).

3. Results and Discussion

It can be seen that the breeders surveyed have a high average age (Table 2). The average number of available hives is 219.5, and the professional experience of the surveyed producers is 17.3 years. It was discovered that 63% of the breeders were migratory beekeepers, the average queen bee replacement period was three years, and 44% of the breeders did not work in beekeeping. The average honey yield per hive was 11.4 kg^{-1}, and the average individual education period was 9.11 years. It has been determined that half of those polled are beekeepers because it is their source of income. 82% of the individuals produced with Caucasian bees, 61% received beekeeping training, 89% were union members, 83% received beekeeping support, 29% received picom information, and 56% were in the main It was determined that they were raising bees. Uzundumlu et al. (2011) discovered in Bingöl that the average age of the beekeepers surveyed was 50.8 years old, the average number of hives was 115, the average honey yield was 16 kg $hive^{-1}$, and 51% of the beekeepers were wandering beekeepers. In a study conducted by Öztürk (2013) in Ordu province, the average age of beekeepers was 48.7 years, the average education level was 7.55 years, the average professional experience was 23.7 years, and the average queen bee replacement period was 1.75 years. It has been determined that 55% of beekeepers work outside of beekeeping, 79% are the primary source of income, 79% produce with Caucasian bees, and the average number of hives is 263.7. The average professional experience in the study conducted by Şeviş (2018) in Bingöl was 18 years, the yield was 11.12 kg^{-1}, the average age of the beekeepers was 47, the number of hives was 133, and the average queen bee replacement was 2 years. According to the same study, 84% of beekeepers were traveling beekeepers, 38% were solely beekeepers, 51% were their primary source of income, and 67% were producing with the Caucasian bee race. The study's findings are partially consistent with the findings of other literature reports.

Table 2. Description of variables and statistical summaries

Variables	Mean	Standart deviation
Honey Yield (kg $colony^{-1}$)	11.41	4.719
Age (years)	46.14	12.221
Professional experience (years)	17.35	8.528
Number of existing hives (pieces)	219.55	171.357
Queen bee change (year)	3.00	0.927
Beekeeping style (Traveler=1; Fixed=0)	0.63	0.486
Education level (years)	9.11	4.573
Is beekeeping the main occupation? (Yes=1; No=0)	0.56	0.499
Purpose of beekeeping (Main livelihood=1; Others=0)	0.50	0.503
Bee race (Caucasian=1; Others=0)	0.82	0.387
Education about beekeeping (Yes=1; No=0)	0.61	0.491
Status of being a member of a beekeeping association (Yes=1; No=0)	0.89	0.310
Status of receiving support for beekeeping (Yes=1; No=0)	0.83	0.378
Status of getting information from PIKOM (Yes=1; No=0)	0.29	0.455
Queen bee production status (Yes=1; No=0)	0.56	0.499

Table 3 shows the correlation values for the relationship between the dependent variable and the independent variables. If the correlation between the independent variables is 0.80 or higher, this is considered an indicator of the multicollinearity problem (Kalaycı, 2014; Çevrimli, 2017). When the correlation table was examined, it was determined that there was no high correlation between the independent variables and that the regression model created did not have a multicollinearity problem. Furthermore, significant relationships were discovered between the dependent variable (yield) and the independent variables (experience, beekeeping type, membership and race). There is no significant or very significant correlation between the dependent variable and the independent variables, or between the independent variables. The strongest correlation was found to be a moderately positive relationship between beekeeping support and union membership. Examining the tolerance and variance

magnification ratio VIF (Variance Inflation Factor) values is one method for determining whether there is a multicollinearity problem. In general, if the VIF criterion is greater than 10, it is assumed that the independent variables have a serious multicollinearity problem (Akdi, 2011; Gazibey et al., 2012). Furthermore, VIF and tolerance values greater than 10 and less than 0.2, respectively, indicate a multicollinearity problem (Gujarati, 2004; Tatldil and Ortunç, 2011; Gazibey et al., 2012). According to the results of both VIF and tolerance values for the variables in the model, it was determined that there was no multicollinearity problem in the study (Table 4). Figures 1, 2, and 3 show that the regression model's errors have a normal distribution and that there is no covariance problem in the model. Figure 4 depicts the visual of the multiple regression model.

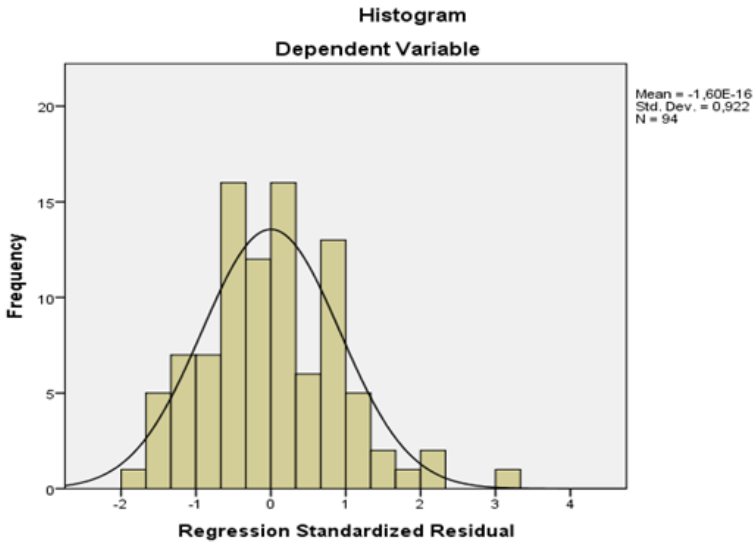

Figure 1. Graph of the normal distribution of errors.

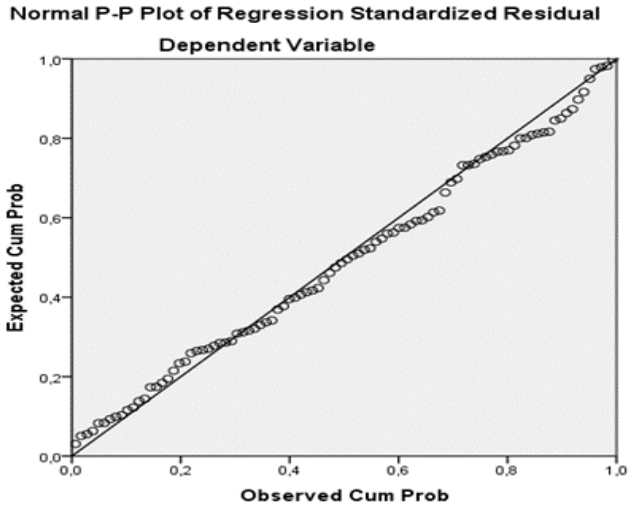

Figure 2. Normal distribution of errors.

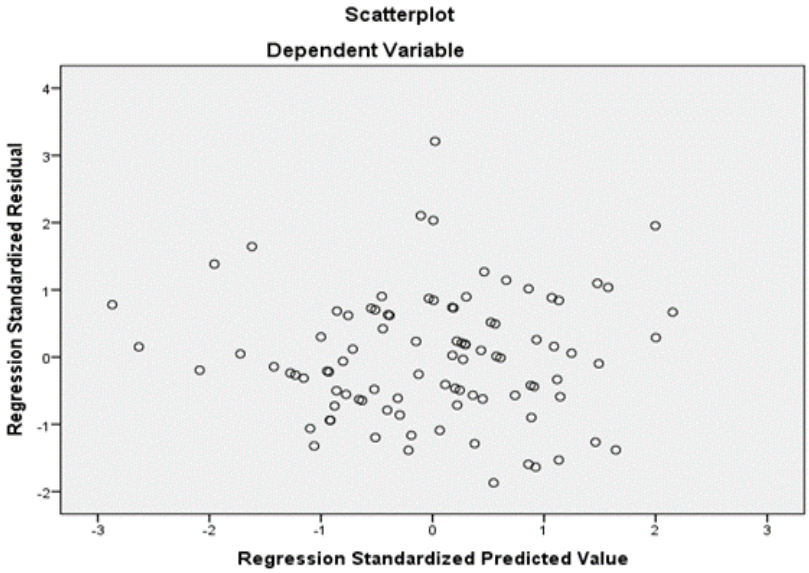

Figure 3. Graph of the covariance assumption.

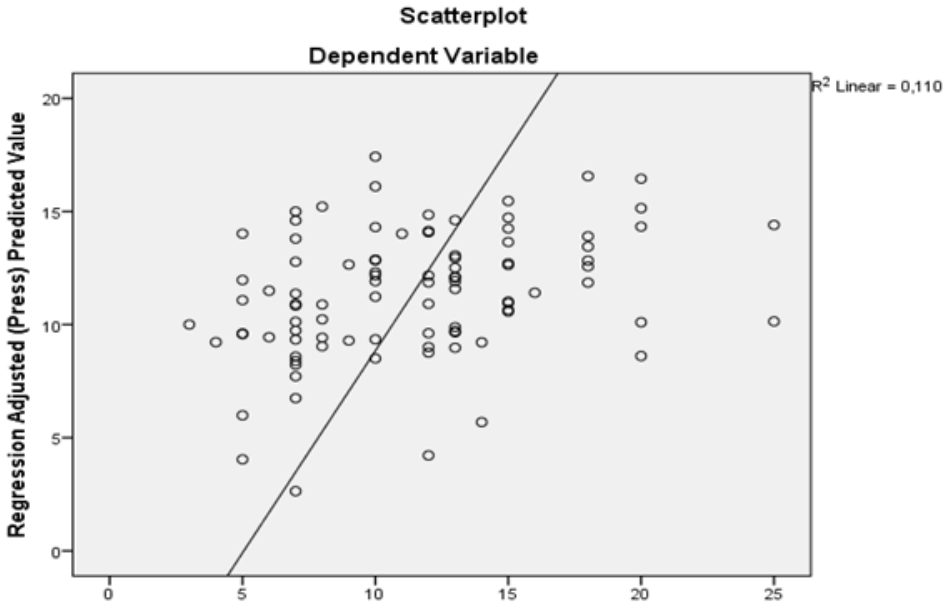

Figure 4. Multiple regression analysis visual.

Table 3. Relationship between dependent variable and independent variables

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Yield (1)	1	0.062	0.096	-0.064	0.213*	0.116	0.378*	0.104	0.090	0.273*	0.064	-0.146	0.212*	0.174*	0.029
Age (2)	0.062	1	-0.423*	0.324*	0.389*	0.179*	0.041	-0.017	-0.007	0.092	0.280*	-0.222*	-0.145	-0.161	-0.083
Education (3)	0.096	-0.423*	1	-0.446*	-0.232*	-0.070	0.018	-0.125	0.072	0.000	-0.276*	0.264*	0.084	-0.041	-0.139
Profession (4)	-0.064	0.324*	-0.446*	1	0.449*	0.193*	0.254*	0.171*	-0.050	0.184*	0.172	-0.153	-0.079	0.092	0.023
Experience (5)	0.213*	0.389*	-0.232*	0.449*	1	0.332*	0.463*	0.387*	-0.028	0.222*	0.106*	0.118*	-0.046	0.115	-0.022
Purpose (6)	0.116	0.179*	-0.070	0.193*	0.332*	1	0.330*	0.171*	0.022	0.138	0.000	-0.071	-0.083	-0.107	0.069
Beekeeping type (7)	0.378*	0.041	0.018	0.254*	0.463*	0.330*	1	0.505*	0.010	0.305*	0.120	0.051	0.038	0.299*	0.143
Number of hives (8)	0.104	-0.017	-0.125	0.171*	0.387*	0.171*	0.505*	1	-0.078	0.208*	0.107	0.198	-0.058	0.361*	0.238*
Getting an education (9)	0.090	-0.007	0.072	-0.050	-0.028	0.022	0.010	-0.078	1	0.146	0.157	0.223*	-0.039	0.082	0.094
Membership (10)	0.273*	0.092	0.000	0.184*	0.222*	0.138	0.305*	0.208*	0.146	1	0.578*	-0.010	0.107	0.392*	0.000
Support (11)	0.064	0.280*	-0.276*	0.172*	0.106	0.000	0.120	0.107	0.157	0.578*	1	-0.088	-0.066	0.230*	0.092
PIKOM (12)	-0.146	-0.222*	0.264*	-0.153	0.118	-0.071	0.051	0.198*	0.223*	-0.010	-0.088	1	-0.007	0.179*	-0.025
Race (13)	0.212*	-0.145	0.084	-0.079	-0.046	-0.083	0.038	-0.058	-0.039	0.107	-0.066	-0.007	1	0.144	-0.030
Queen bee production (14)	0.174*	-0.161	-0.041	0.092	0.115	-0.107	0.299*	0.361*	0.082	0.392*	0.230*	0.179*	0.144	1	0.116
Queen bee change (15)	0.029	-0.083	-0.139	0.023	-0.022	0.069	0.143	0.238*	0.094	0.000	0.092	-0.025	-0.030	0.116	1

*:$p \leq 0.05$.

Table 4. Linearity statistics

Variables	Linearity statistics	
Yield (fixed)	**Tolerance**	**VIF**
Age	0.599	1.670
Education	0.574	1.742
Is beekeeping the main occupation?	0.639	1.565
Experience	0.500	1.999
Purpose	0.770	1.299
Beekeeping type	0.553	1.810
Number of hives	0.577	1.734
Getting an education	0.862	1.160
Membership	0.490	2.042
Support	0.525	1.904
PIKOM	0.732	1.365
Race	0.912	1.096
Queen bee production	0.652	1.535
Queen bee change	0.859	1.164

The regression model, with honey yield per colony as the dependent variable, was attempted to explain with 14 independent variables. The coefficients of the variables in the model were found to be significant and significant. The R^2 value for the model's explanatory power was 0.323, and the corrected R^2 value was 0.203. (Table 5). The model can be interpreted as explaining 20.3% of the change in the dependent variable by the independent variables added to the model and the remaining 79.7% by the variables not included in the model via the error term. The presence of heteroskedasticity, which is common in cross-sectional data, has been investigated. The multicollinearity problem was investigated, and it was discovered that there was no problem because the VIF (variation inflation factor) values were less than 10. A specification test was performed on the model once more, and it was determined that quadratic terms were unnecessary. The Durbin-Watson coefficient was found to be 2.072, indicating that there was no auto-correlation in the model (Kalayc 2014; evrimli 2017). Table 24 shows the parameter values for the independent variables obtained from the regression analysis, as well as their t statistical values and explanatory coefficients. The variables influencing honey yield are beekeeping technique, profession, and information obtained from the picom, in that order.

The following is the equation derived from Table 24:

$$\begin{gathered}\text{Y (honey yield per hive)} = 3.928 + age * 0.030 + professional\ experience * 0.114 - \\ number\ of\ existing\ hives * 0.002 + queen\ bee\ replacement * 0.075 + type\ of\ beekeeping * \\ 3.190 + educational\ status * 0.071 - beekeeping\ purpose * 0.315 + bee\ race * 1.868 - \\ is\ beekeeping\ the\ main\ profession * 2.470 + receiving\ education * 1.121 + \\ membership\ status * 2.716 + receiving\ support * 1.263 + \\ receiving\ information\ from\ PIKOM * 2.726 + queen\ bee\ production * 0.751 + \varepsilon\end{gathered} \quad (4)$$

The interpretation of the regression equation created above will be as follows: "age" 0.030, "professional experience" 0.114, "type of beekeeping" 3,190, "educational status" 0.071, "bee breed" 1.868, "training" 1.121, "membership status" 2.716, "support" 1.263, "information from picom" "receiving" will increase by 2.726 and "queen production" will increase by 0.751. In terms of honey yield per hive, "existing number of hives" will result in a 0.002 decrease and a change of "queen bee to 0.075. According to Uzundumlu et al. (2011), in a study conducted in Bingöl, the variables affecting honey yield were the operator's age, the total number of hives, whether the beekeeper was a traveler or a fixed beekeeper, the number of bee hives extinguished the previous year, and non-agricultural income. It was discovered that the honey yield per hive increased with the farmer's age and the number of hives. It has been determined that mobile beekeeping has a statistically significant positive effect on honey yield. The findings of the study were partially similar and partially different from the findings of Uzundumlu et al (2011). The study's findings were partially similar in terms of farmer age, wandering beekeeping status, and honey yield, but different in terms of number of hives and honey yield. In a study conducted by Öztürk (2013), it was discovered that there was an inverse relationship between the yield per hive and the number of hives, with the yield decreasing as the number of hives increased. The reason for this situation is thought to be that dealing with these hives is difficult in enterprises where the number

of hives is large and the desired importance is not demonstrated. The reason why yield was lower in producers with fewer hives than others was interpreted as more stable beekeeping. The findings of the study were identical to the findings of the Öztürk (2013) study. While the farmer's age and education level were not found to be statistically significant on honey yield in the same study, professional experience was. It is expected that as professional experience grows, so will the yield per hive. However, the study found that those with more than 30 years of professional experience have lower productivity per hive. The reason for this is that elderly people are tired of their nomadic lifestyle and struggle with beekeeping (Öztürk 2013; Esen and Özmen Özbakır 2023). In this study, beekeepers' age, education level, and professional experience had no statistically significant effect on honey yield per hive, but all variables increased honey yield. In his study, Öztürk (2013) discovered that it is critical to replace the queen bee in beekeeping and that not changing the queen bee or changing it late has a negative impact on honey yield. The analysis revealed that as the queen replacement period increased, honey yield decreased, and there was an inverse and significant relationship between the queen bee replacement period and honey yield. The study's findings are partially similar to the findings of the Öztürk study (2013). According to Şeviş (2018)'s study in Bingöl, there is a positive significant relationship between professional experience and productivity per hive. There is a statistically significant, inverse relationship between the number of existing hives and the yield per hive, and the yield per hive decreases as the number of hives increases. The queen replacement period and honey yield have been found to have an inverse and significant relationship, with honey yield decreasing as the queen replacement period lengthens. Wandering beekeepers have a positive and statistically significant effect on honey yield. While the number of existing hives has a significant effect in explaining the model, it has been determined that the variables of beekeeping style, queen change, and the number of individuals in the family have a significant effect, and the variable of professional experience has a lesser effect. The study's findings were partly similar and partly different from the findings of Şeviş's study (2018). The following is the interpretation for dummy variables: It has been concluded that there is an increase in honey yield per hive of migratory beekeeping enterprises, beekeeping is seen as the main occupation and a source of livelihood, continuing the activity with the Caucasian bee race, training, support, and information about beekeeping from the picom and queen bee production that are union members.

Table 5. Regression analysis results

Variables	β	Std. Error	Standardized β	T calculation value	P value
Fixed	3.928	3.567		1.101	0.274
Age	0.030	0.046	0.077	0.646	0.520
Professional experience	0.114	0.072	0.205	1.569	0.121
Number of existing hives	-0.002	0.003	-0.069	0.565	0.573
Queen bee change	-0.075	0.508	0.015	0.148	0.883
Beekeeping type	3.190	1.209	0.329	2.638	0.010***
Educational status	0.071	0.126	0.069	0.563	0.575
Beekeeping purpose	0.315	0.991	-0.034	0.318	0.752
Bee race	1.868	1.182	0.153	1.580	0.118
Is beekeeping the main occupation?	2.470	1.096	-0.261	2.253	0.027**
Getting education	1.121	0.958	0.117	1.169	0.246
Membership status	2.716	2.014	0.178	1.348	0.181
Status of receiving support	1.263	1.596	0.101	0.791	0.431
Receiving information from PIKOM	2.726	1.122	0.263	2.429	0.017**
Queen bee production	0.751	1.086	0.079	0.692	0.491
R^2=0.323; Adjusted R^2= 0.203; F(14.79) = 2.688; P value = 0.003					
Breusch-Pagan Test = 10.116; P value = 0.066; Ramsey Reset Test = 1.254; P value = 0.132					
Durbin Watson test value = 2.072					

*: 0,10, **: 0,05, ***: 0,01; Std. Error: Standart Error.

4. Conclusion and Recommendations

The findings, evaluations, and recommendations developed in this study, which was conducted using a questionnaire, in order to determine the current situation of beekeeping activities of the producers engaged in beekeeping activities in Bingöl, to reveal problems and determine solutions, and to determine the factors affecting the honey yield per colony, are summarized below. The model's variable coefficients were found to be significant. The R^2 value indicating the model's explanatory power was found to be 0.323, and the corrected R^2 value was found to be 0.203. According to the model, the independent variables added to the model explain 20.3% of the change in the dependent variable, while the remaining 79.7% is explained by variables not included in the model via the error term. The variables influencing honey yield are beekeeping technique, profession, and information obtained from the PIKOM, in that order. Each independent variable will increase by one unit in terms of honey yield per colony; "age" 0.030, "professional experience" 0.114, "type of beekeeping" 3.190, "educational status" 0.071, "bee breed" 1.868, "training" 1.121, "membership status" 2.716, "support" 1.263, and "queen production" will increase by 0.751. In terms of honey yield per colony, "existing number of colony" will result in a 0.002 decrease and "replacement of queen bees" will result in a 0.075 decrease. One unit change in each independent variable in terms of honey yield per hive; "age" 0.030, "professional experience" 0.114, "type of beekeeping" 3.190, "educational status" 0.071, "bee breed" 1.868, "training" 1.121, "membership status" 2.716, "support" 1.263, "PIKOM" will provide an increase of 2,726 and "queen production" will provide an increase of 0.751. In terms of honey yield per hive, "existing number of hives" will result in a 0.002 decrease and "replacement of queen bees" will result in a 0.075 decrease. It has been concluded that there is an increase in honey yield per hive of migratory beekeeping enterprises, beekeeping is seen as the main occupation and a source of main income, continuing the activity with the Caucasian bee breed, training, support, and information on beekeeping from the queen bee, which are union members. One of the most important factors affecting honey yield is climate and flora characteristics. It is extremely important to analyze these factors by including them in the model. With the increased number of hives, it is possible that the COVID-19 pandemic, the lack of attention to the hives, the implementation of restrictions, and the current situation caused by the pandemic are all effective in reducing honey yield. Following are some recommendations based on these findings. It is critical to expand wandering beekeeping in Bingöl, to continue the activity with the Caucasian bee race, and to increase the number of enterprises that receive picom beekeeping training, support, and information, become union members, and produce queen bees. Efficiency in hive management and resource use should be ensured as a result of new production planning. Producers' queen bee needs can be met by establishing specific queen rearing centers or increasing the number of established centers in Bingöl province or neighboring provinces. Thus, even if not directly, an increase in honey yield can be achieved indirectly. Given Türkiye's ecological richness and existing rural economic conditions, beekeeping should be done in an organized, conscious, and sustainable manner.

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