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Financial evaluation of the natural bee honey project and the most important factors affecting it in Qena governorate

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ABSTRACT

The importance of bee breeding is manifold, in addition to the fairy profitability invested in these projects, it has nutritional importance represented in the production of natural honey, wax, royal jelly, pollen, bee venom, as well as the role of the bee insect in pollinating many agricultural crops, the problem of the study is the lack and difficulty of increasing the production of honey bees and the inability of productivity of their homes, which led to high prices and low quality in Qena governorate. Therefore, the research aimed to study the nature of the functions of honey bee production, the most important measures of economic efficiency in the various production capacities of honey bee apiary projects in the research sample in Qena governorate for a year 2021, in addition to studying the financial evaluation of those projects in Qena governorate. The study showed that the criteria for the financial evaluation of the honey bee project were that the return on the pound invested from the costs of the hive in the three capacities of the research sample amounted to about 1.72, 1.99, and 1.59 for production capacities on the order. And that the average annual income per pound invested for the project for the three capacities has reached about 10.35%, 14.18%, and 8.47% for the cell. And that the break-even point for revenues and costs was about 3.51, 2.64, 3.52. The production safety limit was estimated to have reached three capacities in a row 60%, 70%, and 59%. It also turns out that the ratio of benefits to costs of the enterprise at a discount rate of 15%. It amounted to about 1.72%, 1.99%, and 1.59% for the three stings in a row. The study recommends (Providing good breeds of Queens and packages of bees, providing medicines, vitamins and good proteins for honey production apiaries in the governorate, motivating and encouraging honey producers in Qena governorate to form marketing associations, work on setting up marketing centers, opening new markets and promoting honey apiary products, providing banks and the Social Fund for development in Qena governorate with the necessary funding for the expansion of honey bees in the province with facilitated procedures.

Keywords: Honey bees, financial assessment, feasibility study.

Introduction

Accommodation the bee breeding project and the bee kingdom is one of the most important agricultural investment projects because it does not need a large capital or an area of land, it features The bees rely on themselves for their life requirements most of the time, which leads to reducing the costs of caring for them, especially with the diversity of crops grown. Quick and easy compensation of losses of Project Units .The purposes of bee breeding are also manifold, including the production of natural honey, wax or the production of royal jelly, on the other hand, bee venom, as well as the role of the bee

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insect in pollinating many agricultural crops, especially fruit crops, medicinal and aromatic plants, etc. Which contributes to increasing the production of these crops and thus increasing the individual income of producers of these crops (Abdel Latif, 1994). In addition to the nutritional importance of bee honey, where its nutritional and pharmacological importance appears, as it contains 40.5 % fructose sugar,34 % Glucose sugar, about 1.5 % sucrose sugar, 17.7 %Water, 6.3 %Mineral substances, honey is a source of energy for the body, a sedative for nerves, prevents the growth of bacteria and leads to killing them with its natural antibiotics, and is considered a natural laxative and antiseptic for the intestines and is useful in the treatment of chest diseases for humans, as well as treats many other diseases (Ali, 2022).

In addition to the economic importance of bee honey, where bees produce honey products, beeswax, royal jelly, pollen, bee venom, and others, which is introduced by humans in many industries, where beeswax is considered a flammable material, as well as beeswax is used in the wood and leather industry, and many cosmetics for women and other industries (Abo El-Nag and Abdelghfar, 2011).

The search problem

The problem of the research is that despite the profitability of investment in the field of bee breeding, the speed of capital turnover in it and the availability of natural sources of nutrition for it in Qena governorate, but the shortage and difficulty of increasing the production of honey from bees and the inability of apiary owners in the governorate to expand the production capacities of them.

Where it was noted that the number of exocrine cells in Qena governorate during the study period began to decrease, from 18.14 a thousand cells a year 2006 to get to 17.26A thousand cells at the end of the period a year 2020, and the level of statistically significant annual decline was estimated at about 44.05 a thousand cells, equivalent to about 4.28 %. The average number of cells is about 1029.34 A thousand cells during the study period .It was also noted that the production of honey bees in Qena governorate during the study period fluctuated continuously, it ranged from a general minimum 2019 where it reached about 94 Tons, maximum per year 2007about me 185.2 Tons, with an average of about 135.83 tons during the study period.

Objectives of the study.

The research aims to identify the feasibility of investing in the field of honey production projects in Qena governorate by achieving the following sub-goals.

1- Studying the nature of the functions of bee honey production and the factors affecting it at different production capacities in the research sample.
2- Studying the most important measures of economic efficiency in the various production capacities of honey bee apiary projects in the research sample.
3- Studying the financial assessment of honey apiaries in Qena governorate to determine the feasibility of establishing these projects or not.

Theoretical analytical framework and research method

The study was based on the use of the two methods descriptive and quantitative inductive economic analysis of the data related to the study, and the regression analysis method was also used to estimate the general trends and logarithmic productivity functions of various statistical variables related to the study, and the study also relied on the use of some measures related to the financial evaluation of:

- **The productive function**

Define the productive function (Ali, 2010) it is the relationship between the production elements used by the production unit, and what these elements produce from various products, and the production function assumes the use of the best technological means in the enterprise, meaning the enterprise follows the most efficient method in the production process, and the study of production functions is useful in familiarizing the technical relationships between the production elements used in the production process, and To those elements and thus achieve the maximum possible return from the productive process.The general picture of the production function is as follows:

$Y=a(x_1, x_2, x_3 \ldots .. x_n)$……(1)

Where :Y Expresses the quantity of production as a dependent variable, While each of $(x_1,x_2,x_3 \ldots .. x_n)$ On the quantities of production elements involved in the production process as independent variables. There are many other images and algebraic equations for estimating production functions and are considered the Cobb-Douglas function Cobb-Doglass It is the most commonly used and takes the following picture:

$Y=a(x_1^{b1}, x_2^{b2}, x_3^{b3} \ldots . x_n^{bn})$……..(2)

Where :Y Expresses the quantity of production as a dependent variable, While $(x_1^{b1}, x_2^{b2}, x_3^{b3} \ldots . x_n^{bn})$ Independent variables, It is the quantity of elements used in production, While a,b Constants.

And the logarithmic form of the function is:

$\text{Log } Y=\text{Log } a+b_1\text{Log } X_1 +b_2\text{Log } X_2+b_3\text{Log } X_3 \ldots\ldots+b_n\text{Log } X_n$…….(3)

It is preferable to use the Cobb function when estimating agricultural production functions -Douglas because it is the most suitable for the nature of agricultural production .To achieve productive efficiency, two basic conditions must be met:

The necessary condition

It means mixing productive elements in a certain way so that they cannot be remixed to obtain a larger amount of production using the same amount of resources, or to obtain the same amount of production using less resources.

Sufficient condition

It is achieved when price relations and production elements are taken into account so that the maximum possible profit can be obtained, thereby facilitating production decision-making to achieve production efficiency.

- **Financial evaluation of projects**

Classification of financial evaluation criteria according to the introduction of thetimeelement in the calculations into two types, namely:

A. Non-discounted criteria for the financial evaluation of projects (Abdul Majid, 1996)

It relies on these metrics in not taking into account the impact of time on the value of money throughout the life of the project when calculating both benefits and costs

1. **Standard net cash flow or total net income** Net Benefit value (NBV) =Total revenue – total costs.
2. **Annual net income standard** = Total net income project economic life of the project.
3. **The norm of the capital recovery period Pay-back period** =Total invested capital ÷Annual net income.
4. **The criterion of return on the invested pound of costs** = Total annual net income total cost.
5. **The standard of the annual income rate** = Annual net income ÷ Total costs x 100, Or =(Total annual net income/ Project life) ÷ Total costs × 100.

The criterion of the amount of Equalization of revenues and cost

It is the amount of production at which both the total revenue and the total costs of the enterprise are equal .It is equal to the fixed costs of production (Average selling price of the produced unit – the average variable costs of the produced unit).

Production safety limit standard

It is used to determine the sensitivity of the project to a decrease in production capacity due to unfavorable conditions from environmental, climatic and biological factors or to a decrease in the production efficiency of the project .Production safety limit (=Average annual production quantity - The amount of production at the breakeven point of revenues and costs÷)Average production quantity.

B. Discounted criteria for financial evaluation of projects

These metrics are based on the general concept of the discount principle, or when certain discount rates represent the opportunity expense available for capital investment. Opportunity Cost of capital That is, these criteria take into account the impact of time on the value of money throughout the life of the project when calculating both benefits and costs, depending on the discount method and the specified discount rate. It is the rate that commercial banks discount when they make a borrowing operation. Three indicators are used for the financial evaluation of the project. Using the mathematical relationship between the present values of revenues and costs, the results of the discounted financial evaluation criteria were derived as follows:

1. **The ratio of present benefits to costs** (Nassar, 1978) Benefit/ Cost Ratio: = {Present value of benefits ÷ Present value of costs} In order for the project to be profitable, this percentage must be greater than the correct one.

2. **Net present value of the project(NPV)** (Nassar, 1978): It is the total expected net returns during the life of the project discounted on the basis of the cost rate of funds and calculated from the following equation: Net present value = {Present value of benefits - Present value of costs } In order for the project to be profitable, this ratio must be positive or greater than the correct one, and the higher this value, the greater the profitability of the project

3. **Internal rate of return(I.R.R)** (Abdul Hadi, 2013) **:** It expresses the profitability of the project and is defined as the discount rate at which the net present value of the project is equal to zero, meaning the ratio of return to costs is the correct one, and it is considered one of the best criteria used in differentiating between different projects, if the internal rate of return is higher than the prevailing interest rate in banks (positive) accepts the project and recommends investing in such an area .This criterion is calculated from the following equation:

Internal rate of return(IRR)=The smallest discount rate + [The difference between the two discount prices× (present Benefit value of The smallest discount price ÷ total present Benefit value of The smallest and greatest discount prices)].

Data sources

To obtain the necessary data, the study relies on two main sources of data, namely published and unpublished secondary data collected from statistical bulletins issued by the central agency for public mobilization and statistics, the Ministry of Agriculture and land reclamation, the Information Center and the Statistics Department of the Directorate of Agriculture in Qena, and the research also relied on preliminary data collected from a field sample of by conducting a field survey on the producers of honey bees in the governorate of Qena agricultural season 2021/2022.

First of all :Determination of the study sample

The sample size was determined using the Cochrane equation (Israel, 1992). by which the sample size can be determined .This is done after calculating the confidence interval using the equation:

$$\pm 1.96 \times \sqrt{\left(\left(\frac{p(1-p)}{n}\right)\left(\frac{N-n}{N}\right)\right)}$$

Where (1.96) :Is a value Z The normative score corresponding to the confidence level 95%, the level of accuracy required in the search results, b Potential response rate, N Community size, PIs the probability value equal to 0.05 .From the above equation, the volume of the first sample can be calculated (n) From the following equation:

$$n = \frac{1.96^2\, pN(1-p)}{0.15^2\, N + 1.96^2\, p(1-p)}$$

Where: PIs the probability value and is equal to0.05, n Is the number of questionnaires and the size of the first or survey sample, where it amounted to 12 Apiaries of the research sample, N Is the size of the adult community 449 Dissolved in Qena governorate.

$$n = \frac{(1.96)^2 (0.5)(449)(1-0.5)}{(0.15)^2 (449) + (1.96)^2 (0.5)(1-0.5)} = 38.98$$

To determine the sample size "C "Required to be withdrawn from a community (Number of apiaries in Qena governorate) And the adult N=449, The response rate has been determined "b "Which is equal to (1-Non-response rate) This is as follows:

$$b = 1 - \frac{5}{12} = 0.583$$

From which the value is calculated c:

$$c = \frac{n}{b} \qquad c = \frac{39}{0.583} = 66.90 \cong 67$$

From this it turns out that the sample size required to be withdrawn amounted to 67 Dissolved in Qena governorate.

Second : Designing the questionnaire form

The data for the sample were compiled through a questionnaire form for each of the vocabulary items by the personal interview method, During the agricultural season 2021/2022,and consideration in the design of the form led to the achievement of the objectives of the current study, The questionnaire form has been testedpre-test For a number(12)Questionnaire forms were distributed to the governorate centers by (3) Forms for each center, To ensure clarity of questions to farmers, And also make sure that the form contains all the objectives of the study, The form has been amended to meet all the objectives of the study.

Third :Characterization of the research sample

From this it turns out that the sample size required to be withdrawn amounted to 67 Dissolved in Qena governorate .A stratified sample was drawn from the four most important centers of Qena governorate for the agricultural season 2021/2022, According to the weight and relative importance of the number of apiaries in each center and according to the geographical distribution of those centers in Qena governorate as shown by the data of table no. (1) By extension, the sample to be withdrawn has been distributed (67 Promiscuous). The centers of Abu Tesht, Qena, Qus and Naqada, and were divided according to their relative importance, so that each center amounted to about 23, 22, 6, 16 dissolved as shown by Table No (1) .It was also found that the bee load in the Qena governorate of the most important flowering crops (balady clover, hijazi, citrus, banana, fennel, sesame) Reported 0.75, 3.51, 12.97, 0.04, 1.54, 0.06Acres for each of the cells of Qena governorate, while the acre load of the total flowering crops in the four sample centers of the study amounted to 0.70, 1.51, 1.83,0.28 Acres for each of the cells of these centers in order.

Then they were studied by comprehensive accounting after dividing them into three production capacities according to the number of cells (Energy Operational) apiary .The first production capacity includes apiaries with a production capacity of 20 fewer and fewer cells this capacity has reached about 12 A hive, then the second production capacity, which includes apiaries with a production capacity of 20 cells to 40 cells, this capacity has reached about 27 cell, finally, the third production capacity, which includes apiaries with a production capacity of more than 40 cells this capacity has reached about 50 cell.

Table 1: Distribution of the sample and the size of the bee load of flowering crops in Qena governorate during the season(2021/2022).

The center	Questionnaire form pre-test	Number of items per sample Promiscuous	Balady Clover	Clover Hijazi	Citrus	Bananas	The Bee load (Acres /Cell)		
							Fennel	Sesame	Total flowering crops
Abu Tesht	3	23	0.53	0	10.97	0.02	0	0.03	0.7
Qena	3	22	0.44	7.21	7.17	0.08	15.69	0.04	1.51
Qus	3	6	1.73	1.69	1.7	0	0.09	0.03	1.83
Naqada	3	16	0.13	0	1.69	0.01	0.97	0.06	0.28
Total	12	67	0.75	3.51	12.97	0.04	1.54	0.06	1.25

Source: Collected and calculated from the Ministry of Agriculture and land reclamation, records of the information center of the Directorate of Agriculture in Qena.

The most important results of previous studies in the field of bees

An economic study of bee honey production in Beheira governorate, to estimate the functions of bee honey production in Beheira governorate, and to study the productive and economic efficiency of honey production in it, showed that each of the variable masks and chimneys represent about more than 70% Of the fixed costs at the sample level, and that both drugs, packaging, sugar nutrition and maintenance account for more than 80% Of variable costs, and that the average kilogram of honey is about 47 Earn it in the three productive categories, (Less than 100 Cell) ,(100 Cell to Cell) ,(200 Cell and more),The average return on invested pounds was estimated at about 1.20, 1.18, 1.23 Put them in categories in order, while estimated at about 1.20 The total sample, while the relative profitability amounted to about 53.79, 63.60, 47.51The categories of the study sample are in order, and about 54.96 In the total sample of the study, the third category was achieved(200 Cell and more)The highest return on the invested pound, and the second category has the highest relative profitability (El-Tatawy *et al.,* 2019).

The study of the financial analysis of honey bee products projects in Sohag governorate has found the following categories (Less than 50 Cell) ,(50-100 Cell) ,(100 Cell and more) The internal rate of return for these projects is estimated at about 27.23%, 32.01%, 63% In order, that this rate is greater than the interest on capital and the amount is about 10%. Therefore, such projects are financially feasible, however, projects with large cell numbers are more feasible than their counterparts .The average speed of capital turnover for these categories amounted to about 3.57, 3.12 and 2.43 One year in a row, meaning that these projects can recover their invested funds through revenues obtained from their production activity within a period of time less than 4, 4, 3 Approximately one year in a row, provided that the prices of both productive resources and production are stable (Ali, 2022).

In an analytical economic study of honey bee production in Assiut governorate, it was shown that the fixed costs amounted to about 389.39 thousand pounds, while the variable costs amounted to about 1236.82 thousand pounds, and the total cost has reached about 1626.21 thousand pounds, and the total return is about 3660.8 thousand pounds, while the return-to-cost ratio was about 2.25, and the net yield amounted to about 2034.58 thousand pounds per year, while the return of the invested pound amounted to about 1.25 .It is a financial assessment according to discount rates 10%, 15% It turned out that the ratio of benefits to costs amounted to about 1.76%–1.57%. Accordingly, while the current value of net benefits has reached about 13.55 and 8.40 million pounds, respectively, while the Internal Revenue Rate was about 13.08% As for the payback period, it amounted to about 7.64 years. The production efficiency of the honey bee production project was estimated in the adult study sample 120 From the solution, it was shown that the number of cells amounted to about 8920 The total production is about

73216. The average production is about 7.50 Kg/It also shows that the average amount of sugar is about 11.14 Kg/The average number of working hours is about 43.90 An hour, and the average number of years of experience amounted to about 11 Year, the average variable costs amounted to about 10.30 thousand pounds, and the average total costs amounted to about 13.55 thousand pounds, and the average farm price was about 50 Egyptian pound (Ismail *et al.,* 2022).

Results and Discussion

First: The most important physical indicators of the honey bee apiary project at the level of production capacities in the study sample in Qena governorate during the season:2020/2021

After collecting the data for the sample through a questionnaire form for each of the vocabulary in the manner of a personal interview, During the agricultural season 2021/2022,The following are 67 It was divided according to the relative importance, so that each Center amounted to about 23, 22, 16.6 Dissolved as shown by Table No (1) and by load Bumblebee For the total flowering yields of these four centers 0.70, 1.51, 1.83, 0.28 Acres for each of the cells of these centers in order, then divide them into three production capacities according to the number of cells produced operational capacity(apiary). The first production capacity includes apiaries with a production capacity of 20 Fewer and fewer cells have reached this capacity, which is about 28 Apiary, then the second production capacity, which includes apiaries with a production capacity of 20 Cell to less than 40 The cell has reached a capacity of about 21 apiaries, and finally, the third production capacity, which includes apiaries with a production capacity of about 40 Cell and more, this capacity has reached about 50 Cell. The following is a study of the quantities of resources used in the production of bee honey for apiaries of the research sample, their impact and the extent of efficiency of their use in the production process, as follows:

1. **The average number of cells used in apiaries of different production capacities :** The study found that the average number of honey bee hives has reached a third production capacity of about 50 cells (it came in first place) and also reached the second production capacity of about 27 cells (apiary occupied second place), then the first production capacity by about 12 cells (promiscuous).

2. **Average number base wax units used in apiaries of various production capacities :**It turned out that the average number of foundation wax units used in the third production capacity was about 484.The unit ranked first, followed by the second production capacity, which ranked second at about 271 units, and then the first production capacity at about 118 units.

3. **Average number Sugary nutrition units with apiaries of different production capacities:** It turns out that the average number of units Sugary Nutrition The third production capacity was about 503 The unit ranked first, followed by the second production capacity ranked second about178 Unit, then the first production capacity is about 105 units.

4. **Average number Protein feeding units with apiaries of different production.** It turns out that the average number of units of protein nutrition The third production capacity reached about 53. The unit ranked first, followed by the second production capacity, about 46 units, and then the first production capacity, about 12 units.

5. **The amount of bee honey production at different production capacities in the study sample :** The study found that the amount of bee honey production for the research sample in Qena governorate 67 The apiary has reached the third production capacity of about 433 Kilograms/Promiscuous and came in first place as shown in table (2) Followed by the second category, then the first by about 105, 237 Kilograms/Decadent on the order.

Table 2 : The physical average of the most important production requirements for honey bee apiaries at the level of production capacities in the study sample in Qena governorate during the season 2020/2021.

Production requirements		The first production capacity	Second production capacity	The third production capacity
Number of cells) Cell	Number of apiaries	28	21	18
	Average	12	27	50
Number of foundation wax units (Unity)	Number of apiaries	28	21	18
	Average	118	244	494
Amount of sugar in the apiary (Kilograms)	Number of apiaries	28	21	18
	Average	105	178	503
The amount of protein feed in the apiary (Kilograms)	Number of apiaries	28	21	18
	Average	12	46	53
Production quantity (Kilograms/Promiscuous)	Number of apiaries	28	21	18
	Average	105	237	433

Source :Collected and calculated from the table from the data of the questionnaire forms for the research sample in Qena governorate for the season 2020/2021.

Second: Statistical estimation of the production functions of honey production projects in Qena governorate.

This part of the study is interested to get acquainted with how the use of limited resources is organized to produce the maximum possible amount of production, thereby obtaining the maximum possible profit .The apiary production of bee honey was represented by fennel, Clover, banana and Sidr varieties, where it was possible to estimate the productive functions to find out the relationship between the total amount of apiary production of bee honey in kilograms" Y "As a dependent variable on the one hand, and between each of the independent variables affecting production and represented by both(Number of cells per cell" X_1 ", The number of base wax units"X_2", The amount of sugary nutrition in kilograms" X_3",The amount of feeding Proteinuria In kilograms" X_4",The number of parcels in the apiary"X_5",The number of workers in the apiary"X_6 ") As independent variables on the other hand.

To find out the extent of the impact of these factors on the amount of production of bee honey in the research sample with the three production capacities under study, the study used the logarithmic phased picture because it is consistent with the economic and statistical logic, and by the results of the graded logarithmic model (Step-Wise) as shown Schedule (3) For the three stings.

First production capacity(Less than 20 Cell)

The results obtained for the first production capacity have yielded (less than 20 cells) about the existence of a statistically significant positive direct relationship between the amount of the apiary's total honey production and the number of cells in the hive "X_1",The number of base wax units"X_2",Where it turns out that by adding 1% to this variable, with the constancy of the rest of the factors, leads to an increase in the amount of honey production in the apiary by about 0.780%, 0.217 on the order.

The parameters of the total elasticity of these variables also indicated a value of about 0.997. It is considered the rational stage for the owners of apiaries in Qena governorate, where the productivity function is characterized at that stage as a decreasing function and the total flexibility of it is less than the correct one, and this means the rule of diminishing return on capacity, in which production increases by less than the increase in the quantities used from productive resources, and that economic resources have been optimally exploited in those apiaries. The value of the adjusted determination coefficient is also estimated (R^{-2}). Which shows that these variables are responsible for explaining about 99.96% of the recent changes in the amount of production of honey bees with this production capacity.

Table 3: Statistical estimation of the honey production function in conservative apiaries Qena Sample study during the season 2020/2021.

Production capacity	The physical productive function in its logarithmic form	F	R-2	Overall flexibility
First	Log Y= 1.68 + 0.780 LogX1 + 0.217 LogX2 *(2.54) **(9.29)	35302**	0.99	0.997
Second	Log Y= 2.50 + 0.924Log X1- 0.016 Log X2 **(403.7) **(-5.70)	172166**	0.99	0.914
Third	Log Y= 2.41 + 0.83 LogX1 + 0.11 Log X4 **(6.81) **(47.70)	12689**	0.99	0.935

Where **Y** indicates^E indicates the value of the phenomenon under study 0 **X** denotes the element of the productive function.
Both indicate **R-2** ,**F** to the coefficient of determination, the value of **F** Calculated in order .The numbers in parentheses indicate the values of) T (Calculated,
She points (**) My morale is at a level 0.01
Source :Collected and calculated from the table from the data of the questionnaire forms for the research sample in Qena governorate for the season 2020/2021.

Second production capacity(From 20 To less than 40 Cell)

As estimated by the productivity function for the second production capacity (from 20 to less than 40 cells), it has been shown that there is a statistically significant positive direct correlation between the amount of apiary production of honey and both the number of cells "X_1", and a negative inverse relationship between the amount of apiary production and the number of base wax units"X_2",Where it turns out that an increase of about 1% From each of the factors affecting production with the constancy of the rest of the factors leads to an increase in the amount of honey production in the apiary of about 0.934% and a decrease in the amount of about 0.016% on the order.
The parameters of the total elasticity of these variables also indicated about 0.908. It is also located in the second stage of the law of variable ratios, which is considered the rational stage for the owners of apiaries in Qena governorate, and the rule of diminishing returns on capacity, in which production increases by less than the increase in the quantities used of productive resources, and that economic resources have been exploited optimally in those apiaries. The value of the adjusted determination coefficient is also estimated (R^{-2}) Which shows that these variables are responsible for explaining about 99.99% From the recent changes in the amount of production of honey bees with this production capacity.

Third production capacity (40 Cell and more)

The production function of the third production capacity was also estimated (40 cells and more), where it was found that there is a statistically significant positive direct relationship between the amount of apiary production of honey and both the number of cells per cell "X_1",The amount of protein nutrition in kilograms "X_4",Where it turns out that with an increase of about 1% from each of the factors affecting production with the constancy of the rest of the factors leads to an increase in the amount of honey production in the apiary of about 0.83%, 0.11% on the order.

The parameters of the total elasticity of these variables also indicated about 0.935. It is also located in the second stage of the law of variable ratios, which is considered the rational stage for the owners of apiaries in Qena governorate, and the rule of diminishing returns on capacity, and that economic resources have been exploited optimally in those apiaries. As indicated by the value of the adjusted coefficient of determination (R^{-2}), these variables are responsible for explaining about 99.93% of the changes in the amount of production of honey bees with this production capacity.

Third: Indicators of economic efficiency of bee honey production for production capacities in the study sample in Qena governorate during the season 2020/2021:

The condition for achieving the maximum efficiency of the use of resources in the production process must be economic efficiency equal to the correct one in the sense that the value of the marginal output of the resource used is equal to the unit price used from it .The study estimated the coefficient of economic efficiency as shown by the data in Table (4) For the resources used in the production of honey bees in the three production stings in Qena governorate:In the first production capacity, it turned

out that the coefficient of economic efficiency of the variables of the number of cells and base wax units is greater than the correct one, which means increasing the efficiency of using those resources and there is an opportunity to further intensify the use of these resources in the production process to obtain the maximum return.

As for the second production capacity, it turned out that the coefficient of economic efficiency of the variable of the number of cells is greater than the correct one, and this means increasing the efficiency of using this variable, and there is an opportunity to further intensify its use in the production process, it also turned out that the coefficient of economic efficiency of the variable The variable in the production process.

In the third production capacity, it turned out that the coefficient of economic efficiency of the variables of the number of cells and the quantity of protein nutrition this means increasing the efficiency of using those resources and there is an opportunity to further intensify the use of these resources in the production process to get the maximum return.

Table 4: Indications economic efficiency for the production of bee honey for production capacities A sample of the study in the apiaries of Qena governorate during the season 2020/2021

Variants	The first capacity		Second capacitance		The third capacity	
The statement	Number of cells (The cell)	Foundation wax (Unit)	Number of cells (The cell)	Foundation wax (Unit)	Number of cells (The cell)	Protein nutrition (Kg)
Flexibility(Relative impact)	0.78	0.217	0.924	-0.016	0.826	0.109
Average production	8.75	0.89	8.778	0.971	8.66	8.17
Marginal product(Marginal impact)	6.825	0.172	5.811	-0.016	7.153	0.89
Average The price of a kilogram of honey	135.01	135.01	134.6	134.6	134.67	134.67
The value of the marginal product	921.44	23.22	782.16	-2.15	963.29	119.86
Unit price of the item	700	5.5	700	5.5	700	80
Coefficient of economic efficiency	1.32	4.22	1.12	-0.391	1.38	1.5

Source :Compiled and calculated from the table From the data of the questionnaire forms for the research sample in Qena governorate for the season 2020/2021.

Fourth :Financial feasibility of honey production projects in Qena governorate.

The inputs or costs of honey production in Qena governorate are divided into two parts: the initial capital costs represented by the fixed costs of the project, which are the amounts spent regardless of production, and included capital assets such as the value of each of the project's land, equipping buildings, wooden cells and Braziers, drum and stand, base wax spawn, sorting and sorting tools, tools Beekeeper, nutritionist .The economic life of the project was also considered to be seven years.

The second section is the variable costs, which change depending on the volume of production, and included the value of each of the bee packages, sugar and protein nutrition, vitamins, medicines and serums, Labor, picking and sorting costs, the costs of transporting packages and production, packages, in addition to the annual maintenance costs, and various honey production projects have been evaluated according to the data extracted from the questionnaire form prepared for this purpose according to three production capacities as shown in Table (5), The results of which were as follows:
Where the costs and revenues of honey apiaries in Qena governorate indicate that the average number of hives in the first capacity (Less than 20 Cell), about 12 the average fixed costs of the cell during the economic life of the project (7 Years) About 247 pounds, and its variable costs averaged about 580 EGP per cell, the average total costs are about 827 EGP per cell, the average total revenue is about 1427 EGP per cell, the average net revenue per cell is about 600 pound .

Table 5: The Costs and returns for the production of annual honey production for research sample apiaries in Qena governorate for the season 2020/2021.

Item	Less than 20 Cells		From 20 To less than40 Cell		40 Cell and more	
	The sample	The cell	The sample	The cell	The sample	The cell
Average number of cells	12	1	27	1	50	1
First: The Annual costs for the production of bee honey by sample						
1. Fixed costs						
Land rent	375	31.25	500	18,52	522	10,44
The cost of buildings	165	13.75	243	8.99	306	6.11
The value of cells, the base and the cover of the cell	1640	137	3760	139.26	6999	140
The cost of brogues	200	16.67	452	16.75	875	17.5
Base wax	218	18.17	498	18.43	922	18.44
The cost of food	40	3.33	90	3.35	168	3.36
Sorting and sorting tools	300	25	300	11.11	300	6
Convictions	29	2.42	50	1.85	81	1.63
Total annual fixed costs	**2967**	**247**	**5893**	**200**	**10173**	**193**
Fixed costs during the life of the project	19755	1646	31129	1153	51443	1029
2. Variable costs						
The cost of parcels and replacement of Queens	1250	104	2764	102.38	5078	101.6
Employment	1875	156	2595	96.12	12950	259
Sugary nutrition	1624	135	3664	136	7542	151
Protein nutrition	960	80	2171	80.42	4200	84
Drugs and serums	80	7	178	6.6	331	6.62
Cost of refills	360	30	814	30.16	1508	30.17
The cost of picking and sorting	525	44	1046	39	980	20
Parcel transportation	169	14	340.5	12.61	622	12.44
Maintenance cost	120	10	271	19	481	30
Total annual variable costs	**6963**	**580**	**13843**	**522**	**33692**	**695**
Total annual total costs	**9930**	**827**	**19736**	**722**	**43865**	**888**
Second: Annual revenues for the production of bee honey by sample						
The amount of fennel honey produced	35	3	80	3	149	3
Fennel honey production revenue (Averageprice per kilogram 120 Fairy)	4200	350	9629	357	17833	357
The amount produced from Balady Clover honey	30	2.51	69	2.6	124	2.48
Municipal alfalfa honey production revenue (Average price per kilogram 100 Fairy)	3013	251	6905	256	12389	248
The quantity produced from Hejazi clover honey	30	2.5	69	2.6	124	2.5
Production of alfalfa honey (Average price per kilogram 100 Fairy)	3013	250	6905	256	12389	248
The amount of banana honey produced	20	1.65	44	1.63	80	1.61
Production revenue of honey alfalfa banana (Average price per kilogram 100 Fairy)	1975	165	4405	163	8028	161
The amount of Sidr honey produced	20	1.65	44	1.63	80	1.61
Production of honey Clover Sidr (Average price per kilogram 250 Fairy)	4938	411	11012	408	20069	401
Total production of honey	105	8.75	237	8.78	433	8.66
Total annual total revenue	14125	1427	38855	1439	70708	1414
Annual net income	4195	600	19119	717	26843	527

Source :Compiled and calculated from the table from the data of the questionnaire forms for the research sample in Qena governorate for the season 2020/2021.

The average number of cells with a second capacity was also (from 20 cells to less than 40 cells) about 27 cells. As the average fixed costs of the cell is about 200 pounds and its variable costs averaged about 522 EGP per cell, the average total costs are about 722 EGP per cell, the average total revenue is about 1439 EGP per cells, the average net revenue per cell is about 717 pounds. The third capacity (40 Cell and more) The average number of cells is about 50 Cells, as the average fixed costs of the cell is about 193 pounds and its variable costs average about 695 EGP per cell; the average total costs are about 888 EGP per cell, the average total revenue is about 1414 EGP per cell, the average net revenue per cell is about 527 pounds.

Fifth: Financial analysis of projects honey bee apiaries in Qena governorate

The aim of conducting this assessment is to address the outflows and inflows, or revenues and the actual costs of the project after its implementation and to find out the deviations between the planned results before its implementation and the actual.

The financial analysis of the project is intended to study the financial conditions in light of the price levels applicable in the market, whether for project revenues or costs of various types, meaning that the financial analysis is conducted to judge the ability of the project as a commercial enterprise to meet the required financial obligations, and this part of the study deals with the most important components of apiaries and financial evaluation metrics in normal circumstances, which include some of the discounted and non-discounted criteria for the financial evaluation of projects, as follows:

1. Non-discounted criteria for the financial evaluation of projects

It is based on comparing benefits with costs in each year of the life of the project without taking into account the impact of time on the value of money throughout the life of the project as a criterion of net oil flows. Net Benefit value (NBV)Annual net income and capital recovery period Pay-back period The return on the invested pound and the average annual income. The criterion of the amount of equivalence of revenues and costs Breakeven Point Production Safety Ratio.

It is shown from the data of the table no. (6) The net cash flows of the cell during the life of the project amounted to about 497, 5018, and 3686 pounds for the three stings in a row and an average of about 4300 pounds for the three capacities; thus we conclude that the second capacity is the highest net profit. It also turned out that the recovery period of the capital invested in the project amounted to about 2.55, 3.59, and 2.73 years for the cell with three capacities in a row, and an average of about 2.96. From this it becomes clear that the investment in the first capacity recovers the costs that he spent on his project in a shorter period of time.

By estimating the rate of return on the invested pound of costs for the cell in the three capacities of the research sample, it turned out that it has reached a ratio of about 1.72, 1.99, and 1.59 for the production capacities on the order, with an average of about 1.76 for three capacities, the second capacity is better, as an investor achieves earlier and faster income for the project.

It also turned out that the average annual income per pound invested for the three capacities has reached about 10.35%, 14.18%, 8.47% For a cell, an average of about 10.80 For the three capacities, it is clear that the second capacity has the highest annual income rate.

By estimating the break-even point criterion for revenues and costs Break Even Point It turns out she's about 3.51, 2.64, and 3.52 from this it turns out that the second capacity is the best because it is the lowest production quantity, the total revenue is equal to the total costs of the project, and this means that when producing 14.18 kilogram is equivalent to 30.05% From the production capacity of the project, it may be expected that the project will not achieve profits or losses, and the average amount of breakeven per sample has reached about 3.22 for the three stings.

It was also found by estimating the production safety limit that it reached three capacities in a row 60%, 70%, and 59% from this it becomes clear that the second capacity is less sensitive to a decrease in the production capacity of the project due to inappropriate conditions in the sense of the production safety limit of this capacity shows that the production capacity of the project can decrease by 70 % without getting into the zone of losses.

2. Discounted criteria for financial evaluation of projects

These metrics are based on the general concept of the discount principle or when certain discount rates represent the opportunity expense available for capital investment Opportunity Cost of

Capital That is, these criteria take into account the impact of time on the value of money throughout the life of the project when calculating both benefits and costs, depending on the discount method and the specified discount rate (It is the rate that commercial banks discount when they carry out the lending process),The table data shows a number (7) Where it turns out that the ratio of benefits to costs at a discount rate10%, 15 %It amounted to about 1.72%, 1.99%, 1.59% For the three stings in a row .Which indicates that the second capacity of the project is more profitable than the first and second capacities, while this ratio of benefits to costs for the average research sample at the discount rates is about 1.76 Which confirms the financial feasibility of investing in the field of Honey Apiary projects. It turned out that the net present value of the second capacity at the same discount rates amounted to about 3490, 2984 They are positive values and higher than the first and second capacities of the project .It also turned out that the internal rate of Return was approximately equal to the three capacities and the sample averaged about 12.696%This is higher than the prevailing commercial interest rate of banks, which is about 10.25 ,%Which confirms the financial feasibility of honey production projects in Qena governorate in the season 2020 /2021.

Table 6: Non-discounted financial evaluation criteria for the production of bee honey for apiaries in the research sample Qena governorate for the season 2020/2021.

Item	Less than 20 Cell		20 to less than 40		40 Cell and more		Average capacities	
	By sample	In the cell	By sample	In the cell	By sample	In the cell	By sample	In the cell
Annual fixed costs	2967	247	5893	200	10173	193	6344	213
Annual variable costs	6963	580	13843	522	33692	695	18166	599
Annual total costs	9930	827	19736	722	43865	888	24510	812
Total annual revenue	14125	1427	38855	1439	70708	1414	41229	1427
Annual net income	4195	600	19119	717	26843	527	16719	614
Fixed costs during the life of the project	19755	1646	41251	1398	51443	1351	37483	1465
Variable costs during the life of the project	48739	4146	96904	3656	235846	4864	127163	4222
Total costs during the life of the project	**69508**	**5792**	**138155**	**5054**	**307057**	**6215**	**171573**	**5687**
Total revenue during the life of the project	98875	9990	271985	10072	494959	9901	288606	9988
Net income during the life of the project	29367	4197	133830	5018	187903	3686	117033	4300
Capital recovery period	1.49	2.55	3.24	3.59	3.65	2.73	2.79	2.96
Return on invested pounds of costs	1.42	1.72	1.97	1.99	1.61	1.59	1.68	1.76
Average annual income per invested pound	6.04	10.35	13.84	14.18	8.74	8.47	9.74	10.8
The average price per kilogram of honey		135		135		135		135
Variable costs per kilogram of honey		67.93		59.41		80.22		69.18
Average cell output		8.72		8.79		8.66		8.72
The amount of Equalization = Fixed costs ÷ (Average price - Average variable costs)		3.51		2.64		3.52		3.22
The amount of Equalization÷The amount of honey production× 100		40.22		30.05		40.69		36.99
Production safety limit		60		70		59		63

Source : Compiled and calculated from the table from the data of the questionnaire forms for the research sample in Qena governorate for the season 2020/2021**.**

Table 7: Discounted financial evaluation criteria for the production of bee honey for the research sample apiaries in Qena governorate for the season2020/2021.

Discount rate	Financial evaluation criteria	Values			
		First capacity	Second capacitance	Third capacity	Sample average
10 %	Total present value of costs (Pound)	4028	3515	4322	3955
	Total present value of revenue (Pound)	6948	7005	6886	6946
	The ratio of benefits to costs%	1.72	1.99	1.59	1.76
	Net present value (Pound)	2920	3490	2564	2991
15 %	Total present value of costs(Pound)	3442	3004	3694	3380
	Total present value of revenue (Pound)	5937	5986	5884	5936
	The ratio of benefits to costs%	1.72	1.99	1.59	1.76
	Net present value (Pound)	2495	2982	2190	2556
	Internal rate of return(%)	12.6958	12.6962	12.6956	12.696

Source :Compiled and calculated from the table from the data of the questionnaire forms for the research sample in Qena governorate for the season 2020/2021.

3. The results of the financial evaluation according to the allergy analysis of honey bees in Qena governorate

The analysis of the sensitivity of the project to inappropriate conditions is used, especially since agricultural projects are often subject to conditions of uncertainty or uncertainty .The aim of conducting this analysis is to study the impact of each change that may occur in the project on the discounted financial feasibility criteria of the project, as follows:

(1) The total cost of the project increased by 10%.

The table shows the number (8) The results of the financial evaluation of honey apiaries in Qena governorate according to the allergy analysis test increased the total costs by 10.% from it can be seen that the three production capacities have achieved positive values relative to the net present value with an average of about 2595, 2218 EGP for the total sample of the study at two discount rates 10%, 15 % The second capacity came in first place with values of about 3138, 2682 pounds at the same discount rates, respectively, followed by the first capacity and then the third .As for the return-to-costs ratio when using the same two discount rates, the average for the study sample was about 1.60% The second capacity came in first place, followed by the first capacity and then the third, estimated at about 1.81%,1.57%, and 1.45 % pounds on the order, and for an internal rate of return that is approximately equal to the three capacities and amounted to an average sample of about 12.696 %from this it becomes clear that the values of the criteria used are good, which confirms the safety of the feasibility of investing in honey apiaries in light of the high production costs.

(2) The total benefits or revenues of the project decrease by 10%.

The same table shows the results of the financial evaluation of honey apiaries in Qena governorate according to the allergy analysis test, with a decrease in total revenues of 10%, it turns out that the three production capacities have achieved positive values relative to the net present value with an average of about 2837, 1962 EGP for the total sample of the study at two discount rates 10%, 15%. The second capacity came in first place with values of about 2789 and 2384 pounds at the same discount rates, respectively, followed by the first capacity and then the third.

As for the return-to-costs ratio when using the same two discount rates, the average for the study sample was about 1.76%. The second capacity came in first place, followed by the first capacity and then the third, estimated at about 1.79%, 1.55%, and 1.43% and estimated the internal rate of return for the average sample and for the three stings, was about 12.696%. It is clear from this that the values of the criteria used are good, which confirms the safety of the feasibility of investing in honey apiaries in light of the high production costs.

Table 8: Criteria for the financial evaluation of honey bee apiaries in Qena governorate according to allergy analysis.

Discount rate	Financial evaluation criteria	The first capacity		Second capacitance		The third capacity		Sample average	
		Before the change	After the change	Before the change	After the change	Before the change	After the change	Before the change	After the change
The total cost of the project increased by 10 %									
10 %	**Net present value (Pound)**	2920	2224	3490	2789	2564	1875	2991	2837
	The ratio of benefits to costs%	1.72	1.55	1.99	1.79	1.59	1.43	1.76	1.76
15 %	**Net present value (Pound)**	2495	1901	2982	2384	2190	1602	2556	2296
	The ratio of benefits to costs%	1.72	1.55	1.99	1.79	1.59	1.43	1.76	1.76
Internal rate of return(%)		12.696	12.696	12.696	12.696	12.696	12.696	12.696	12.696
The total benefits or revenues of the project decrease by10 %									
10 %	**Net present value (Pound)**	2920	2517	3490	3138	2564	2131	2991	2595
	The ratio of benefits to costs%	1.72	1.57	1.99	1.81	1.59	1.45	1.76	1.6
15 %	**Net present value (Pound)**	2495	2151	2982	2682	2190	1821	2556	2218
	The ratio of benefits to costs%	1.72	1.57	1.99	1.81	1.59	1.45	1.76	1.6
Internal rate of return(%)		12.696	12.696	12.696	12.696	12.696	12.696	12.696	12.696
Increased costs by 10%The project's revenue decreased by 10%									
10 %	**Net present value (Pound)**	2920	1822	3490	2438	2564	1443	2991	1901
	The ratio of benefits to costs %	1.72	1.41	1.99	1.63	1.59	1.3	1.76	1.44
15 %	**Net present value (Pound)**	2495	1557	2982	2083	2190	1233	2556	1624
	The ratio of benefits to costs %	1.72	1.41	1.99	1.63	1.59	1.3	1.76	1.44
Internal rate of return(%)		12.696	12.696	12.696	12.696	12.696	12.696	12.696	12.696

Source :Compiled and calculated from the table from the data of the questionnaire forms for the research sample in Qena governorate for the season2020/2021.

(3) Increased costs by 10 % The project's revenue decreased by 10%.

The results of the financial evaluation of honey apiaries in Qena governorate according to the allergy analysis test with rising costs and a decrease in total revenues by10 % for each of them as shown by the table (8) that the three capacities have achieved positive values relative to the net present value with an average of about 1901, 1624 EGP for the total sample of the study at two discount rates 10%,15 %The second capacity came in first place with values of about 2483, 2083 Pounds at the same discount rates, respectively, followed by the first capacity and then the third.

As for the return-to-costs ratio when using the same discount rates, the average sample of the study amounted to about 1.44 % the second capacity came in first place, followed by the first capacity and then the third, estimated at about 1.63%, 1.41%, 1.30 %And estimated the internal rate of return for the average sample and for the three stings, about12.696% it is clear from this that the values of the criteria used are good, which confirms the safety of the feasibility of investing in honey apiaries in light of the high production costs.

Recommendations

Activating the role of agricultural extension Specialist in the field of bee breeding to guide and guide honey producers in Qena governorate.

1. Providing good breeds of queens and bee parcels, providing medicines, vitamins and good proteins for honey production apiaries in the province.
2. Stimulate and encourage bee honey producers in Qena governorate to form marketing associations, establish marketing centers, open new markets and promote bee honey apiary products.
3. Interest in technical and economic research and studies specialized in the field of honey production to raise the production and marketing efficiency of honey bees in the province.
4. Raising awareness on increasing the number of apiaries and the number of cells in each of them to take advantage of the principle of comparative advantage of some conservation centers, especially those characterized by the cultivation of plants and flowering crops to provide nutrition for honey bees.
5. The banks and the Social Fund for development in Qena governorate provide the necessary funding for the expansion of honey production projects in the governorate with facilitated procedures.

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Appendix

Table 1: The number of hives and honey production in Qena governorate for the productive season2020/2021.

The center	Limiting the number and production of honey apiaries in the Centers of Qena governorate for the productive season 2021.							
	Number of apiaries	%	Number of cells	%	Average cell productivity (kg)	Honey production (tons)	Price (pound/kg)	Production value (thousand pounds)
Abu Tesht	46	10.24	4630	26.21	8	37040	50	1852
Farshut	35	7.8	985	5.58	8	7880	50	394
Nag Hammadi	24	5.35	727	4.12	7	5089	75	381.68
Dishna	37	8.24	805	4.56	11.77	9474.85	57.86	548.21
El Waqf	24	5.35	882	4.99	7.22	6368.04	80	509.44
Qena	118	26.28	4530	25.64	9.81	44439.3	50	2221.97
Qift	19	4.23	510	2.89	9.37	4778.7	93.31	445.9
Qus	80	17.82	1256	7.11	11.47	14406.32	86.91	1252.05
Naqada	66	14.7	3340	18.91	8.21	27421.4	67.79	1858.9
Total	449	100	17.665.00	100	80.85	156.897.61	610.87	9.464.15
Arithmetic mean	49.89	…	1.962.78	…	8.98	17.433.07	67.87	1,051.57
Geometric mean	41.99	…	1.415.51	…	8.84	12.512.60	66.03	826.19

Source :Collected and calculated from Ministry of Agriculture and land reclamation, Directorate of Agriculture in Qena, Department of agricultural services 2021.