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The Determination of Prevailing Factors in Sheep Farming Activities by Factor Analysis

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Abstract

In this study, the economic analysis of agricultural farming that involves also sheep farming in the Konya Province in Turkey was done and then the effective factors in sheep farming activities were determined. 104 of agricultural establishments were selected by Strafied Random Sampling Method.

In this study, we used the factor analysis to determine the effective variables in this study. According to the factor analysis, 27 of variables were selected affecting to sheep farming was gathered by 4 factors. These factors are named as follows: income factor, volumetric factor, cost factor and labor factor.

Keywords: Sheep farming activities, Factor analysis

1. Introduction

In the province, where the most intensive agricultural establishments of sheep farming, agricultural technique, in terms of geographic and economic situation in the province of Konya, representing Cihanbeyli, Karatay and Karapınar districts have been identified.

Activity to determine the current status of the province of Konya, sheep farming establishments in the general characteristics of training, establishment of economic analysis, and determining the location of business activity within the whole sheep, sheep with the help of statistical techniques, factor analysis to reveal important factors that affect its activities, determining the solutions to the problems faced by sheep farmers opportunities for development and submission of final determination of the activity of sheep in the Konya province of the purposes of this study can be counted.

2. Materials and Methods

Sample selected establishments by going face to face questionnaires were filled by making a personal interview. This is the main material for the study of Cihanbeyli, Karatay and Karapınar counties of Konya province agricultural establishments engaged in raising sheep to be obtained from the districts of constituted the primary data. Each district has the highest concentration of sheep farming village, taking a total of 9 villages were selected. Criterion based on the number of six sheep ram this population, sample size was determined using random sampling method.

According to the number of business districts make up the population is divided as follows: Karatay 323, Cihanbeyli 553, Karapınar 514. Accordingly, a total of 9 of these three counties the number of establishments entering the village, population 392, respectively.

Stratified random sampling (SRS) method, according to the sample population was drawn process. Proportional method, using the formula for finding the value of n, n values of the layers used in finding the formula (Yamane 1967).

While n value is founded by this formula in the proportional method, n value for the layers is used by this formula.

$$n = \frac{N \sum N_h S_h^2}{N^2 D^2 + \sum N_h S_h^2}$$

According to the method of SRS, population as a result of the withdrawal of the sample size = 104, respectively. As a result of the sample according to the method of proportionate distribution of the first layer of the layers n_1 = 73, second layer is n_2 = 20 and the third layer of the calculated as operating n_3 = 11.

The completed survey forms, data entry of information, made in a spreadsheet environment. Analysis of primary data is entered into the computer in the process, the program was evaluated using the SAS Enterprise Guide 3.0 (Anonymous 2004).

In this study, factor analysis of the 27 variables are included in the high element of partnership, formed by 4 factors were obtained from these variables. The results of the factor analysis program were used in obtaining the SAS Enterprise Guide 3.0 (Anonymous 2004). Stage of factor analysis, factor extraction methods, Principal Component Analysis (PCA) method, the Varimax method of factor rotation method was chosen.

Factor analysis of the correlation matrix, while the first stage, which examined the correlation between variables. Variables to contain the common factors are expected to be high correlations between the variables. Factor analysis of the feasibility test, the common factor variance (CFV) was considered.

3. Results and Discussion

The common factor variance and variables in determining the ability of the variables are represented. The common factor variance (CFV) shows the amount of variance explained by each variable are included in the analysis.

Factor analysis of the applicability test used in making an element of partnership and the partnership element of the variables were obtained as the average 0.927102 (Table 1).

Eigenvalue of the factor analysis, difference, ratio, and the cumulative values are given in Table 2. The eigenvalues of these factors are going down. After the properties of other explanatory factors, the factor 4 is reduced. According to Kaiser, the variable, eigenvalues ≥ 1 criteria were applied to a large (Kaiser 1960).

The sum of the eigenvalues of factors, the number of variables which were found to be equal to 27. Factors, the value of the difference, is the difference between two eigenvalues. Ratio value of each factor indicates the ratio of the eigenvalues of total eigenvalue. The value of this ratio, but also gives the percentage of variance that factor. Cumulative value, the cumulative sum of the rates can be obtained, shows the cumulative variance. In general, the cumulative distribution is expected to be above 70%. The resulting 4-factor variance 0.9271, ie the sum of the percentages of 92.71% is. 92.71% of the variation in percent value is quite high, this can be explained by 4 factors (Table 2).

Factor in determining the number of factors can be given by the graphics. This is the first break point on the graph by determining the factors seen to that point (Figure 1). Designations and associated factors of the eigenvalues, variance and cumulative percentage of variance values given in Table 2.

Accordingly, 49.99% of the total variance first factor, 26.55% second factor, 10.06% percent, and the third factor is 6.11% percent by the fourth factor is described. According to the cumulative variance, 76.54% of the total variance-third by the first two factors are described, with shares that are lower than the other two factors. 4 factors determined the percentage of the total variance is 92.71%, 92.71% of the total variance can be explained by these factors (Table 3).

Factors obtained by factor analysis, factor loadings are given in Table 4. Significance level of 5% for 200 observations, 0.180, and larger values were used for the determination of factor loadings (Joseph et al. 1992). Factors in whether or not the factor loadings perpendicular to the original variables, dependent and independent variables are factors that the multiple regression equation that represents the standardized regression coefficients. According to Table 4, which has the highest load factor in the variable Agricultural Income/BAU variable. For this variable, the first factor $(0.06939)^2$, the second factor $(0.99438)^2$, the third factor $(0.02624)^2$ and the fourth factor $(-0.0173)^2$ describes a variance. Explanation rate of the total variance of this variable is founded by $(0.06939)^2 + (0.99438)^2 + (0.02624)^2 + (-0.0173)^2 = 0.99459$.

Factor matrix, obtained during factors show the relationship between factors and variables, although on the basis of this matrix is very difficult to identify significant factors. Factor analysis to identify clusters of closely related variables that summarizes and describes the significant factors. Rotation process, aims to transform the initial matrix to a matrix more easily interpreted. Factor transformation matrix, the factor solution identifies the specific rotation. Rotation matrix is multiplied by the conversion factor with factor loadings non-rotation factor loadings are obtained.

Factor score coefficient matrix, the expression values for each individual factor scores are used in the calculation. Factor scores for each variable, the variable values are multiplied with the factor score coefficients are calculated by adding (Table 5).

Factor 1, that make up the var 1, var 2, Var 3, var 4, var 5, var 6, Var 7, Var 14, Var 15, Var 16, Var 17, Var 26 and Var 27 has a value as high as 0,836 variables, the average factor loadings (Table 4). 49.99% cumulative variance explained by these variables (Table 3). As a result, this factor "***Income Factor (Factor 1)***" was called.

Factor 2 by the Var 10, Var 11, Var 12, Var 13, Var 18, Var 19 and Var 20 such as that expressed per unit of economic values for the "volume factor" was called. The average factor loadings of these variables are 0,990 (Table 4). The total percentage of these criteria is 26.55% (Table 3). As a result, this factor "***Volumetric Factor (Factor 2)***" was called.

Acting on Factor 3, Var 8, var 9, Var 21, Var 22 and Var 25 shows the average factor loadings measures 0,816. This factor indicates the costs of production activities that are effective "cost factor" is defined as. Factor loadings of these variables, was roughly equal to the average factor loadings (Table 4). 10.06% of the relevant criteria in the percentage of variance are (Table 3). As a result, this factor "***Cost Factor (Factor 3)***" was called.

Factor 4 as an in family labor for var 23 and used in the Var 24 variables based on factor loadings, while the number is nothing to do with labor and factor 4, so "the labor factor" was called. Factor 4 has an effect on family labor for var 23 and used in the Var 24 shows the factor loadings per 0,886 criteria are (Table 4). 6.11% of the variance in these criteria is (Table 3). As a result, this factor "***The Labor Factor (Factor 4)***" was called.

Factors are interpreted, evaluated, and variables within each factor on its own dependence on factors described. In addition to the factors set relations were evaluated separately for each variable. As a result of the analysis factors; Income factor (factor 1), the volumetric factor (factor 2), the cost factor (factor 3) and the labor factor (factor 4) is called.

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TABLES

Table 1. Used variables in factor analysis and common factor variance values

Variable Numbers	Variable Names	Variable Abbreviations	Common Factor Variance
1	Working capital (TL)	Var 1	0.94341913
2	Active capital (TL)	Var 2	0.98105887
3	Gross Domestic Product (TL)	Var 3	0.98949828
4	Total Operating Costs (TL)	Var 4	0.98051855
5	Pure Product (TL)	Var 5	0.85793021
6	Gross Profit (TL)	Var 6	0.98258853
7	Agricultural Income (TL)	Var 7	0.98703055
8	Existence of Sheep (BAU)	Var 8	0.94129765
9	Feed Cost (TL)	Var 9	0.95896263
10	Gross Profit / BAU	Var 10	0.99379614
11	Agricultural Income / BAU	Var 11	0.99527129
12	Gross Profit / BAU	Var 12	0.96427262
13	Gross Domestic Product / BAU	Var 13	0.99506889
14	Business Land (Da)	Var 14	0.89182875
15	Total Arable Land (Da)	Var 15	0.92375122
16	Property Land (Da)	Var 16	0.94840909
17	Irrigated Land (Da)	Var 17	0.61705438
18	Total Operating Costs / BAU	Var 18	0.99413989

19	Total Variable Costs / BAU	Var 19	0.99590038
20	Fixed Charges / BAU	Var 20	0.98350249
21	Cost of feed / BAU	Var 21	0.86271240
22	Labor Costs / BAU	Var 22	0.84780237
23	Family Labor Wage Provisions (TL)	Var 23	0.90149066
24	Labor Used (MLU)	Var 24	0.94013131
25	BAU / MLU	Var 25	0.85187833
26	Gross Profit / MLU	Var 26	0.91308359
27	Pure Product / MLU	Var 27	0.78936204
Mean			**0.927102**

Table 2. Eigenvalue of the factor analysis, difference, ratio, and the cumulative values

Factors	Eigenvalue	Difference	The Percentage of Variance	Cumulative Percentage
1	**13.4963264**	**6.3274906**	**0.4999**	**0.4999**
2	**7.1688359**	**4.4521997**	**0.2655**	**0.7654**
3	**2.7166362**	**1.0666743**	**0.1006**	**0.8660**
4	**1.6499618**	**1.0342142**	**0.0611**	**0.9271**

Table 3. According to the analysis of factors related to these factors, the naming and the eigenvalues, variance and cumulative variance values

Factor No	Factor Names	Eigenvalue	The Percentage of Variance	Cumulative Percentage
1	Income factor	13.4963264	0.4999	0.4999
2	Volumetric factor	7.1688359	0.2655	0.7654
3	Costs factor	2.7166362	0.1006	0.8660
4	Labor factor	1.6499618	0.0611	0.9271

Table 4. Factor Loading Matrix

Variables	Factors			
	Factor 1	Factor 2	Factor 3	Factor 4
Working capital (TL)	**0.69612**	-0.06567	0.44392	0.19972
Active capital (TL)	**0.89339**	0.03688	0.38616	0.18012
Gross Domestic Product (TL)	**0.85261**	0.01634	0.48357	0.16866
Total Operating Costs (TL)	**0.83927**	0.00696	0.47603	0.22249
Pure Product (TL)	**0.80461**	0.03595	0.45629	0.03219
Gross Profit (TL)	**0.89686**	0.04404	0.39256	0.14896
Agricultural Income (TL)	**0.86204**	0.01292	0.46460	0.16699
Existence of Sheep (BAU)	0.48840	-0.16315	**0.81088**	0.13645
Feed Cost (TL)	0.47236	-0.13151	**0.83385**	0.15247
Gross Profit / BAU	0.06342	**0.99438**	0.02624	-0.0173
Agricultural Income / BAU	0.06939	**0.99476**	0.02904	-0.0087
Gross Profit / BAU	0.05386	**0.97486**	0.09179	-0.0509
Gross Domestic Product / BAU	0.06762	**0.99445**	0.03792	-0.0116
Business Land (Da)	**0.91132**	0.17086	-0.03328	0.17611
Total Arable Land (Da)	**0.92301**	0.17893	-0.00619	0.19937
Property Land (Da)	**0.94204**	0.16818	0.02927	0.17838
Irrigated Land (Da)	**0.77749**	-0.03658	-0.03039	0.10151
Total Operating Costs / BAU	0.07338	**0.99426**	0.01257	0.00678
Total Variable Costs / BAU	0.07226	**0.99253**	0.07453	-0.0024
Fixed Charges / BAU	0.07374	**0.98810**	-0.03894	0.01434
Cost of feed / BAU	0.10957	0.40888	**0.81321**	0.14904

Labor Costs / BAU	0.08475	0.42070	**0.80033**	0.15201
Family Labor Wage Provisions (TL)	0.26392	-0.00356	0.08359	**0.90821**
Labor Used (MLU)	0.41856	-0.07069	0.11492	**0.86414**
BAU / MLU	0.23451	-0.16106	**0.82261**	-0.307
Gross Profit / MLU	**0.77269**	0.16428	0.46105	-0.2765
Pure Product / MLU	**0.70291**	0.15982	0.49304	-0.1633

Table 5. Factor scores coefficient matrix

Variables	Factor 1	Factor 2	Factor 3	Factor 4
Working capital (TL)	0.01706	-0.02095	0.10090	0.04387
Active capital (TL)	0.09301	-0.00831	-0.00757	0.00458
Gross Domestic Product (TL)	0.33583	-0.04157	0.10053	-0.20049
Total Operating Costs (TL)	-0.12235	0.00987	-0.02273	0.18285
Pure Product (TL)	0.00000	0.00000	0.00000	0.00000
Gross Profit (TL)	0.09632	-0.00784	-0.00695	-0.01284
Agricultural Income (TL)	0.07753	-0.01184	0.02075	0.00267
Existence of Sheep (BAU)	-0.03800	-0.03323	0.18106	0.03624
Feed Cost (TL)	-0.04676	-0.02860	0.19059	0.04801
Gross Profit / BAU	-0.00429	0.13510	-0.00834	-0.00319
Agricultural Income / BAU	-0.00459	0.13516	-0.00813	0.00099
Gross Profit / BAU	-0.01284	-0.04524	0.04295	-0.03294
Gross Domestic Product / BAU	-0.00132	0.68965	-0.10121	0.04266
Business Land (Da)	0.15583	0.01258	-0.13916	-0.00855
Total Arable Land (Da)	0.15127	0.01364	-0.13206	0.00375
Property Land (Da)	0.15240	0.01137	-0.12445	-0.00937
Irrigated Land (Da)	0.14168	-0.01492	-0.11933	-0.03678
Total Operating Costs / BAU	0.00000	0.00000	0.00000	0.00000
Total Variable Costs / BAU	-0.01425	0.02259	0.02947	-0.00423
Fixed Charges / BAU	0.00000	0.00000	0.00000	0.00000
Cost of feed / BAU	-0.12072	0.05099	0.23323	0.09562
Labor Costs / BAU	-0.12412	0.05311	0.23290	0.10002
Family Labor Wage Provisions (TL)	-0.06881	0.00715	0.01013	0.47420
Labor Used (MLU)	-0.03759	-0.00514	-0.00342	0.43142
BAU / MLU	-0.03595	-0.03519	0.21030	-0.17921
Gross Profit / MLU	0.11109	0.00436	0.02043	-0.23065
Pure Product / MLU	0.07979	0.00607	0.04320	-0.15888