



The Effect of Socio-Economic Factors on Adoption of Innovations in Dairy Farms

Aysun Yener^{1*}, Cennet Oğuz²

¹Department of Agricultural Economics, Faculty of Agriculture, Selçuk University, 42250 Konya, Turkey

²Department of Agricultural Economics, Faculty of Agriculture, Selçuk University, 42250 Konya, Turkey

ARTICLE INFO

Research Article

Received 14 July 2017

Accepted 28 August 2017

Keywords:

Adoption

Dairy farm

Chi-square

Innovation

Konya

*Corresponding Author:

E-mail: aysunyener@selcuk.edu.tr

ABSTRACT

The research was conducted with the aim of determining the social and economic factors which are effective on the adoption of new technologies at dairy farms in the province of Konya. The data used in the research was obtained on a volunteer basis by questionnaire technique from 128 dairy farms determined with stratified sampling method that is one of random sampling method. 51.56% of enterprises investigated were high innovators and 48.44% of enterprises were low innovators. In conclusion, it was determined that the milk yield, enterprise income, education of enterpriser, family size, number of animals, existence of land, case of receiving services of consultancy and frequency of using mass media tools made positive contributions to adoption of innovations by enterprises in the research field. But the training level decreased as the age of enterpriser increased in the research field. This case retards the adoption process of innovations and deescalates the use of new technologies in the enterprises. The young farmers come to the forefront in the adoption and implementation of innovations.

DOI: <https://doi.org/10.24925/turjaf.v5i11.1389-1393.1421>

Introduction

The animal husbandry has a significant place in Turkey as around the world. In the livestock sector, the increase of welfare levels of enterprisers is directly related to the income level of enterpriser. The incomes of enterprises are directly proportional to the yield increase and the yield increase per animal is related to the use of technology in agriculture, in other words the innovativeness level. The innovation may be de defined as perceiving an idea, a method, practice or product as new and being used by the user for the first time. The concept of innovativeness has been defined in the similar way in various literatures (Scott and Bruce 1994; Döm 2006; Larson 2000). The agricultural innovations are the transfer of technology to agriculture sector and its use by the farmers at a level which will increase the yield (Ozçatalbaş and Gürgen 1998; Taluğ 1990; Yurttaş 1979; Taluğ and Tatlıdil 1993). The levels of adoption of innovations by the enterprises depend on the society structure, life standards and economic conditions. The access to information is ensured by the increase in level of adoption of innovations. The education, age, production level and family structure of enterpriser is effective on the adoption of innovations (El-Shabat, 1992; Madhukar and Ram, 1996; Salama, 2001; Singh and Sharma, 1995). Thanks to the adoption of innovations, the agricultural development is ensured. The effectiveness of human in

the developing, processing, spreading, sharing and using the information is always at the center of agricultural development. It has been increasing the quality of agriculture based on information day by day (Kızılaslan, 2009). Therefore, the adoption and use of new information and technologies by the farmers is very significant in terms of increasing the agricultural yield and ensuring the rural development. In this context, it is thought that the determination of factors which are effective in the adoption of agricultural innovations will provide an insight at future studies on this topic (Sezgin et al., 2010).

The aim of research is to determine the social and economic factors which are effective in the adoption of new technologies by dairy farms in the province of Konya.

Material and Method

The original data collected from dairy farms in the province of Konya by questionnaire constitutes the main material of study. The previous researches on this subject and the data collected by the relevant institutions and organizations were also used. The questionnaire covers 2015-2016 production periods.

In the research, the stratified sampling method that is one of random sampling method was used with the aim of increasing the accuracy of findings obtained from the enterprises and ensuring the representation of different parts in the population sufficiently (Yamane, 1967; Güneş and Arıkan, 1985). The sample size was calculated as 128 in 95% confidence interval and with 5% margin of error and the enterprises within the sample size were selected on random volunteer basis.

The levels of adoption of new technologies by enterprises were analysed by creating ‘‘innovativeness index’’ in accordance with the case of use of current technology by producers. The innovations that the enterprises had been implementing currently were determined with the aim of revealing the dissemination and adoption of innovations relevant to dairy farming to calculate the levels of innovativeness of producers in the research field and each innovation was given a score varying between ‘‘0 and 1’’. After this scoring was turned into an index, all producers were classified into two sub-groups as ‘‘high innovators’’ and ‘‘low innovators’’ in accordance with their scores (Ozkaya 1996). The innovativeness index was calculated as follows:

$$\text{Innovativeness Index} = (\text{UATP}/\text{UAMP}) \times 100,$$

UATP : Total score of producer,
 UAMP: Maximum score that the producer may get

Interesting in the animal stock exchange, benefitting from veterinary services, making silage, breeding certificate, producing fodder crop, taking out animal insurance, artificial insemination, using factory fodder, using fodder additive, using mineral substance, treatment of dry-coarse feed, type of shelter, milking unit, milking device, cooling tank, camera, chip, automatic drinking bowl and automatic feeder in the research field were taken as the innovations in the dairy farms.

The enterprises of which innovativeness index was below 50% were accepted as ‘‘low innovators’’ and the ones of which innovativeness index was above 50% were accepted as ‘‘high innovators’’. The correlations between the levels of adoption of innovations by enterprises and yield, income, education, age, family type, existence of animal, existence of land, case of receiving services of consultancy and frequency of use of mass media tools were analysed with chi-square method.

Results and Discussion

In accordance with the research findings, 51.56% of enterprises were determined to be high innovators and 48.44% of enterprises were determined to be low innovators (Table 2). Average innovativeness level of enterprises in the research field was calculated as 50.58% and it was determined that the enterprises were high innovators. In a similar study, the innovativeness level was calculated as 57.50% (Oğuz and Yener, 2017). In another study, the level of adoption of innovation in 19% of dairy farms was determined to be low, in 54% of dairy farms was determined to be medium and in 27% of dairy

farms was determined to be high (Türkyılmaz et al., 2003). It shows similarity with other studies in terms of adoption of innovations especially at medium and high levels (Simşek and Karkacıer, 1996; Ozçatalbaş, 2000).

As it is seen in Table 2, the ratios of adoption and use of new technologies increase as the number of animals in the enterprises increase in the research field. It is possible to see similar results in other studies (Simşek et al., 1996; Oğuz and Yener, 2017).

There was a positive correlation between the level of adoption of innovations and milk yield of enterprises in the research field ($P < 0.05$). While 59.68% of enterprises of which milk yields varied between 0-20 kg were low innovators, 60.61% of enterprises of which milk yields varied between 21 kg and above constituted from high innovator enterprises. The high innovator enterprises had higher yield compared to low innovator enterprises. This result was also obtained in similar studies (Türkyılmaz et al., 2003; Çiçek et al., 2008). The milk yield is the leading factor which affects the income of enterprise in dairy farms (Sakarya, 1993; Aksoy et al., 2011).

Table 1 The distribution of dairy farms by number of animals (Sample Size)

Enterprise Size Groups	Sample Size (Unit)
0-25	84
26-75	29
76-+	15
Total	128

Table 2 Innovativeness Level According to Enterprise Scale

Group	Low Innovator		High Innovator		Total	
	N	R	N	R	N	R
1 st Layer	56	66.67	28	33.33	84	100
2 nd Layer	5	17.24	24	82.76	29	100
3 rd Layer	1	6.67	14	93.33	15	100
Total	62	48.44	66	51.56	128	100

N: Number, R: Ratio

Table 3 Adoption Level of Innovations According to Milk Yield in the Enterprises

Yield	Low Innovator		High Innovator		Total
	N	%	N	%	N
0-20	37	59.68	26	39.39	63
21-+	25	40.32	40	60.61	65
Total	62	100.00	66	100.00	128

$X^2=5.262$ $P < 0.05$

Table 4 Adoption Level of Innovations According to Annual Income in the Enterprises

Income (TL)	Low		High		Total
	N	%	N	%	
0-75.000	43	69.35	21	32.31	64
75.001-150.000	13	20.97	10	15.38	23
150.001-+	6	9.68	34	52.31	40
Total	62	100.00	65	100.00	127

$X^2=27.498$ $P < 0.05$

While 69.35% of low innovator enterprises were at the income range of 0-75.000 TL, 52.31% of high innovator enterprises had 150.001 TL income and above. This case was also supported by the chi-square test conducted ($P < 0.05$).

In terms of education, 57.89% of low innovator enterprises were primary school graduates, 14.52% of them were secondary school graduates, 11.29% of them were high school graduates and 3.23% of them were undergraduates. 48.48% of high innovator enterprises were primary school graduates, 13.64% of them were secondary school graduates, 28.79% of them were high school graduates and 9.09% of them were undergraduates. The positive correlation was determined between the level of adoption of innovations by enterprises and educational backgrounds ($P < 0.05$). The positive correlations were also determined in similar studies between the educational backgrounds and adoption levels of innovations (Weir and Knight 2000; Türkyılmaz et al., 2003; Kutlar and Ceylan, 2008).

In terms of age group, 50.00% of low innovator enterprises were at the age range of 36-50, 27.42% of them were at the age range of 51-+ and 22.58% of them were at the age range of 18-25. 57.58% of high innovator enterprises were at the age range of 36-50, 24.24% of them were at the age range of 51-+ and 18.18% of them were at the age range of 18-25. The correlation between the innovativeness levels of enterprises and age groups was determined with chi-square analysis and correlation was not determined between the levels of adoption of innovations by the enterprises and age groups ($P > 0.05$).

In the research field, the dairy farms which had a family size of 5 and above were more open to innovations. Then, a positive correlation was determined between the family size and innovativeness levels of enterprises according to the chi-square analysis.

In terms of existence of animal (unit), 90.32% of low innovator enterprises had 1-25 dairy animals, 8.06% of them had 26-75 dairy animals and 1.61% of them had 76+ dairy animals. 42.42% of high innovator enterprises had 1-25 dairy animals, 36.36% of them had 26-75 dairy animals and 21.21% of them had 76 dairy animals and above. The positive correlation was determined between the implementation levels of new techniques by enterprises and number of dairy animals ($P < 0.05$).

While 41.94% of low innovator enterprises had land varying between 0-50 decare, 50% of high innovator enterprises had land above 151 decare. There was a correlation between the innovativeness levels of enterprises and the existence of land ($P < 0.05$).

The mass media tools used in the enterprises were radio, television, gazette, journal and internet. The ratios of use of mass media tools only in the follow up of agricultural innovations are given in Table 10. As it is seen in the Table, 59.68% of low innovator enterprises follow the innovations with mass media tools a few times in a year, 17.74% of them follow the innovations a few times in a month, 12.90% of them never follow the innovations, 8.06% of them follow the innovations a few days in a week and 1.61% of them follow the innovations

with the mass media tools every day. 34.85% of high innovator enterprises follow the innovations with mass media tools a few times in a year, 33.33% of them follow the innovations a few times in a month, 19.70% of them follow the innovations a few days in a week, 7.58% of them follow the innovations every day and 4.55% of them never follow the innovations with mass media tools.

Table 5 Education of Enterpriser and Adoption Level of Innovations

Education	Low		High		Total
	N	%	N	%	N
Primary School	44	70.97	32	48.48	76
Secondary School	9	14.52	9	13.64	18
High School	7	11.29	19	28.79	26
University	2	3.23	6	9.09	8
Total	62	100.00	66	100.00	128

$X^2=9.317 P < 0.05$

Table 6 Age of Enterpriser and Adoption Level of Innovations

Age Groups	Low		High		Total
	N	%	N	%	N
1 (18-35)	14	22.58	12	18.18	26
2 (36-50)	31	50.00	38	57.58	69
3 (51-+)	17	27.42	16	24.24	33
Total	62	100.00	66	100.00	128

$X^2=0.770 P > 0.05$

Table 7 Adoption Levels of Innovations According to Family Size of Enterprises

Family Size (Unit)	Low		High		Total
	N	%	N	%	N
1 (1-4)	26	41.94	18	27.27	44
2 (5-+)	36	58.06	48	72.73	84
Total	62	100.00	66	100.00	128

$X^2=3.047 P < 0.05$

Table 8 Adoption Levels of Innovations According to Animal Existence of Enterprises

Existence of Animal (unit)	Low		High		Total
	N	%	N	%	N
1 (1-25)	56	90.32	28	42.42	84
2 (26-75)	5	8.06	24	36.36	29
3 (76-+)	1	1.61	14	21.21	15
Total	62	100.00	66	100.00	128

$X^2=32.955 P < 0.05$

Table 9 Adoption Levels of Innovations According to Land Existence of Enterprises

Existence of Land (decare)	Low		High		Total
	N	%	N	%	N
1 (0-50)	26	41.94	15	22.73	41
2 (51-150)	22	35.48	18	27.27	40
3 (151-+)	14	22.58	33	50.00	47
Total	62	100.00	66	100.00	128

$X^2=10.918 P < 0.05$

The correlation between the innovativeness levels of enterprises and periods of following up the innovations with mass media tools was determined according to chi-square ($P < 0.05$). In similar studies, the correlation between the adoption levels of innovations and frequency of use of mass media tools was determined (Sezgin 2010; Türkyılmaz et al., 2003; Çiçek et al., 2008).

Table 10 Adoption Levels of Innovations According to Frequency of Use of Mass Media Tools in the Enterprise

Mass Media Tools	Low		High		Total N
	N	%	N	%	
Never	8	12.90	3	4.55	11
A few days in a year	37	59.68	23	34.85	60
A few days in a month	11	17.74	22	33.33	33
A few t in a week	5	8.06	13	19.70	18
Everyday	1	1.61	5	7.58	6
Total	62	100.00	66	100.00	128

$\chi^2 = 15.318$ $P < 0.05$

Table 11 Adoption Levels of Innovations According to Services of Consultancy Received by Enterprises

Services of Consultancy	Low		High		Total N
	N	%	N	%	
Yes	4	6.45	21	31.82	25
No	58	93.55	45	68.18	103
Total	62	100.00	66	100.00	128

$\chi^2 = 13.089$ $P < 0.05$

While 6.45% of low innovator enterprises gets services of consultancy, 31.82% of high innovator enterprises gets services of consultancy. The positive correlation was determined between the innovativeness levels of enterprises and case of receiving services of consultancy ($P < 0.05$).

In accordance with the results of study, a positive correlation was determined with the adoption levels of innovations and yield, education of enterpriser, family size, existence of animal, existence of land, frequency of use of mass media tools used and case of receiving services of consultancy. There was a positive correlation between the increase of milk yield in the animal husbandry enterprises and follow up and use of new technologies. In other words, the animal race in the enterprises, milking method, automatic drinking bowl, automatic feeder, fodder properties, ration preparation information, structure of barn and welfare levels of animals increase the milk yield of enterprises and make a positive contribution to the income. As the education level of enterpriser increase, the access to information and levels of use of new technologies at convenient level and in due course also increase. But the educational level of enterpriser decreases as the age of enterpriser increase. This case adversely affects the adoption process of innovations. The young farmers come to the forefront in terms of adoption and implementation of innovations in the research field. This section is the "Innovators" within the category of 4% in terms of agricultural dissemination which we may also call as pioneer farmers. In the research field, the contribution of innovators in the

adoption and implementation of new technologies in the dairy farming is very high. As the young farmers use the mass media tools actively, the effectiveness of mass media tools in telling the innovations should be increased. 57.58% of high innovator enterprises are at the age range of 36-50 years. As the family size increases, the adoption levels of innovations also increase. The positive correlation was determined between the existence of animal and amount of land in the enterprise and adoption levels of innovations. The income increases as the number of animals increases in the dairy farms. But the fodder costs will increase and the income of enterprises will decrease if the amount of land on which coarse fodder production is made is not increase in parallel with the increase in the number of animals. The decrease of incomes of enterprises will lead to extension of processes of following up and implementing the developing technology and adoption of future innovations. Working with the agricultural advisors who serves as a bridge in the access to information by enterprises will accelerate the processes of using individual and mass communication techniques. Therefore, the enterprises will adopt the new technologies in a shorter time and will get a chance to compete on the market. Besides that, the animal welfare should be paid attention to increase the animal yield and technical information should be provided on ration preparation.

Acknowledgments

This study was supported as a whole project by the Selçuk University, Scientific Research Fund (BAP). Project No: 16101001

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