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Decision making analysis of cotton producers via Edinburgh scale

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Abstract
Cotton is one of the strategic and important agricultural products for Turkey. But cotton harvested area decrease year by year in Turkey. The main purpose of the study is to determine the factors affecting on farmers decisions of cotton production. In addition, purposes of farmers, their thoughts about agricultural policies and returning to cotton producing in locations where cotton production decreased. The main material of the study is the datum obtained from face to face survey conducted with farmers all across production areas. Reliability Analysis and Edinburgh Scale were used for analysing the data. According to the results, the main objective of the manufacturer to obtain the highest profit and improve their living standards. Producer thinks they can get it with government supporting and best producing. At the end of the study, with determination of factors in decision making process for product grown by farmers, agricultural policies was thought to be applied more effectively and could be helpful to develop macro policies.

Key Words: *Cotton producer, farmer decisions, agricultural policies, Edinburgh Scale, Turkey*

JEL Classification: *C10, Q10*

1. Introduction

Cotton is a product having economic importance for producer countries with its common and necessary usage, value-added and employment opportunities. Cotton is the raw material in ginning industry in terms of processing, in textile industry with its fibre, in oil and feed industry with its seed and in paper industry from the point of its linter. Oil extracted from cotton seed as an alternative to petroleum is increasingly used for production of biodiesel. Besides, demand for cotton is rising thanks to population growth and increased living of standards.

However, there has been a rapid increase in the cost of cotton production and it has not been reflected exactly proportional to fibre prices owing to import constraints in recent years. Therefore, cotton areas decreased from 750 thousand hectares (1996) to 46 thousand hectares (2013) in Turkey. As a result, despite high yield varieties planted in recent years, cotton production has been decreasing gradually and cotton plantation areas have been increasingly turning into regions grown fruits. It is needed to identify affected factors on the decisions of cotton production for save strategic cotton production.

Cotton have importance as strategic product for government, as added value and profit for producer and as clothing and feeding for costumer. Controversially, cultivation area of cotton is getting decrease year after year. Thereby, cottons importance is gradually getting increase.

When we look at the data in last five years (2005-2013), it is shown that cotton cultivated 32.5 billion hectare area and produced 24 billion tone fiber cotton on the average on worldwide. India has largest cotton producing area all of the world. She is followed by China, USA, Pakistan, Uzbekistan and Brazil subsequently in the world. The top seven cotton producer are China, India, USA, Pakistan, Brazil, Uzbekistan and Turkey. Also the top three are China,

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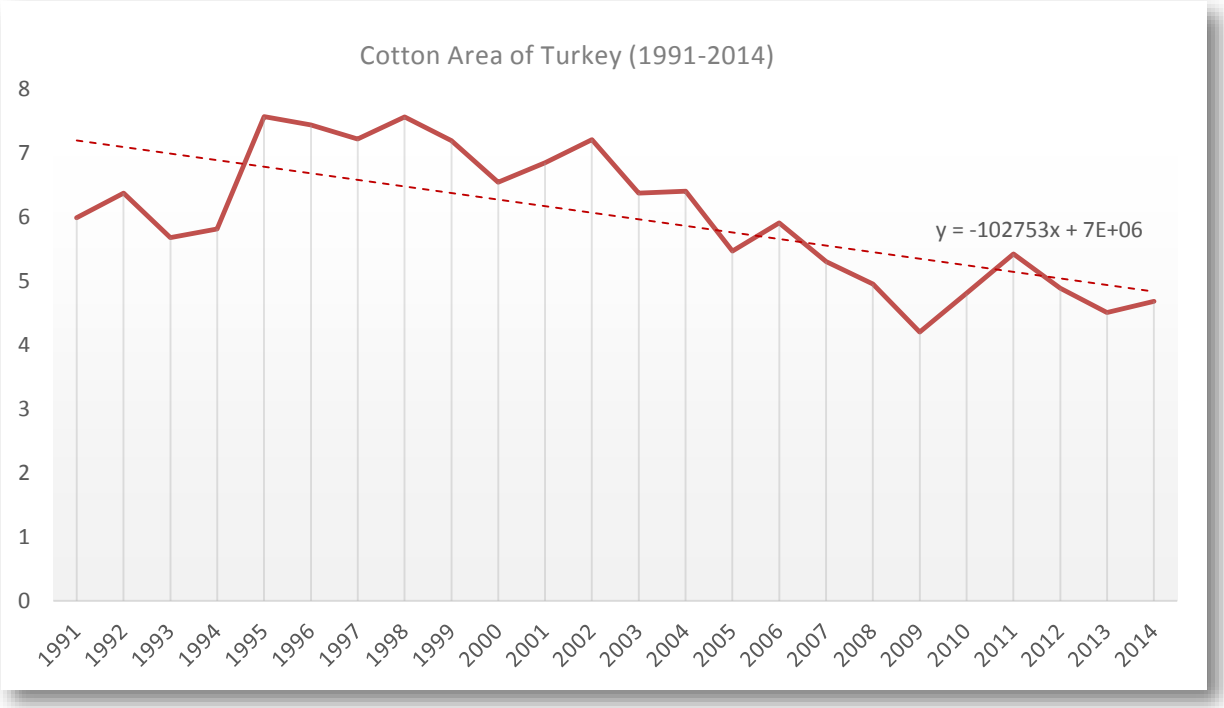
India and Pakistan respectively. And they are followed by Turkey, the United States and Brazil (FAO, 2013).

While Turkey's cotton cultivation areas about 600 thousand hectares in 1991, these areas has reduced approximately 30% in recent years. Notably, the farmers who stay in agricultural business of Aegean and Mediterranean regions has adequately gave place to cotton in the production plan in recent years. A detailed research has not been done according to the issue yet.

Figure 1: The Tendency of Cotton Area of Turkey



Source: TUIK, 2013 (www.tuik.gov.tr).

In this sense, the main purpose of the study is to analyse the decision making procedure of farmers. And to reveal the attitude, objective and behaviour of farmers by using Edinburgh Scale. To identify of the underlying cause of losing significance of cotton productions for farmer is very important information for the policy makers, businessmen, mediators, and producers.

2. Data and Method

The data that is such as to original obtained from 90 agricultural enterprises operated in Aydın region via questionnaire constitutes of main material of the study. General socio-economic information of Aydın could gain from notably Cotton Research Station, Provincial Directorates of Food, Agriculture and Livestock Ministry, The Chamber of Agriculture Engineer, Chamber of Agriculture and Industry, associations and organizations that can keep record at local level. In addition, results of research and examination carried out before on the issue and publications that are published could be benefited from.

8 cities that are Izmir, Manisa, Aydın, Denizli, Mugla, Kutahya, Afyon and Usak in Aegean Region. Cotton production can’t be performed in Afyon, Kutahya, and Usak cities

economically among these cities. Thus, 60% of cotton production in Aegean Region produced totally is produced in Aydın city.

Therefore Aydin where produce 60% of all Turkey's cotton production is selected as study area (TUIK, 2010).

The main material of study is composed of data collected from survey study which was done cross-sectional in Aydın. Proportional approach was used in determination of number of sample that would represent the main population (Miran, 2003; Newbold, 1995).

$$n = \frac{Np(1-p)}{(N-1)\sigma_{px}^2 + p(1-p)} \qquad (1)$$

n: Volume of sample N: The number of agricultural farm in Aydın

σ_{px}^2: Variance[1] p: The rate of cotton producer[2]

According to data of official records, total farm of Aydın was 54166 (Anonymous, 2010). The sample size which was obtained with this formula according to 90% confidence interval and 10% error margin was determined to be 90 at least. The farm which is done survey has been identified randomly.

In this study, main descriptive statistics was calculated and then Reliability Analysis was used in order to determine degree of reliability of our dataset for the analysis (Tavşancıl,2005). After that Edinburgh Scale was used considering the easiness of understanding, in order to determine the affective factors on decision making procedure of cotton producer (Tatlıdil, 1996; Cankurt, 2008).

3. Results and Discussion

3.1. Reliability Analysis

First of all, reliability analysis of responses obtained from the survey questions prepared in attempt to investigate cotton production decisions of the farmers to determine reliability in the level of analysable. 41 questions that are influential on the decision prepared are studied behaviours relation with cotton production decision and 77 questions belonging to edinburg scale impending to data set consisted of 118 variables totally are determined quite reliable (0.723) and responses endowed to the variables are different from each other. According to Hotelling T2 test, differences among question averages are significant statistically (Hotelling T2: 23556.96; p:0.000). According to reliability analysis, data of questionnaires will be used trustfully in analysis.

3.2. General Information on Farmers

Individual and household characteristics of the farmers in the research region are crucial determinants on the decisions will be taken in agricultural operations. Thus, features of the farmers in relation with agriculture are needed to investigate. The characteristics of the farmers on individual and household are examined in the research region. According to this, data is collected on age, education level, and experiences on agricultural management, as well as the number of individuals in farmer households, and also the number of individuals who are engaged in farming.

[1] This value was accepted as 2.58 s_p^2 = 0.025 and calculated as s_p^2 = 0.0097.

[2] This rate is not known. In such cases, in order to enable sample size as great as posible it is suggested that the value of p=0.5 that would give the greatest value from p(1-p). Therefore in determination of sample volume, p=0.5 was taken.

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Table 1. General Information on Farmer

	Mean	Std. Dev.	Min	Max	Median
Age	48	11	22	75	48
Education	7	3	5	16	5
Experience	29	12	2	50	30
Household Individual	5	2	2	11	4
Household Agriculture	2	1	1	9	2

According to the analysis' results, some demographic characteristics on farmers such as age, education, experience, and family information are represented. It is defined that mean age is 48 and education period is 7 year in the research region. While director of the farm is engaged in farming for 29 years, farm family is comprised of 5 individuals, and also 2 individuals within the family are engaged in farming (Table 1).

When analyzed the tables, while mean age of the farmers is 49, and also minimum age is 22 and maximum age is 75 years. While the farmers take education as 7 years' period, large diversification in a vast range is seen from primary school to university. Agricultural experience is a crucial factor in agricultural decisions. While mean agricultural experience is 29 years, it shows a large variation between 2-50 years.

When analyzed household of the farmers, while individuals in the households are changing among 2-11, mean individuals per household are 5. When examined participation of the households to agricultural practices, it is seen that 2 persons support to agricultural production.

3.3. General Information on Agricultural Enterprise

Land size, ownership status and characteristics of land are important factors in agricultural practices. Thus, investigation of the agricultural enterprises are important.

The characteristics of the farmers intended for enterprise specials are examined in the region placed in the research context. Thus, data is collected on land size, ownership status, and circumstance of irrigable and non-irrigable land.

Table 2. General Information on Enterprises

	Mean	Std. Dev.	Min	Max	Median
Land size (da)	221	340	20	2750	118
Ownership status	111	113	0	500	63
Land to rent	168	358	4	2530	80
Sharecropping	223	329	24	800	60
Land to rent out	66	56	26	105	66
Irrigable land	213	335	20	2750	110
Dry farming land	83	61	30	150	70

According to data investigated, while land size of the producers is 221 da, minimum and maximum land sizes are changing between 20 da as minimum and 2750 da as maximum values, respectively. While mean ownership land size is 111 da, land to rent and

sharecropping land sizes are 168 da and 223 da, respectively. And also mean land to rent out is 66 da, ownership, it is seen large variation on land to rent, sharecropping and land to rent out. Size of agricultural enterprises is crucial factor in agricultural production decisions. Land sizes show large variation among 4 - 2530 da in terms of ownership status of the land (Table 2).

While most of the lands of the producers interviewed are irrigable land, mean land size is 213 da, minimum and maximum land sizes are 20 da and 2750 da, respectively. While average dry farming land is 83 da, it is changing between 30 da and 150 da.

3.4. Farmer Decision and Edinburgh Scale

Edinburgh Scale is one of the scales used frequently in farmer decision analysis. It investigates farmer decisions in three dimensions. One of those is farmers' attitudes, other is objectives, and the latter is behavior that is to say implementation of the decision. While preparation of the survey form, it is benefited from the study named Edinburgh Farming Objectives Scale (Willock et al., 1999; Simona and Romano, 2006; Aromolaron and Olayemi, 2000) and required modifications are made considering region conditions.

Table 3. Farmer Attitudes

	Mean	Std. Dev.	Min	Max	Median
Inexpensive government credit should be given to farmers.	4,79	0,59	1,00	5,00	5,00
Vicissitudes in agricultural politics should be declared clearly by the government.	4,72	0,78	1,00	5,00	5,00
Doing planning should be performed in order to make successful farming.	4,59	0,63	3,00	6,00	5,00
Farming is an occupation that is managed well.	4,52	0,55	3,00	5,00	5,00
Produce the best production is crucial.	4,39	0,91	1,00	5,00	5,00
Visiting to other agricultural management is important in the framework of seeing methods applied by them.	4,19	0,91	1,00	5,00	4,00
Farmer children don't want to make farming.	4,18	1,10	1,00	5,00	5,00
Farmers decide own decisions by themselves.	4,04	1,08	1,00	5,00	4,00
Decisions in relation with production are decided by farmer himself.	4,04	1,06	1,00	5,00	4,00
Farmers should make insurance.	4,02	1,14	1,00	6,00	4,00
Reading publications on agricultural practices is important.	3,76	1,32	1,00	5,00	4,00
I have a structure that is no taking risk.	3,68	1,31	1,00	5,00	4,00
Most part of the assets that will be required should be taken as credit.	3,58	1,54	1,00	5,00	4,00
Visiting of authorities to your enterprise occasionally is important.	3,48	1,54	1,00	5,00	4,00
Farming is an occupation being proud of.	3,47	1,62	1,00	5,00	4,00
Following / reading publications on agricultural practices is important.	3,47	1,31	1,00	5,00	4,00
Short term borrowings are important in farming.	3,39	1,54	1,00	6,00	4,00
Other occupations are better than farming.	3,34	1,64	1,00	6,00	4,00

I want to give up agriculture if I have a chance.	3,28	1,83	1,00	5,00	4,00
Consulting with professional advisors before decisions coupled with agriculture is required.	3,01	1,54	1,00	5,00	3,00
There is no important modern record keeping system in farming.	2,41	1,48	1,00	6,00	2,00
Taking financial risks are required in farming.	2,40	1,43	1,00	5,00	2,00
Making application intended for agricultural supports and incentives is easy.	2,28	1,38	1,00	5,00	2,00
There is no more bureaucratic transactions (document, stationary etc.) in agriculture.	2,08	1,10	1,00	5,00	2,00
Agricultural politics in the last years are suitable.	1,93	1,11	1,00	5,00	2,00

Analysis of farmer attitudes among the factors affected in cotton production decision key to Edinburgh scale is given in Table 3. Statements participated by the farmers in maximum level indicated below: 'Produce the best production is crucial (4.64); doing planning should be performed in order to make successful farming (4.63); Inexpensive government credit should be given to farmers (4.46); Vicissitudes in agricultural politics should be declared clearly by the government (4.46). On the other hand, statements participated by the farmers in minimum level indicated below: Agricultural politics in the last years are suitable (2.17); there is no more bureaucratic transactions (document, stationary etc.) in agriculture (2.25).

Table 4. Farmer Objectives

	Mean	**Std. Dev.**	**Min**	**Max**	**Median**
Obtaining highest profit as soon as possible is important.	4,79	0,41	4,00	5,00	5,00
There is needed to increase living standard of family.	4,78	0,44	3,00	5,00	5,00
Using own resources is important.	4,71	0,55	2,00	5,00	5,00
Having machines and equipment up to date is important.	4,67	0,47	4,00	5,00	5,00
Spending time with family is crucial.	4,66	0,48	4,00	5,00	5,00
There is needed to become indebted to as far as slender.	4,52	0,80	2,00	5,00	5,00
Trying to new cultivars in production is important.	4,52	0,66	3,00	6,00	5,00
Chemical fighting in suitable time and dosage is beneficial.	4,51	0,78	1,00	5,00	5,00
There is needed to leave agricultural land like receiving one.	4,51	0,69	2,00	5,00	5,00
Although people has special talents, they are still liable to natural law.	4,46	0,85	1,00	6,00	5,00
Information on political change is insufficient.	4,46	0,94	1,00	5,00	5,00
Objectives of general agricultural politics are not clear.	4,37	1,03	1,00	5,00	5,00
Decreasing of fertilizer and pesticide using with different methods (cropping, farm manure etc.) is important.	4,36	0,98	1,00	5,00	5,00
There is enough resources, as long as people knows how they will use those resources.	4,36	0,81	1,00	5,00	4,00
Plants and animals have right to exist as far as people.	4,32	0,97	1,00	5,00	5,00
Minimizing risk in farming is important.	4,32	0,83	2,00	5,00	5,00

Performing new agricultural investments is important.	4,32	0,87	1,00	6,00	4,00
Having other fields of interest apart from farming is crucial.	4,26	1,01	1,00	6,00	5,00
Authorities don't know what current legal regulations are.	4,12	1,30	1,00	5,00	5,00
World is the place that has constraint resources.	4,07	1,15	1,00	6,00	4,00
Performing cropping system is needed.	4,00	1,18	1,00	6,00	4,00
If everything continues like present day, people will be faced with a huge ecological disaster.	3,96	1,48	1,00	6,00	5,00
There is needed to continue to agriculture on no account.	3,90	1,53	1,00	5,00	5,00
There is need to gain esteems of other farmers in society.	3,80	1,27	1,00	5,00	4,00
Interfering of people to nature poses to results that generally bring disaster.	3,68	1,34	1,00	6,00	4,00
Equilibrum of nature is strong till to cope with negatif effects of industrialization.	3,68	1,30	1,00	6,00	4,00
Participate to festival and gain to prize are needed.	3,60	1,71	1,00	6,00	4,00
People has right to modification within natural environment to fulfil their's needs.	3,58	1,32	1,00	6,00	4,00
Organic agriculture is a transient eagerness.	3,54	1,79	1,00	6,00	4,00
People usually abuses to natural environment.	3,54	1,24	1,00	6,00	4,00
Taking charge in producer organizations is needed.	3,50	1,42	1,00	6,00	4,00
Working in different areas apart from farming is important.	3,46	1,38	1,00	6,00	4,00
Using credit is not good for farming.	3,44	1,37	1,00	5,00	3,50
It is not needed to tillage of land riotous.	3,23	1,54	1,00	5,00	3,00
It is required to make nonagricultural occupation to continue agriculture.	3,23	1,55	1,00	6,00	3,00
Equilibrium of the world is weak as a kitten and it is destroyed easly.	3,17	1,42	1,00	6,00	3,00
Intelligance of people renders to the world unliveable.	3,16	1,56	1,00	6,00	3,00
Environmental problems are exaggerates bellyful.	3,06	1,46	1,00	6,00	3,00
It is needed to use chemical barely.	2,89	1,61	1,00	5,00	3,00
Small scale of the firm is good.	2,09	1,40	1,00	6,00	1,00

Analysis of farmer objectives among the factors affected in cotton production decision key to Edinburgh scale is given in Table 4. Statements participated by the farmers in maximum level indicated below: 'Obtaining highest profit as soon as possible is important' (4.79); 'Using own resources is important' (4.69); 'There is needed to become indebted to as far as slender.' (4.65).

On the other hand, statements participated by the farmers in minimum level indicated below: 'Small scale of the firm is good' (2.75); 'It is required to make non-agricultural occupation to continue agriculture.' (3.28) (Table 4).

Analysis of farmer behaviours among the factors affected in cotton production decision key to Edinburgh scale is given in Table 5. Statements participated by the farmers in maximum level indicated below: "I have difficulty to meet the financial needs of my farms" (4.70); "The debts of my farms has increased for last five years" (4.30); "My financial situation were downfall in last ten year" (4.12). On the other hand, statements participated by the farmers in minimum level indicated below: "I have made a big investment for five years"(1.99); "My agricultural income has increased for five years." (2.14) (Table 5).

Table 5. Farmer Behaviour

	Mean	Std. Dev.	Min	Max	Median
I have difficulty to meet the financial needs of my farm.	4,70	0,74	1,00	5,00	5,00
The debts of my farm has increased for five years.	4,30	1,28	1,00	5,00	5,00
My financial situation were downfall in last ten year.	4,12	1,38	1,00	5,00	5,00
I check my farm's success.	4,04	1,18	1,00	5,00	4,00
I use new agricultural technics.	3,71	1,10	1,00	5,00	4,00
I put bull's eye in my agricultural production	3,61	1,33	1,00	5,00	4,00
I keep the financial record of my farm	3,43	1,61	1,00	5,00	4,00
I have a development plan of my farm over the next five years.	3,06	1,84	1,00	6,00	3,00
I have not find to meet my friend.	2,74	1,49	1,00	5,00	3,00
My harvested area has increased for five years.	2,38	1,63	1,00	5,00	2,00
My agricultural income has increased for five years.	2,14	1,40	1,00	5,00	1,50
I have made a big investment for five years.	1,99	1,44	1,00	5,00	1,00

4. Conclusion

In Turkey, cotton producible area is limited as well as overall world. Cotton producible areas is intentionally irrigated fields of southeast Anatolia, Aegean and Mediterranean regions in Turkey. That is the reason why, the decisions of farmers who are cotton producer is very important for politic decision makers, researchers, mediator, businessmen, and other market stakeholders.

All of the world, Turkey is seventh producer and second exporter country (FAO, 2013).

According to 2013 data, cotton production of Turkey can be meet the requirement just 60% although a strategic product for Turkey. That is, Turkey is obligated to import cotton in order to make it up. At the same time, cotton area should be extended using as motivating tools for farmers on cotton producible areas. With each passing year, cotton areas convert into maize and fruits areas with competitive pressure.

For this, policy makers needs to know "which effective factors on the decisions of farmers which can produce cotton". If the answer of this question can be find, cotton production can improve via some agricultural politic tools. For these reason, some findings were revealed about these issues with this realized study.

Edinburgh scale is one of the most prevalently used a scale for measuring farmer's attitudes, objectives, and behaviours. Edinburgh Scale is used in this study. According to the results, the attitudes of farmer that "Doing planning should be performed in order to make successful farming" and "Produce the best production is crucial". In terms of farmer's objectives, farmers aims that "Obtaining highest profit as soon as possible is important" and "There is needed to increase living standard of family". If it is seen the side of farmers behaves that, they are in a struggle for finance of their farms but the debts of farm has increased in last five years. And financial and economic situation are getting bad in last ten years. Any investment was not made in farms for a long period and decreasing of harvested areas is identified with this study.

As a consequence; farmers would like to produce cotton due to practice and knowing of the cotton production, suitable equipment existing, storability, easy marketability. However, farmers have given up cotton production due to the cost is higher and profit is lower than alternatives. Particularly, policy maker should take steps for regulations of cotton market and farmer price of cotton.

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