FACTORS INFLUENCING ON PARTICIPATION TO AGRICULTURAL COOPERATIVES IN ARMENIA

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Abstract

The creation of agricultural cooperatives has become one of the major priorities in the sector of agriculture in Armenia. Being a post-Soviet country, Armenia greatly depends on agriculture. According to the data of National Statistical Service of Armenia 20.5 percent of Armenian GDP (Gross Domestic Product) is generated from the agricultural sector of the economy, and hence it is one of the priorities of development of Armenian economy (Armstat, 2016). Nowadays people leaving in rural municipalities of Armenia do not have necessary funding to acquire consumer services, such as housing, education, social benefits, telecommunication, credit, and other financial services (Movsisyan, 2013). In this context, agricultural cooperatives, as a major component of the food and agriculture industry, can help them to market their products and enable them to supply at competitive price levels. The continuous creation of agricultural cooperatives in rural communities is distinguished among priorities of the government. So, one of the main goals of government in this sector must be the enhancing of participation of households to agricultural cooperatives. This paper examines the main factors that influence participation of households to cooperatives. It finds out that there is a need to enhance people's awareness about the benefits of agricultural cooperatives. The paper also examines the impact of agricultural cooperatives on household's income and welfare.

Keywords: agricultural cooperative, cooperative movement, voluntary association, cooperative participation, cooperative identity

JEL classification: M10, O20, Q13, P32

1. Introduction

1.1. Background of the Problem

The small sizes of farms and the fragmented lands are the core issues of agricultural development in the post-privatization period in Armenia and are the main obstacles for the future rise of effectiveness in this field. The past experience of the co-operative movement has a great impact on the current state of agricultural co-operation in Armenia, too. The slowdown in the dissemination in Armenia and in all post-Soviet countries is conditioned by peculiarities of cooperative movement. In 1918 the first collective farms were formed, which was the result of the general ideology of collectivization of the economy. These farms were state-owned entities where employed people had received a fixed salary. The latter were associations formed on the basis of collective use of means of production, in first times they were manifested in different ways, depending on the means of joint use. Particularly, until the 1930s there were sharing only land, and the basic means, such as buildings, machinery and livestock, belonged to the villagers. Accordingly, income was distributed not only to the work performed, but also to the value of the means of production provided by individual members. Later, however, the collective farms were united in the form of "agricultural dumps". In this case, the main means of production were also common property, and the income was distributed according to the census (a measure of the quantity and quality of labor). The

collectivization of the economy led to the fact that in different parts of the USSR (Union of Soviet Socialistic Republics), with the aim of becoming a leader in collectivization indicators and exceeding the planned indices, local officials contributed by administrative methods to the formation of collective farms by virtue of voluntariness. However, the problem was not only the violation of the principle of volunteerism, but also the fact that hundreds of collective farms were formed without being economically justified. As a result, productivity in the agricultural sector has dropped sharply. Essentially, the ungrounded forming of collective farms, not only their economic, but also their social and political goals, and then the fallacy of their former members, completely distorted the normal direction of the development of cooperatives. After the collapse of the USSR, the effectiveness of the use of small and fragmented lands resulting from the privatization should increase dramatically, which, however, was slowed down, partly due to the negative attitude of farmers. This is also the result of the policy of "promotion of personal gains" made by post-Soviet countries, which propagated privatization and individual entrepreneurship. Countries in the transitional period were convinced that private enterprises will provide the highest economic outcomes. Such a process left its negative impact on the development of the former Soviet Union member states, including the cooperative movement of Republic of Armenia.

And now in terms of solving the problems concerning the increase of competitiveness of agriculture the main and essential role is assigned to joint companies of farmers by creating agricultural cooperatives and other organizational units based on the principle of voluntariness. Creation of cooperatives is a natural process and has no alternative in terms of increasing productivity in the agriculture sector, ensuring extended reproduction, increasing the production level, especially in countries with transitional economies.

The promotion of the cooperative movement will greatly contribute to ensuring significant progress in improving the living conditions of the rural population and in development of rural areas. Experience in inculcating the idea of cooperation shows that agricultural cooperatives can solve many essential problems in the agricultural sector of Armenia such as overcoming difficulties in selling agricultural products, using agricultural equipment, making resources (fuel, seeds, fertilizers and etc.) available for farmers.

1.2. Cooperative Movement in Armenia

Three stages of cooperative development have been identified in Armenia. The first starts from 1993 when first autonomous, voluntary farmers' organizations developed in Armenia. But huge quantity of them had been closed soon because of farmers' mentality and their misconceptions about the principles of cooperative management and because of their passive participation or non-participation in the economic activities of cooperatives (Urutyan, 2013).

The second stage starts from 2000 and it includes the activities of donors and international organizations and their programs related to cooperative development. A number of projects were implemented by donor organizations and within these programs a great support was given to the creation of cooperatives. For example, with the assistance of UMCOR (United Methodist Committee on Relief) a program was implemented under which 27 cooperatives were created. In this framework the cooperatives received a large amount of loans to do agricultural inputs purchase order. Project partner cooperatives also got management and marketing training and consulting (Urutyan, 2013).

In 2005 by the technical assistance of Foreign Agricultural Service of United States Department of Agriculture (USDA) has established a credit cooperative organization called "Farm Credit Armenia" UCO (Universal Credit Organization) commercial cooperative.

"Farm Credit Armenia" UCO commercial cooperative offers loans to individuals and legal entities engaged in the agricultural activities and in the manufacturing of agricultural food. Company offers 4 main financial products: agricultural loans, agribusiness loans, SME (small and medium enterprises) loans and leasing of agricultural equipment. The mission of "Farm Credit Armenia" UCO is to improve the quality of life in rural Armenia by providing accessible financial services to agriculture; agribusiness; small and medium enterprises, micro-borrowers; young, beginning, and small farmers; women; and minority rural residents (FCA).

The third stage of cooperative movement begins from 2010. Currently promotion of cooperation is one of essential parts of government policy in the sector of agriculture in

Armenia. The latter is evidenced by a series of documents underlying public policy in the agricultural sector. One of these is the Government program, another is the Sustainable Development Strategy of Rural Areas and Agriculture in Armenia in 2010-2020. Since 2012 by the Decision of Armenian Government the creation of agricultural cooperatives has become one of the major priorities in the sector of agriculture. Among the government's priorities in 2016 the continuous creation of agricultural cooperatives in rural communities is distinguished.

By the Initiative of Ministry of Agriculture the draft was developed and on December 21, 2015, the National Assembly passed the "Agricultural Cooperatives" Law, which would improve the legislative basis for the development of agricultural cooperation, promote the formation of agricultural cooperatives, increase the efficiency of farms activities, increase competitiveness in business sphere, increase the level of food security and specify the main directions of state policy on agricultural cooperation (Minagro, 2016). The law on Agricultural cooperatives is in compliance with the International Labour Organization's proposals and with the provisions established by the International Cooperative Alliance. The law regulates the processes of creation, membership, management, decommissioning, restructuring of agricultural cooperatives, defines the rights, obligations and responsibilities of cooperative's members and defines the relationships between the latter and the state (Law on Agricultural Cooperatives, 2015).

Currently there are about 270 agricultural cooperatives in Armenia, and their main purpose is the collection and harvesting of milk, fruit, vegetable, grain crops growing, service delivery through agricultural equipment, apiculture, pasture management.

Since January 2015 a three-year program "European Neighborhood Programme for Agriculture and Rural Development" (ENPARD) has been launched by the United Nations Industrial Development Organization and the United Nations Development Programm and funded by the European Union and the Austrian Development Agency. The main aims are supporting the creation of agricultural cooperatives in Shirak, Lori Gegharkunik, Aragatsotn, Kotayk, Vayots Dzor Marzes (regions), as well as strengthening of cooperatives, developing business skills, increasing production volumes and product range, technology upgrading, marketing and implementation of agricultural best practices and creating disaster risk reduction systems (Minagro, 2016).

2. Literature Review

2.1. Internatioanl Approach to Cooperative Identity and Principles

According to the definition of International Co-operative Alliance (ICA) agricultural co-operative is an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise (ica.coop). By the definition of International Labour Organization (ILO) cooperative is an independent association of women and men, united voluntarily to meet their common, social, cultural needs and aspirations through a jointly owned and democratically controlled enterprise (ILO, 2016). According to the definition of United States Department of Agricultural (USDA) a cooperative is a business owned and democratically controlled by the people who use its services and whose benefits are derived and distributed equitably on the basis of use (USDA, 2012). According to the one of the simplest definitions of agricultural cooperatives it is a voluntarily created economic unit for the production and distribution of goods and services, operated by its members who share their mutual benefits and risks (Urutyan V., Avetisyan S., 2006).

As we can see, the approach to agricultural cooperatives is basically same for different international organizations and countries and the main principles underlying creating cooperatives are the followings. 1. Voluntary and Open Membership. 2. Democratic Member Control. 3. Member Economic Participation. 4. Autonomy and Independence. 5. Education, Training and Information. 6. Co-operation among Co-operatives. 7. Concern for Community (ica.coop).

Despite of the united approach to cooperatives, different countries have their own systems for legal regulations on cooperatives. One of the recent studies emphasizes the two main forms of cooperative legislation.

- A general cooperatives law that regulates all types of cooperatives in a country; this is the most common form of cooperative legislation and can be found, for example, in Brazil, Serbia, Germany, Hungary, India (both at federal and at state levels), Jordan, Kenya, Mexico, Spain and Thailand.
- Separate laws for special types of cooperatives; some countries, e.g. Ethiopia, Japan, Romania, Uruguay and others, have adopted specific laws for different cooperative sectors (Movsisyan, 2013).

Despite of that fact that there is a little information about how to make an ideal cooperative legislation and which form is the most successful, a 'Guidelines for Cooperative Legislation' was written by Hagen Henrÿ and published jointly by the ILO and the Committee for the Promotion and Advancement of Cooperatives (COPAC). The trend is towards having one single general law covering all types of cooperatives because it is believed that:

- one law for all types of cooperatives, possibly with specific parts for specific types of cooperatives/activities, for example housing or savings and credit cooperatives, best guarantees the autonomy of cooperatives, i.e. their power to regulate their own affairs as far as possible through by laws/statutes, since the degree of detail in such a law will be lower than in a multitude of laws
- this low degree of detail diminishes bureaucracy
- one single law avoids the fragmentation of the cooperative movement that might occur where different types of cooperatives were registered under different acts and placed under the supervision of different public authorities with, perhaps, heterogeneous policies
- one single law creates legal security for those dealing with cooperatives. Legal security relates rather to structural and liability aspects than to a specific type of cooperative or activity
- in the context of development constraints, one single law is the most adequate tool to reach congruency between development-oriented, member-oriented and self-sufficiency goals of cooperatives (Henry, 2012).

However, in the light of the recent discussions on how to restore cooperative distinctiveness, it is being considered, especially in the industrialized countries, to have different laws.

2.2. International Literature on Cooperative Participation

Many of recent studies have identified the factors influencing farmers' participation in agricultural cooperatives. The following determinants are mainly chosen for explaining farmers' decision to participate in cooperatives: age (MUGABEKAZI, 2014)(Junichi Ito, Zongshun Bao, Qun Su, 2012), (Meike Wollnia, Manfred Zellerb , 2007), (Degnet Abebaw, Mekbib G. Haile, 2013), (Tanguy Bernard, David J. Speilman, 2009), educational background (MUGABEKAZI, 2014), (Shi Zheng, Zhigang Wang, Titus O. Awokuse, 2012), (Meike Wollnia, Manfred Zellerb , 2007), (Arayesh, 2011), (Degnet Abebaw, Mekbib G. Haile, 2013) risk attitude (Shi Zheng, Zhigang Wang, Titus O. Awokuse, 2012), (Junichi Ito, Zongshun Bao, Qun Su, 2012), cultivated area (Shi Zheng, Zhigang Wang, Titus O. Awokuse, 2012), (Junichi Ito, Zongshun Bao, Qun Su, 2012), (Meike Wollnia, Manfred Zellerb , 2007), (Arayesh, 2011), (Degnet Abebaw, Mekbib G. Haile, 2013), (Tanguy Bernard, David J. Speilman, 2009), annual income (Meike Wollnia, Manfred Zellerb , 2007) , (Arayesh, 2011). Most of these studies have found that these determinants have significant effects, expect of study which is conducted in China (Junichi Ito, Zongshun Bao, Qun Su, 2012) in the field of watermelon production. This research shows that variables related to household characteristics are not significant, including number of household members, age of household, educational background, risk attitude. Instead of these determinants it found out the coefficient of following variables positive: adoption of new technology and seed, neighbor participation and production instability.

Some of these studies are emphasizing the role of other determinants of participation, too: previous experience, history (Shi Zheng, Zhigang Wang, Titus O. Awokuse, 2012), (MUGABEKAZI, 2014), credit and technical assistance and extension services (Meike Wollnia, Manfred Zellerb , 2007), (B. Msimango, O. I. Oladele, 2013), psychological features, political factors and communicational-informational factors (Arayesh, 2011).

All these studies found out the main determinants that influence on farmers' decision to participate in agricultural cooperatives in various markets and in different countries. The factors that influence on farmers' participation in agricultural cooperatives in the Republic of Armenia will be further discussed in the later parts of this paper.

Recent studies also tend to focus on how agricultural cooperatives influence farmers' income. Some of them show that cooperatives improve the economic welfare of farmers. These studies show that farmers participating in cooperatives gain more income than their non-cooperative counterparts. One of these studies is conducted in the field of pig raising in Philippines and it shows that there is a direct relationship between membership to a well-managed cooperative and higher level of income from backyard pig raising (Maharjan, K.L., and C.C. Fradejas, 2006).

One of above mentioned studies (Shi Zheng, Zhigang Wang, Titus O. Awokuse, 2012) is also emphasizing the role of agricultural cooperatives on farmers' income. The research conducted in Northern China shows that agricultural producers perceive cooperatives as a positive means for improving their economic welfare. It suggests that in general, farmers participate in cooperatives because they view it as an institution that can help them to reduce production and marketing risks and ultimately enhance their chances of expanding their business operations and increase their income level.

The results of a research conducted in Rwanda show that Cooperative membership significantly increases farm income (with about 40 to 45%), and significantly reduces the likelihood of being poor (with 10 to 14% points) (Ellen VERHOFSTADT, Miet MAERTENS, 2014).

Another study is conducted in Delta State of Nigeria and it shows that the income and severity of poverty of cooperative and non-cooperative farmers provide sufficient evidence that membership in agricultural cooperatives could serve as a means for improving farmers' income and well-being (Omoregbee, E. F., Ighoro, A., 2012).

But on the other hand there are studies that found out that participation in agricultural cooperatives have no influence on farmers' income. One of them is conducted in the field of rice-producing in China. That paper investigated the treatment effect of participation in a rice-producing agricultural cooperative on the rice income of member households as compared with that of rice-cultivating non-participants. The estimated results show that no significant difference between participants and non-participants in the cooperative is observed in terms of net income from rice production after controlling for the differences in farmers' rice income before the treatment (Hisatoshi Hoken, Qun Su, 2015).

3. Methodology and Data

3.1. Data source

The data used in this research were collected from the survey on commodity supply chains in Central Asia and Caucasus in 2014. Survey was conducted by ICARE International Center for Agribusiness Research and Education. The data were collected from Aragatsotn, Lori, Shirak, Syunik, Gegharkunik marzes (regions) of Armenia.

The questionnaire includes nine parts. The first part concerns to household roster and includes demographical questions, such as age and gender of household hand, educational level, questions concerning employment of family members and questions concerning hired labor. Second part includes questions concerning farm type and land resources, such as the area of plot, distance from household, land use type, source of water and questions about ownership and renting land resources in the last 12 months. The third section includes questions concerning to household assets and farm machinery. It contains questions about the farm tools and equipment that are used in main activities. The fourth part concerns to agricultural production. It includes questions about types of crops and fruits producing on

plots, questions about the problems concerning marketing and water availability and questions concerning to input and costs of farm both related to specific crop and other activities needed for production (taxes, fees, depreciation costs). The fifth section contains questions about livestock production. The sixth section dedicated to cooperation. It contains questions about the main activities that are done jointly or farms are willing to do them jointly. It also includes information about formal and informal cooperatives existing in the field and the main benefits that membership is bringing to participants. The seventh section contains questions about processing and quality standards of fertilizers, transport, harvesting, hygiene and animal welfare. The eighth part contains questions about availability of information and extension markets. The ninth part contains questions about uncertainty risk and management options, including questions concerning insurance.

3.2. Descriptive Statistics

As shown in Table 1, the age of the head of households mostly varies between 36 and 55 years. Survey has also indicated that even though the greatest percentage (28.5%) of the heads of households has university degree, the great percentage of them has educational level of middle school, high school or college. It is also shown in Table 1 that more than 90% percent of the heads of households are man. Survey shows that 78,05% respondents' land size is less than 10 hectare.

Table 1. Survey results on households' social-demographic, individual and operational characteristics in the Republic of Armenia

Variable	Number of Households	Percentage
Age of the Head of Household (Year)		
<=35	43	10,75
36-55	206	51,50
56<	151	37,75
Children in the Household (<16years)		
Yes	233	58,10
No	168	41,90
Educational Level of the Head of Household		
Primary	1	0,25
Middle school	99	24,75
High school	88	22,00
College	98	24,50
University degree	114	28,50
Gender of the Head of Household		
Male	360	90,68
Female	37	9,32
Marz (Region)		
Aragatsotn	55	13,72
Gegharkunik	106	26,43
Lori	48	11,97
Shirak	119	29,68
Syunik	73	18,20
Land Size (Hectare)		
<10	313	78,05
10-19	49	12,22

Variable	Number of Households	Percentage
20<	39	9,73
Variety of Crop and Fruit Production (Multiple Choice)		
Wheat	398	99,25
Barley	259	64,59
Potato	129	32,17
Perennial hay grasses	78	19,45
Other vegetables	10	2,49
Annual hay grasses	13	3,24
Corn	5	1,25
Apple	1	0,25
Berries	1	0,25
Water Availability in 2014		
very bad	205	51,38
below average	85	21,30
average	76	19,05
above average	25	6,27
very good	8	2,01
Variety of Livestock Production (Multiple Choice)		
Milk cows	307	76,75
Chickens	195	48,63
Beef cattle	174	43,50
Sheep	152	37,91
Pigs	75	18,70
Sow	33	8,23
Breeding bulls	22	5,49
Bees	22	5,49
Horses	14	3,49
Rabbits	7	1,75
Ducks	3	0,75
Donkeys/Mules	2	0,50
Goats	2	0,50
Other Poultry	1	0,25
Revenue from Crop and Fruit Production in 2014 (Armenian drams)		
0	158	39,40
<=50000	217	54,11
50000-99999	6	1,50
100000-199999	3	0,75
200000-299999	5	1,25
300000-399999	2	0,50
400000-499999	3	0,75
500000-599999	1	0,25
600000-699999	2	0,50

Variable	Number of Households	Percentage
>=700000	4	1,00
Income from Livestock Production in 2014 (Armenian drams)		
0	154	38,40
<10000	71	17,71
10000-99999	40	9,98
100000-199999	69	17,21
200000-299999	41	10,22
300000-399999	17	4,24
400000-499999	8	2,00
>500000	1	0,25
Participation in Informal Cooperatives		
Yes	102	25,44
No	299	74,56
Participation in Formal Cooperatives		
Yes	31	7,73
No	369	92,27
Risk Source/ Drought		
not important at all	3	0,75
somehow important	11	2,75
Important	93	23,25
very important	293	73,25
Risk Source/ Market Price		
not important at all	5	1,25
somehow important	37	9,27
Important	200	50,13
very important	157	39,35
Risk Source/ Customs Regulations and Allowances		
not important at all	238	59,50
somehow important	126	31,50
Important	29	7,25
very important	7	1,75
Risk Source/ Spring Frost		
not important at all	26	6,50
somehow important	81	20,25
Important	226	56,50
very important	67	16,75
Risk Source/ Early Frost		
not important at all	17	4,25
somehow important	85	21,25
Important	228	57,00
very important	70	17,50
Risk Source/ Wind		

Variable	Number of Households	Percentage
Importance		
not important at all	35	8,79
somehow important	121	30,40
Important	176	44,22
very important	66	16,58
Risk Source/ Storm Importance		
not important at all	45	11,25
somehow important	137	34,25
Important	179	44,75
very important	39	9,75
Risk Source/ Varmints Invasion		
not important at all	74	18,50
somehow important	85	21,25
Important	188	47,00
very important	53	13,25
Risk Source/ Hail Importance		
not important at all	5	1,25
somehow important	11	2,75
Important	87	21,75
very important	297	74,25
Risk Source/ Flood Importance		
not important at all	213	53,52
somehow important	105	26,38
Important	62	15,58
very important	18	4,52
Risk Source/ Winter Killing		
not important at all	36	9,05
somehow important	111	27,89
Important	198	49,75
very important	53	13,32
Risk Source/ Changes Importance		
not important at all	12	3,02
somehow important	44	11,06
Important	201	50,50
very important	141	35,43
Access to Information and Extension Services		
Yes	79	19,70
No	322	80,30
Subsidized inputs/Seed		
Yes	108	26,93
No	293	73,07
Subsidized inputs/Fertilizer		

Variable	Number of Households	Percentage
Yes	295	73,57
No	106	26,43
Subsidized inputs/Fuel		
Yes	216	53,87
No	185	46,13
Subsidized inputs/Credit		
Yes	76	19,00
No	324	81,00
Subsidized inputs/Machinery		
Yes	0	0,00
No	400	100,00
Subsidized inputs/Other equipment and devices		
Yes	0	0,00
No	400	100,00

Source: ICARE International Center for Agribusiness Research and Education, Survey conducted in 2014

Table 1 reports, that agricultural products include crops, grain and fruits, as well as livestock products. 39,4% of respondents are not engaged in crop and fruit growing or selling. 54,11% of respondents got less than 50000 Armenian drams (AMD) as revenue from sales of crops and fruits in 2014 and only 1% of them got more than 700.000 AMD as revenue. 99.25% of them are engaged in wheat growing, 64,59% of them are engaged in barley growing and 32.17% of respondents are growing potato. It is also shown that 38,4% of respondents are not engaged in livestock production or sales. As Table 1 shows, great percentage of them are engaged in milk cows, chickens, beef, sheep and pig production. Table 1 shows that 17,71% of respondents earned less than 10000 AMD as annual income from sales of life animal, milk, wool, skin, egg, honey, manure or other in 2014.

The survey also answers the question how was the water availability for farms in 2014. According to answers it is in the “very bad” scale for more than 50% of sampled respondents.

The survey also shows that 102 households (25,44% of sampled respondents) are participants of informal cooperatives and only 31 households (7,73% of sampled respondents) are participating in formal cooperatives. Results of survey also show that 30 participants of formal cooperatives are also participants of other informal cooperatives. In other words, 103 households are participating in agricultural cooperatives, from which 102 are informal cooperative members. Consequently, later we will examine factors affecting households participation in informal cooperatives with the consideration that the determinants that are affecting farmers’ participation in cooperatives are going to be mainly the same for both formal and informal cooperatives. Most of activities performing jointly with other farmers are production, mechanized field works, selling of farm products and purchase of farm inputs.

Table 1 also shows the importance of various risks in production and business operations of households. It indicates that drought and hail are considered to be “very important” risks for production. Market price, spring and early frosts, wind, storm, varmints’ invasion, winter killing and changes in feed, seed, fuel, machinery repairs, chemicals, custom services are also considered as “important” risks for the great percentage of respondents.

It is also shown in Table 1, that 19,70% of households received information/advice from extension agents. It mostly referred to soil and water conservation and crop protection.

As Table 1 shows, more than 90% of respondents own spades, scythes, pitchforks and rakes. 23,25% of respondents are tractor owners, 48,75% of households are car or minibus owners and 22,00% of them have lorries.

We can also see in Table 1 that 73,57% of households received subsidized fertilizers, 26,93% of them received seed, 53.87% of respondents got subsidized fuel and 19% of them

received credit as a subsidy. Machinery or other equipment and devices were not given as a subsidy to households.

3.3. Definition of Variables and Methods Used in Analysis

As a dependent variable we define "Farmers' participation in informal agricultural cooperatives", because as we discussed above, the great percentage of households are participating in informal cooperatives. Explanatory variables are based on some of previously discussed characteristics of households which we expect have significant influence on farmers participation in cooperatives. Some of independent variables used in our analysis describe socio-demographic characteristics of households. These are the age of the head of household, educational level of the head of household, gender of the head of household, region, land size. The other group of variables describes operational situations of households. It includes the revenue gained from crop and fruit production, as well as from livestock production. We expect that water availability also will be important factor influencing farmers' participation in cooperatives. We include in model the main types of agricultural production and consequently the variables are the following: wheat producers, barley producers, milk cows owners, beef cattle owners, sheep owners, chickens owners. We expect that the access to information and extension services is also a significant factor for participating. We include in model some of important risk sources for farmers, as we expect that farmers will participate in cooperatives if their risks are high. We also think that the factor of receiving of subsidized inputs is also an important determinant of participating.

Stata 14.1 statistical software is used in analyses. As our dependent variable is binary (the 102 households who are participating in informal cooperatives are represented as "1" and 299 of households who are not members of cooperatives are represented as "0"), we could not use simple regression in our analysis. So logit regression model is used, which gives the opportunity to describe data and to explain the relationship between dependent binary variable (participation in informal cooperatives) and other ordinal (educational level of the head of household, water availability, risk source), categorical (gender of the head of household, marz (region)), interval (age of the head of household, land size, income from livestock production in 2014, revenue from crop and fruit production in 2014) and binary (subsidized inputs, access to information and extension services, crop and fruit producers) independent variables. In Table 2 summary is shown for statistics of variables included in analyses.

Table 2. Summary statistics of variables

Variable, Description (when needed)	Mean	Std. Dev.	Min	Max
Participation in Informal Cooperatives	0.254364	0.436047	0	1
Age of the Head of Household	52.0175	12.43478	23	90
Educational Level of the Head of Household (primary, middle school, high school, college, university degree)	3.5625	1.153004	1	5
Gender of the Head of Household	0.906801	0.291078	0	1
Marz (region)	2.882793	1.209846	1	5
Land Size	12.68843	47.87154	1	800
Wheat producers	0.992519	0.086278	0	1
Barley producers	0.645885	0.478842	0	1
Milk cows producers	0.7675	0.422955	0	1
Beef cattle producers	0.435	0.496378	0	1
Water Availability in 2014 (very bad, below average, average, above average, very good)	1.862155	1.057895	1	5
Revenue from Crop and Fruit production	28957.63	204623.6	0	3560000
Income from Livestock production	75162.88	109669.4	0	600000
Access to information and extension services	0.197008	0.398235	0	1
Subsidized seed	0.269327	0.444164	0	1
Subsidized credit	0.19	0.392792	0	1
Risk source/ drought importance (somehow	2.69	0.560969	0	3

Variable, Description (when needed)	Mean	Std. Dev.	Min	Max
important, important, very importamnt)				
Risk source/ market price importance (somehow important, important, very importamnt)	2.275689	0.679333	0	3
Risk source/ hail importance (somehow important, important, very importamnt)	2.69	0.587164	0	3

Source: Outputs of analyses by authors using Stata 14.1 statistical software

4. Results

Table 3. Estimation results for determinants of participation in informal agricultural cooperatives in Armenia

Logistic regression — Number of obs = 389
LR chi2(18) = 59.29
Prob > chi2 = 0.0000
Log likelihood = -192.07392 — Pseudo R2 = 0.1337

Participation in Informal Cooperatives	Odds Ratio	Std. Err.	Z	P>z
Age of the Head of Household	1.008653	0.011295	0.77	0.442
Educational Level of the Head of Household	1.326712	0.157197	2.39	**0.017**
Gender of the Head of Household	2.586396	1.384603	1.78	**0.076**
Marz (region)	0.956701	0.106045	-0.4	0.69
Land Size	1.000431	0.002267	0.19	0.849
Wheat producers	0.617481	0.804877	-0.37	0.711
Barley producers	2.047056	0.617499	2.37	**0.018**
Milk cows producers	0.56423	0.197011	-1.64	0.101
Beef cattle producers	1.75834	0.526621	1.88	**0.06**
Water Availability in 2014	0.68659	0.093214	-2.77	**0.006**
Revenue from Crop and Fruit production	1	7.66E-07	-0.23	0.816
Income from Livestock production	1.000002	1.21E-06	1.81	**0.07**
Access to information and extension services	2.219233	0.683614	2.59	**0.01**
Subsidized seed	0.770523	0.224727	-0.89	0.371
Subsidized credit	2.518992	0.762697	3.05	**0.002**
Risk source/ drought importance	0.729587	0.158491	-1.45	0.147
Risk source/ market price importance	0.880746	0.167138	-0.67	0.503
Risk source/ hail importance	0.671319	0.145079	-1.84	**0.065**
_cons	0.464524	0.858838	-0.41	0.678

Source: Outputs of analyses by authors using Stata 14.1 statistical software

As we can see from Table 3, the P-values of age of the head of household, gender of the head of household, marz (region), land size, wheat producers, milk cows producers, beef cattle producers, revenue from crop and fruit production, income from livestock production, subsidized seed, risk source/ drought importance, risk source/ market price importance and risk source/ hail importance are greater than α=0.05 level of significance, so the test fails to reject the null hypothesis, which means that the above mentioned variables are statistically insignificant, with 5% significance level.

Educational level of the head of household, barley producers, water availability in 2014, access to information and extension services and subsidized credit are variables which have P-values less than α=0.05 level of significance, so the test rejects the null hypothesis, which means that the above mentioned variables are statistically significant, with 5% significance level.

5. Discussion

We can conclude, that for every additional unit increase in independent variable of educational level of the head of household, other things being equal, the probability to join informal cooperatives increases 1.3 times. This means that the farmers who have higher level of education are more likely to participate in cooperatives. So, educational level of the head of household has a significant and positive effect on participation.

The independent variable of barley producers has also significant and positive effect on participation. This means that barley producers are more than 2 times more likely to participate in informal cooperatives than farmers who are not engaged in barley production.

We can also see, that for every additional unit increase in independent variable of water availability in 2014, other things being equal, the probability of joining informal cooperatives decreases with a multiple rate of 0.69. As we mentioned above, the answers of the question concerning water availability include following choices: very bad, below average, average, above average, very good. So, it is obvious, that farmers are more willing to participate in cooperatives when they have worse conditions for water availability.

The independent variable of access to information and extension services has also significant and positive effect on participation. This means that households who have access to extension and information services are 2.2 times more likely to participate in informal cooperatives than farmers who are not receiving these services.

Likewise, the independent variable of subsidized credit has also significant and positive effect on participation. This means that households who receive credit as a subsidies are 2.5 times more likely to participate in informal cooperatives than farmers who don't.

But, as we can see following variables are also statistically significant, with 10% significance level: gender of the head of household, beef cattle producers, risk source/ hail importance, income from livestock production. This means that the households, heads of which are male, are 2.5 times more likely to participate in informal cooperatives than those households, which heads are female. And also beef cattle producers are 1.8 times more likely to participate in informal cooperatives than farmers who are not engaged in beef production. Our expectations are not fulfilled concerning to risk source variables. Moreover, we can see that for every additional unit increase in independent variable of risk source/hail importance, other things being equal, the probability of joining informal cooperatives decreases with a multiple rate of 0.67. Although the variable of income from livestock production is also statistically significant, with 10% significance level, but for every additional unit increase in this independent variable, other things being equal, the probability to join informal cooperatives increases only with a multiple rate of 1,000002. So, we can conclude that this explanatory variable yields no significant outcome.

6. Conclusion

As shows the theoretical part of our study, creation of agricultural cooperatives can solve one of the most important issues in Armenian agricultural sector, which is the problem of fragmented lands. But the findings of study show that the percentage of participation in agricultural cooperatives is not on higher levels in Armenia. Only 7.73% of sampled households are participating in formal agricultural cooperatives and 25.44% of all respondents are members of informal cooperatives. We can conclude from econometric analysis that people with higher educational level are more eager to participate in cooperatives, than householders with primary or middle educational level. Likewise, people who have access to information and extension services are more eager to join cooperatives. So, we can conclude that most of the people living in rural areas are not aware of opportunities to join cooperatives and they are not aware of benefits which are given from doing some activities jointly. Econometric analyses also show that people who consider their operational situation is in bad conditions are more eager to join cooperatives than the others. From the analyses we also found out that man householders are more eager to cooperate than woman heads of households. So, we can say that these analyses will help to concentrate more on segment that is more eager to participate in cooperatives and to raise the awareness of those households who do not participate.

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