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Determining the Factors Effective the Effectiveness of Agricultural Mechanization Cooperatives by Confirmatory Factor Analysis

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Abstract

Cooperative organizations play an important role in improves the quality of work, especially in agricultural sector. The main purpose of this research was to determining the effective factors on the effectiveness of agricultural mechanization cooperatives (EAMC) in the Mahabad Township that located in west Azerbaijan province, Iran. The research population included farmers that member agricultural cooperatives in Mahabad township in the West Azerbaijan Provinces (N = 18758). By using Cochrane formula sample size was determined as 215 people. The data collection tool was the questionnaire. Reliability coefficient of the questionnaire was obtained by Cronbach's alpha that was 0.769. Results showed that factors influencing the effectiveness on agricultural mechanization cooperatives (EAMC) include management, economic, social, policy-making and educational factors. Also finding of confirmatory factor analysis by lisrel shows that the highest value of R2 = 0.72 was related to the policy making factor and the lowest value of R2 = 0.42 was related to economical factor.

1. Introduction

In Iran in 2018 year the numbers of 3857 new cooperative companies have been registered in the country for various business activities. On average, more than 11 cooperatives are formed and registered in the country each day and their operating status is being exploited. The total number of members of these cooperatives is 72324 members and the number of employees is 61986 person, with initial capital of about 889 billion Rial (Ebadzadehet al., 2018).

Farmers that participate in agricultural division of labor and cooperation means transform their agricultural production from a traditional self-sufficient mode to one that is specialized and intensive. Agricultural division of labor measured by farmers' participation in an agricultural division of labor in the production stages, or in agricultural products, and agricultural cooperation measured by farmers' participation in farmers' cooperatives significantly and positively influence their agricultural production efficiency after correcting farmers' endogenous selection bias (Liu et al., 2019).

Agricultural sector is considered as an affective factor on economic development by policy makers. In addition, rate of population growth and need to provide food, always have been concerned by planners (Rasouliazar, 2018). Agriculture is an important economic sector in Iran. Despite the importance and the role of agriculture sector in food production and employment and exports, agricultural society is facing with many problems including: poverty, unemployment and hidden unemployment, low productivity, environmental destruction, poor structure of human resources employed in agriculture, weak extension systems in the agricultural sector (Mirzai et al., 2008). Development of the agricultural sector and increasing the resource productivity requires continuous increase of knowledge and skills of agricultural producers (Anderson, 2008).

Cooperative organizations plays an important role in improve the quality of work,

especially in agricultural sector. Cooperative can be identified as an autonomous, association of persons united voluntarily to meet their common, economic, social and cultural needs and aspirations through jointly owned and democratically controlled enterprise (Abdulquadri and Mohammed, 2012). Modern agriculture requires an innovative capacity which goes far beyond the individual farmer, researcher, industrialist, and even beyond the abilities of any one of their organizations or institutions. Small lands, excessive use of inputs, inappropriate mechanization, traditional irrigation, and low performance are among the main challenges in agricultural sector. Agricultural production cooperatives in the presence of proper management can play an important role in solving these problems (Terameshlo et al., 2016).

In Iran the agricultural sector has an important role in food security, economic growth, job creation and GNP. This sector also accounted for share of non-oil export sector. Accordingly, we conclude that the growth of the agricultural sector cause to a large extent be determined by the country's economic growth (Bageri and Moazen, 2010).Planning and more efficient use of machinery in agriculture need to learn from the region as well as the factors influencing the adoption by farmers. Mechanization of agriculture is an integral part because mechanization has the low cost of the car in front of the labor force, better quality and easier operation and management of the machinery (Mohamadi and Zarefiyan, 2006).

The rural production cooperatives have an important mission in agricultural sector, that include the improve productivity of the village, preventing the migration of rural people to urban region and create balance in the development of rural areas. The mechanization cooperatives have a useful tool for working people and cooperatives play an important role in achieving sustainable development. And also cause to enhance rural people's ability to boost the development of rural areas (Taherkhani, 2007). In conjunction with the word mechanization may be mentioned that the word is derived from the mechanical. In the case of equipment and instruments and equipment mechanization is said to have used for the production of agricultural operations. Amjadi and Chizari (2006) indicated that government programs in recent years in the use of machinery in agriculture were not successful. Mechanization has also led to the failure of development programs and also did not even respond to the depreciation of machinery.

Almasi (2001) states that definition of mechanization is application of technology in agriculture sector for access to sustainable development.

Bayati et al (2001) in their study indicated that the investment support, motivation and willingness to invest in appropriate and proportionate to the objectives of the company. And be expressed the expected economic justification for investors. Presents findings from research projects, the proportion of investment by the results of the agricultural machinery sector (agriculture, building service companies) for them to be transparent.

Peshbien and colleagues (2008) in their study determined that the low productivity of the machine operation due to lack of proper use of machinery. And to develop training priorities and maintenance and operation of the inputs to favorably increased productivity.

Chasango and Obi (2010) finding research showed that mechanization is an important factor in the performance of farmers. And the results showed that the availability of land and access to resources to achieve production efficiency are critical. The government should be in his plans more attention for increase development and support of development of mechanization to improve the productivity.

For increase the efficiency of agricultural mechanization the government is need more attention to an effective and stable structure for the lack of development of mechanization in agriculture sector(Akinbamowo, 2013).

It is necessary points to the qualitative and quantitative development of each product according to the shape and dimensions of the machines used in farm mechanization (Havrlandet al., 2006).

The results of Amadi et al(2014) showed that delivery loans and financing material to farmers is cause to make better use of agricultural machinery and necessary to motivate and increase efficiency.

Bigdeli et al (2007) findings in relation to the development of agricultural mechanization in the Hamadan province showed that development of mechanization in this province is not desirable, and also results showed there is a significant relationship between the amount of financial received, support services, education and parts of agricultural land and agricultural experience and mechanization development is found.

The results of Amini and Ramazani (2006) reflect the fact that cooperatives have been unsuccessful in achieving the desired goals and meet the expectations of members. The results of path analysis showed that technical manager’s skills, age record membership in cooperatives, participation in cooperative's affairs, the quality of education offered, number of training courses and human manager’s

skills have the greatest impact on the success of cooperatives.

The results of Nekoeynaeniy et al (2007) reflect the relative success of cooperative companies dependent in terms of social and economic goals. The results also show that factors in determining a successful cooperatives from unsuccessful cooperatives include the :company's relationships with governmental and nongovernmental organizations, rural cooperative organizational performance in terms of control, monitoring and training, capital of managers and cooperatives members.

The research results of the Sabet et al (2010) showed that there is a significant relationship between manager's demographic characteristics such as age, education, management experience and satisfaction of members of the rural cooperative operation. Also the methods of management decisions have a direct and positive impact on member satisfaction.

Due to the geographical position of the Mahabad city in west Azerbaijan, which is devoted to agricultural activities the agricultural mechanization cooperatives provides services to farmers for agricultural activities. Therefore, it is necessary the factors that affective in cooperatives efficiency were studied.In the Mahabad Township there are eight agricultural cooperatives that active and delivering agricultural mechanization services to 18758 farmers in rural area. Unfortunately in recent years, these companies have failed in to development in the agricultural sector. Considering the state of agriculture in Mahabad township and many stakeholders who are active in the agricultural sector, the researcher tries to identify affecting factors on the efficiencyof the services, mechanization cooperatives, provide the areas for development and enhance the efficiencyand improve the management of these units. Due to the geographical position of the Mahabad Township in west Azerbaijan, which is devoted to agricultural activities the agricultural mechanization cooperatives provides services to farmers for agricultural activities. Therefore, it is necessary the most components that affective in cooperatives efficiency were investigated.

2. Materials and methods

The methodology used in this research was survey research method. These methods included the use of correlation and descriptive analysis as data processing methods. A questionnaire was developed based on interviews and the relevant literature. The questionnaire included both open-ended and fixed-choice questions. A 5-point Likert scale was applied as a quantitative measure. Content and face validity were established by a panel of experts consisting of faculty members and experts in the social science. Cronbach's Alpha coefficient was 0.769, which demonstrated that the questionnaire was highly reliable. The research population included farmers that member agricultural cooperatives in Mahabad township in the West Azerbaijan Provinces (N = 18758). By using a Cochran formula, sample size was determined at 215. Confirmatory Factor Analysiswas used, to determine influencing factors on the efficiency of agricultural mechanization cooperatives in the township of Mahabad byLisrel 8.1 software.

$$n = \frac{N(ts)^2}{Nd^2 + (ts)^2}$$

$$d = t\frac{s}{\sqrt{30}}$$

$$d = 1.96\frac{8.26}{\sqrt{30}} = 2.95$$

$$n = \frac{18758(1.96 * 8.26)^2}{18758 * 1.12^2 + (1.96 * 8.26)^2} = 214.145$$

3. Results and discussion

The results of descriptive statistics show that the average age of respondents were 44 years, with 10.7 years agricultural experience. The average years of receive services by agricultural mechanization cooperatives (AMC) was 6.5 years. And the average area of agricultural land was 6.6 hectares (Table 1).

3.1 Priority of factors on the effectiveness of agricultural mechanization cooperatives (EAMC)

Table (2) shows the mean, standard deviation, coefficient of variation and prioritizing the variables related to management factor on the effectiveness of agricultural mechanization cooperatives. Results shows that management variables such as "appropriate division of responsibilities between member " (CV=0.200) was the main important management factor in the effectiveness of agricultural mechanization cooperatives and "coordination between the activities of the company and members"(CV=0.202) and "have a plan for success" (CV=0.217) located in the 2th and 3th important priorities management factor on the effectiveness of agricultural mechanization cooperatives (table 2).

Also Results shows that policy factor such as "government support for the payment of loans to cooperatives and farmers" (CV=0.196) was the main important policy factor and "encourages the government to form cooperatives" (CV=0.206) and

"provide proper access of farmers to agricultural inputs" (CV=0.214) located in the 2th and 3th important priorities policy factor on the effectiveness of agricultural mechanization cooperatives.

Also Results shows that educational variables such as "improve the level of knowledge of management and staff through training courses" (CV=0.197) and "application of knowledge in the management of cooperatives"(CV=0.206) and training centers through raining" (CV=0.210) located in the 1thand 2th and 3th important priorities educational factors on the effectiveness of agricultural mechanization cooperatives.

The economical variables such as "provide loans with lower interest rates to farmers to increase their income" (CV=0.203 and "providing inputs to farmers at a reasonable price" (CV=0.221) and the use of financial facilities to expand the company's goals" (CV=0.224) were the important economical factor on the effectiveness of agricultural mechanization cooperatives. Results shows that social variables such as "interest in collective and collaborative activities among members" (CV=0.208) and "interests of members cooperative teamwork and partnership" (CV=0.211) and feeling job security by members" (CV=0.216) were the important social factors on the effectiveness of agricultural mechanization cooperatives (table 2).

3.2 Results of Confirmatory Factor Analysis of Factors affecting the effectiveness of Mechanization Cooperatives (EAMC)

The results of confirmatory factor analysis of the influential factors are as follows: Non-standardized factor loadings are significant for the variables of educational, managerial, social, policy, and economic structures that are unbound (Table 3).These estimates show that changes every unit in the above factors, 1.85, 1.72, 1.84, 3.25, 1.04 units will be effective in the effectiveness of mechanization cooperatives. And it's also positive for their change. Indicates the standard error value according to Table (4) shows that the parameters of the influencing factors can be reliably determined from the available data. The significance of t for these five factors also confirms. The economic factors variable was used as the reference variable to determine the scale. The parameter value for this variable is set to 1. Therefore, the estimate is not standardized or t is not calculated. An examination of the values of the errors in the variables shows for each of the influencing factors. The lowest error rate is related to "policy-making factor " (0.28) and the highest error rate is to "economic factor" (0.58) (Figure 1).

In Table 3 and Figure 1 complete standardized factor loads of each of the effective factors is shown. Policy and management and social Factors with 0.85, 0.83 and 0.83 have the highest correlation and most importance in latent variables, ie the effectiveness of agricultural mechanization cooperatives. In addition to the significant factor loadings of calculated R2 values for explicit variables. This rate is relatively high. It shows the importance of the explicit variables considered in explaining the latent variables (the effectiveness of the agricultural mechanization cooperative).

The highest value of R2 = 0.72 respectively was related to the policy making factor and the lowest value of R2 = 0.42 was related to economical factor (Table 3). It is noteworthy that the fitting of the proposed model uses comparative fitting indices. The amount of NNFI = 0.94, CFI = 0.96, RFI = 0.93 and IFI = 0.97 is acquired. These indices show that the proposed model has an acceptable fit (table 4).

Policy and management and social Factors with 0.85, 0.83 and 0.83 have the highest correlation and most importance in latent variables, ie the effectiveness of agricultural mechanization cooperatives.This illustrates that of paying attention to the policy factors for effectiveness of agricultural mechanization cooperatives. It is therefore essential that they should be clearly supported by the government. On the other hand, attention must be paid to the management factor and internal issues of the companies. Company members need to have the necessary planning for effective management of the company. It is also noteworthy that agricultural mechanization companies must be well-adapted to the social conditions of farmers. This is one of the most important issues in promotional discussions. Also the standardized coefficients for educational and economic structures are 0.75, 0.69 and 0.65. This is very important and indicates the high importance of these factors. The calculated R2 values are also high for the factors and indicating that the factors considered are important in explaining the latent variable changes. Complete standardized factor loads of each of the effective factors is shown. The most correlated policy and social and managerial variables are observed and most important are the latent variables, the effectiveness of the agricultural mechanization cooperative. In addition to the significant factor loadings of calculated R2 values for explicit variables. This rate is relatively high. It shows the importance of the explicit variables considered in explaining the latent variables (the effectiveness of the agricultural mechanization cooperative).

Table 1. Demographic characteristics of respondents

Variables	Mean	SD	Max	Min
Age	44	9.03	23	68
The agricultural experience	10.7	6.5	50	2
The average area of agricultural land (hectare)	6.5	5.2	50	3
The average years of receive services by AMC	6.5	4.27	1	12

Table 2. Priority Affective factors on the effectiveness of agricultural mechanization cooperatives

Factors		Mean	SD.	CV	Rank
	Appropriate division of responsibilities between member	3.85	0.77	0.200	1
	Coordination between the activities of the company and members	3.86	0.78	0.202	2
	Have a plan for success	3.82	0.83	0.217	3
Management	Adoption of new methods for success	3.62	0.80	0.220	4
Factor	Responsibility manager	3.81	0.85	0.223	5
	Excellent work	3.75	0.84	0.224	6
	Creativity and innovation	3.84	0.87	0.226	7
	Control activities	3.89	0.88	0.226	8
	Courage and risk-taking	3.66	0.84	0.229	9
	Perseverance and achievement	3.58	0.89	0.248	10
	Government support for the payment of loans to cooperatives	3.76	0.74	0.196	1
Policy Factor	Encourages the government to form cooperatives	3.87	0.80	0.206	2
	Provide proper access of farmers to agricultural inputs	3.78	0.81	0.214	3
	Government incentive policies for integrating land	3.72	0.83	0.223	4
	Government subsidies to farmers	3.65	0.93	0.254	5
	Improve the level of knowledge of management and staff	3.79	0.75	0.197	1
Educational	Application of knowledge in the management of cooperatives	3.83	0.79	0.206	2
Factor	Training centers through training	3.75	0.79	0.210	3
	Provide the necessary training to farmers to increase production	3.80	0.93	0.244	4
	Establishing training courses for members	3.73	0.92	0.246	5
	Provide loans with lower interest rates to increase income	3.93	0.80	0.203	1
Economical	Providing inputs to farmers at a reasonable price	3.92	0.87	0.221	2
Factor	The use of financial facilities to expand the company's goals	3.83	0.86	0.224	3
	Access to low-interest credit	3.75	0.85	0.226	4
	Having the financial resources to provide effective services	3.74	0.86	0.229	5
	Purchase of agricultural products at a reasonable price	3.72	0.87	0.333	6
	Interest in collective and collaborative activities among members	3.78	0.79	0.208	1
	Interests of members cooperative teamwork and partnership	3.74	0.79	0.211	2
Social Factor	Feeling job security by membership in cooperatives	3.65	0.79	0.216	3
	The support and cooperation of authorities, regional organizations, cooperatives and farmers	3.64	0.81	0.224	4
	Corporate membership	3.71	0.84	0.226	5
	The system of collective decision-making and advisory company	3.68	0.86	0.233	6

Table 3. Non-Standardized Coefficients Confirmatory Factor Analysis of Effective factor

Latent variable	Economical factor	Educational factor	Management factor	Social factor	Policy-making factor
Non-Standardized Coefficients	1	1.85	1.72	1.85	3.25
t	-	10.88	11.46	11.50	12.03

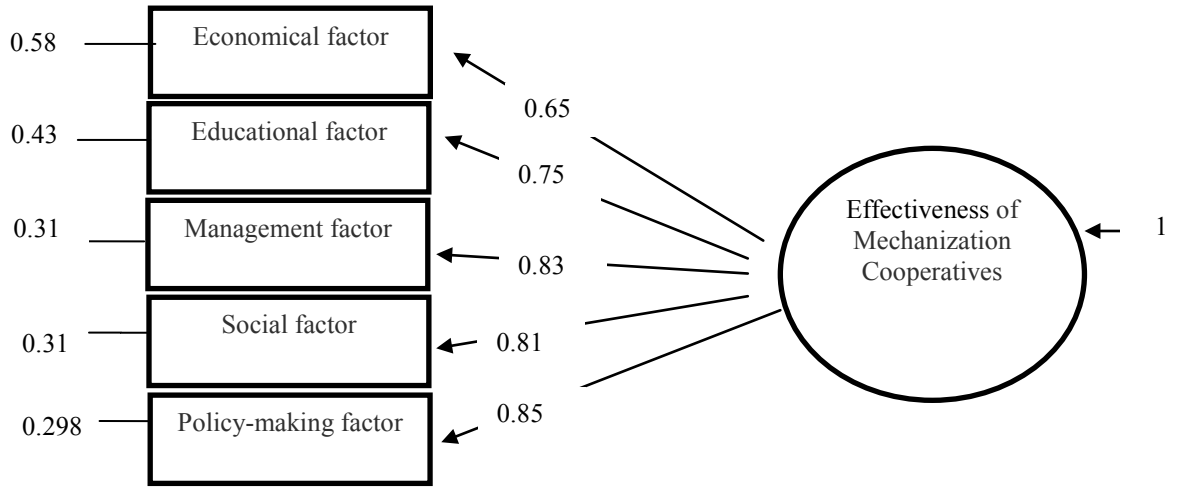

Figure 1. Standardized coefficients and error variance of effective factors

Table 4. Standardized Coefficients and R^2 and t Coefficients of Mechanisms of Mechanization Cooperative Effectiveness

Explicit variables (role)	Standardized Coefficients	t	R^2
Economical Factor	0.65	-	0.42
Educational Factor	0.75	10.88	0.57
Management Factor	0.83	11.46	0.59
Social Factor	0.83	11.50	0.69
Policy-Making Factor	0.85	12.03	0.72

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mechanization cooperatives. It is therefore essential that they should be clearly supported by the government. On the other hand, attention must be paid to the management factor and internal issues of the companies. Company members need to have the necessary planning for effective management of the company. It is also noteworthy that agricultural mechanization companies must be well-adapted to the social conditions of farmers. This is one of the most important issues in promotional discussions. Also the standardized coefficients for educational and economic structures are 0.75, 0.69 and 0.65. This is very important and indicates the high importance of these factors. The calculated R2 values are also high for the factors and indicating that the factors considered are important in explaining the latent variable changes. Complete standardized factor loads of each of the effective factors is shown. The most correlated policy and social and managerial variables are observed and most important are the latent variables, the effectiveness of the agricultural mechanization cooperative. In addition to the significant factor loadings of calculated R2 values for explicit variables. This rate is relatively high. It shows the importance of the explicit variables considered in explaining the latent variables (the effectiveness of the agricultural mechanization cooperative).

4. Conclusion and recommendations

Findings results shows that there is significance and positive relationship was found between affective components and efficiency of agricultural mechanization cooperatives. Therefore it is essential that planners and administrators in the agricultural sector must be pay attention to the relation were between these components and efficiency of agricultural mechanization cooperatives. Amini and Ramizani (2006) have a study to evaluate the success of rural cooperatives, and the factors affecting it. The factors affecting the success of cooperatives were investigated in three internal, external and structure. The findings showed that there cooperatives is poor performance. And parameters of membership in the cooperative, the cooperative structure, enhancement of member share, education, participation and level of training and awareness member has a direct and positive impact on the company's success.

Developing effective programs to support cooperative mechanization can improve the efficiency of the service. However, due to efficient management of companies should be further considered by the board members. And board members on the election of people deserve their manager.

The results Nekoeynaeniy and colleagues (2007) found that the factors contributing to the success of cooperatives were the level of communication with governmental and nongovernmental organizations, rural cooperation in all aspects of the control, supervision and training, capital management and capital of cooperatives.

Amjadi and Chizari (2006) indicated that government programs in recent years in the use of machinery in agriculture were not successful. Mechanization has also led to the failure of development programs and also did not even respond to the depreciation of machinery.

In addition pay attention to the education the members and encourage farmers to use more extensive mechanization of cooperatives is essential. This can cause the development of agriculture in the city and provide more efficient company. Also attention to social issues is important. Regardless of communicating effectively with members and considering their participation in planning, the company's performance cannot been sued. Alizadeh (1390) pointed to Farmers' participation in implementing the goals of Agricultural Mechanization caused to enhancement people participation in activates. Members are also required to attain more motivated to overcome obstacles and difficulties.

Also pay attention to the education of its members and to encourage farmers to use more extensive than necessary mechanization services cooperatives. On the other hand, according to the social issues that are the basis for cooperative activities in rural areas is important. Regardless of effective communication with members and their participation in the planning cannot guarantee the performance of the company. The results Bigdelli et al (2007) in relation to the development of agricultural mechanization showed that the development of mechanization is not desirable. Also there is a significant relationship was found between the amount of credit, support services, education and the number of components and the development of mechanization of farming and agricultural activities.

Also by the appropriate way improve the management skills of members and the Board of Directors be provided. And professional's persons to train them must be used. This, along with supportive policies to improve the performance of companies is very important. Our results also show that for increasing the efficiency of cooperative other studies must be done on the other factors that directly or indirectly effect ton performance the agricultural cooperatives mechanization.

Policy and management and social factors with 0.85, 0.83 and 0.83 have the highest correlation

and most importance in latent variables, ie the effectiveness of agricultural mechanization cooperatives. This illustrates that of paying attention to the policy factors for effectiveness of agricultural mechanization cooperatives. It is therefore essential that they should be clearly supported by the government. On the other hand, attention must be paid to the management factor and internal issues of the companies. Company members need to have the necessary planning for effective management of the company. It is also noteworthy that agricultural mechanization companies must be well-adapted to the social conditions of farmers. This is one of the most important issues in promotional discussions. Also the standardized coefficients for educational and economic structures are 0.75, 0.69 and 0.65. This is very important and indicates the high importance of these factors. The calculated R2 values are also high for the factors and indicating that the factors considered are important in explaining the latent variable changes.

Recommendations:

Enhancing the Management skills of agricultural cooperatives board members by encourage participation in a workshop.

Increasing the economic power of cooperative mechanization by delivery loans to them for buying the machine and agriculture equipment.

Use social networks to introduce potential and capabilities of cooperative mechanization to increase the awareness of other farmers about potential of cooperative mechanization.

It is very important to improve the level of knowledge and competence of service delivery (operators like tractor driver) in agricultural cooperatives through training courses.

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