



Factors Affecting Commercialization of Agricultural Mechanization in Khuzestan Province

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Abstract

The main research paradigm of the present work is quantitative in which a descriptive survey methodology was used. The study investigates some of the economic factors that influence the success of mechanization organizations in Khuzestan province, Iran. Khuzestan province is one of the leading agricultural hubs of Iran, so it was selected as the study site. The statistical population was composed of 18 active mechanization service organizations which covered 19,844 hectares of wheat plants in 726 wheat farms at 89 villages and counties of the province in the previous year. The main research instrument was a questionnaire whose content validity was confirmed by a panel of experts and its reliability was calculated to be 0.89 by the coefficient of Cronbach's alpha. The results of the correlation of the research variables with the economic performance variables of the organizations showed that the variables of diversity of organizational performance of the organization, number of available facilities and machinery, non-government support for the organization, the number of training courses, and the amount of government cash support (loan and bank credit) were significantly correlated with the variable of annual economic performance. Also, 45.1% of the annual economic performance of the mechanization organization is explaining with “the annual performance of mechanization organization”, “non-government support for the organization”, “the availability of facilities and machinery”, and “the CEO's understanding of the concept of organization services, chief executive officer (CEO)'s perception of the concept of organization, annual

Key Words: Economic Function, Modernization, Organization, Agriculture Equipment, Commercialization

Introduction

Agricultural mechanization is an important symbol of agricultural modernization, and agricultural equipment is a key factor in enhancing agricultural mechanization (Liu and Tian, 2009). To properly fulfill its mission, the agricultural sector needs to

develop and improve the productivity and efficiency of its production factors. One of the factors that are of great help to the agricultural sector is the use of machinery (Amirani, 2001). To keep prosperity in the agricultural sector requires meeting the

needs, particularly the energy supply of agricultural machinery and equipment in the context of conventional technology (Wei *et al.*, 2018). Modern agriculture, more than traditional agriculture, puts emphasis on the nature of man and machine relationship to create an effective and accurate system. Agricultural mechanization can be considered as a system that can bring about fundamental changes in the agriculture of a community with proper management (Zhang *et al.*, 2017; Hou, 2008; Wei *et al.*, 2018). In the meantime, organizations providing mechanized agricultural services including public, private and co-operative organizations can act as a powerful arm to help accomplish the goals of agricultural mechanization (Bayati *et al.*, 2013). Currently, there are three methods to use the aforementioned machinery in performing and providing mechanized services to farmers and applicants in Iran: personal, collective (cooperative), and joint venture (and service) (Panahi *et al.*, 2015). In spite of the existence of these systems of operation in the past and organizing new operations as mechanization service companies by the government in recent years, Iran's mechanization level is low versus other developed countries. Low mechanization level, on the one hand, and the characteristics of agricultural units in Iran (such as small sized and scattered lands) and the characteristics of beneficiaries (such as literacy and technical skill and knowledge) (Effati, 2015), on the other hand, require proper organization of the operation units in order to increase the coefficient of mechanization and efficiency

and employ proper types of machinery and farmers when needed. This organization also requires establishing appropriate organizations that can provide timely, efficient and economical technical services to properly respond to the needs of beneficiaries (Panahi *et al.*, 2015). Mechanized organization refers to a group of people in the agricultural sector who use agricultural machinery and equipment to provide mechanized services to farmers at different stages of tillage, planting, and harvesting of various crops (Effati, 2015). The competitiveness and high speed of knowledge production and exploitation in today's world has made it a major management challenge for how researchers, owners, and investors of economics turn it into an economic return stream. In other words, we need to look for work in the commercialization process and the way we seize opportunities (Farsi and Klathaei, 2012).

In addition to depicting the current condition and quality of mechanized organizations in Iran, the present paper attempts to analyze the role and status of these organizations in promoting their level. Several studies have investigated the factors affecting the activity of agricultural mechanization. According to some of them, agricultural management, transfer of agricultural force, income policy, income level of farmers, development level of agricultural machinery industry, and the cost of using agricultural machinery products have significant impacts on the development of agricultural mechanization (Zhang *et al.*, 2017; Yiang *et al.*, 2006;



Hou, 2008). Liu and Tian (2009) and Yan (2014) concluded that the level of economic development is the most important factor contributing to the development of mechanization in China.

In a study on mechanization index and its impact on crop yield and socio-economic factors in Pakistan, Adnan *et al.* (2017) suggested that the level of education, public agricultural machinery (external support for machinery), and subsidies had significant effects on increasing product performance. Thus, in order to increase financial means of farms, it is essential to improve farmers' education levels and have a long-term investment to create an infrastructure for supportive services. Other research studies have also shown that mechanization utilization index is directly related to potential agricultural productivity and other socioeconomic indices improve the sustainability of agricultural systems (Zhangeneh *et al.*, 2010). Industrialization of a country and the development of agricultural economy are directly related to mechanization (Singh, 2006); i.e., the mechanization status is specific and dynamic. Therefore, the development of mechanization requires measuring its impact on productivity and economic factors (Hormozi *et al.*, 2012; Singh, 2006). Key factors affecting successful mechanization include social and economic infrastructure and technical skills (Olaoye and Rotimi, 2010). The major problems of the development of agricultural mechanization in Iran are imbalance in regional and district development and the lack of coordination between investment

and intensive services. In our country, the situation is different. Barriers of mechanization including insufficient investment on the development of agricultural mechanization, inability to supply the required agricultural machinery, the high costs of agricultural machinery and equipment due to scattered, small sized, and traditional type of farms and gardens, the lack of technical knowledge in using modern machines, the lack of improvement in industrial development planning of the country in order to meet the mechanical needs of the agricultural sector, the disproportion in price rates of agricultural products and agricultural machinery, the lack of proper structure and legal requirements for mechanization development, the failure to pay attention and plan to promote agricultural machinery market in commercial policies of the country, the lack of adequate support from banking system to provide appropriate facilities needed for mechanization development, and the lack of quantitative and qualitative mechanized trade unions and services prevent the optimal use of existing capabilities (Zeraei Dastgerdi, 2006). The operating system in partnership with agricultural machines may offer several benefits, including less and lower costs, more efficiency, faster and easier access of farmers to new technologies as well as wider range of knowledge, experience, and information resources (Alizade Naeini, 2005). The main purpose of the present study is to investigate effective factors in commercialization of mechanization organizations in Khuzestan province, Iran.

Its specific objectives include checking the number and diversity of organization services, age, and annual performance, education level of CEOs, the number of available facilities and machineries to the organizations, the number of training courses for CEOs of organizations, the number of villages covered by the organizations, the CEOs' understanding of the concept of organization, non-cash government support for organizations, per capita ownership of the organization members, the quality of government cash support in the form of bank credits, and loans for the organizations.

Research Methodology

This is an applied research conducted by a descriptive method with quasi-experimental control of variables. In this research, Khuzestan province, one of the top agricultural centers of Iran, is selected as the study site. Khuzestan province currently has 18 active mechanization services which, in the past cropping year, covered about 19,844 hectares of wheat farms of 726 wheat farmers in 89 villages and cities of the province. Two methods are used to gather information. First, the literature including documents, books, scientific journals, and the Internet resources were reviewed and the results of previous surveys in the field of research were used to identify research variables and hypotheses. In the field study, to obtain the required information, a questionnaire was used to achieve the goals and answer the research

questions. To examine the validity of the questionnaire, professors and experts in this field were surveyed. Then, the coefficient of Cronbach's alpha was also used to measure the reliability of the questionnaire. For this purpose, 30 questionnaires were completed in Lorestan province and were subjected to the SPSSv19 software package to calculate Cronbach's alpha (89%) which indicated the desired validity of the questionnaire.

Results

Findings showed that the average age of the managers of mechanized service organizations was 42 years (SD = 8.55). The majority of executives in the studied mechanized service organizations (47.1%) were bachelors. The average years of experience in mechanized service organizations were 15.71 years. The answers provided by the respondents showed that the type of administration of organization was Mechanization Development Department (47.1%) and only 23.6% of them are assigned to the Deputy of Promotion and Operation of the Rural Cooperation Organization. The average number of machines available for the studied mechanization organizations was about 22, and 25% of the studied organizations had only between 3 and 10 devices in stock. The results showed that, on average, each organization covered about 10 villages. It was revealed that the wages paid to the drivers in most of the studied organizations (52.9%) were on a monthly basis. The results showed that the average annual performance of the studied mechanization



organizations was about 5.5522 hectares. The results of the survey indicated that the majority of the studied organizations (41.2%) were receiving their fees cash-strapped. To assess the multiplicity and diversity of mechanization organizations, 18 questions were designed and the respondents

were asked to state their answers on a Likert scale (very low, low, medium, high, very high). Table (1) shows the frequency of responses about ranking the multiplicity and diversity of services of mechanization organization.

Table1. Ranking of the multiplicity and diversity of services of mechanization organizations

Item	Mean	Standard Deviation	Coefficient of Variation	Rank
Crop production or livestock breeding	3.098	1.058	0.342	1
Provision of mechanized services in the field of land preparation	3.059	1.088	0.356	2
Providing mechanized planting services	3.647	1.656	0.454	3
Providing mechanized spraying services	1.294	0.588	0.455	4
Providing mechanized services in the field of fertilizer (centrifuge, livestock)	3.588	1.769	0.493	5
Providing mechanized services in the field of soil conservation	3.294	0.862	0.501	6
Providing mechanized repair services	3.059	0.728	0.548	7
Providing mechanized harvesting services	1.765	1.091	0.618	8
Providing mechanized services in the field of collection and packaging	1.177	0.728	0.619	9
Providing mechanized services in the field of spare parts sales	1.353	0.862	0.637	10
Providing mechanized services in the field of production and distribution of agricultural products	1.647	1.057	0/642	11
Providing mechanized services in the field of seed disinfection	1.412	0.939	0/665	12
Providing mechanized services in the field of sale and distribution of agricultural inputs	1.353	0.996	0.736	13
Providing mechanized services in the field of industrial product distribution	1.882	1.453	0.772	14
Provide mechanized services in the field of cultivation	1.706	1.359	0.796	15
Providing mechanized services in the field of relative leveling with laser scripts	1.824	1.468	0.805	16
Providing mechanized services in the field of stone lifting machine	1.941	1.749	0.901	17
Providing mechanized services in the field, other subdivisions of gardening, animal husbandry, fisheries and ...	1.471	1.328	0.903	18

Evaluation Range: very low= 1, low= 2, partial: 3, high= 4, very high= 5

To assess CEOs' perceptions of the concept of organization, 18 questions were designed and the respondents were asked to express

their answers on a Likert scale (very low, low, medium, high, very high). The results are summarized in Table 2.

Table 2. Ranking of the mechanization organizations in terms of understanding their CEOs' understanding of the concept of organization

Item	Coefficient of variation	Standard deviation	Mean rank	Rank
Increasing public awareness, expertise and training of self-education of members	0.174	0.727	4.1765	1
Regular meetings of the Board of Directors with the members	0.238	0.927	3.8824	2
Applying up-to-date technology in service delivery to reduce costs and increase customer satisfaction	0.248	0.951	3.8235	3
Systematic monitoring of service providers' performance to ensure their accuracy, skill, calibration and instrumentation, and their moral and occupational health	0.261	1.028	3.9412	4
Regular visiting of agricultural equipment exhibitions	0.295	1.131	3.823	5
Acceptance of employment and cooperation with young and educated human forces	0.324	1.124	3.4706	6
Delivery of multifunctional activities and services to organization's	0.328	1.175	3.5882	7
Collaboration with scientific, research and academic centers	0.341	1.3441	3.9412	8
Applying professional service driver by the CEO and Board of Directors	0.356	1.277	3.5882	9
Providing and supplying high-quality machinery	0.359	1.277	3.4118	10
Flexibility in understanding the economic and social conditions of the beneficiary and employees	0.363	1.280	3.5294	11
Collaboration between members and traders and avoiding ethnic differences in the workplace	0.376	1.328	3.5294	12
Applying credits for the purpose of the organization	0.383	1.263	3.2941	13
Positive and constructive interaction with other mechanized service organizations and cooperatives	0.394	1.416	3.5882	14
Maintaining discipline in the works	0.416	1.347	3.2353	15
Engaging and working closely with Jihad-e-Agriculture Organization	0.446	1.497	3.3529	16
Annual investment and equipping of the company	0.452	0.446	3.2941	17
Ethics and acceptance of responsibility undertaken by the organization in any circumstance	0.486	1.457	3	18

Evaluation Range: very low= 1, low= 2, partial: 3, high= 4, very high= 5

In order to evaluate government cash support in the form of bank loans and credit, several questions were designed and the respondents were asked to state their answers on a five-point Likert scale (very

low, low, medium, high, very high). The findings showed that most of the mechanized services organizations (94.1% based on frequency obtained) had a low level of government cash support.



Table 3. Frequency of the quality of government cash support in the form of loan and bank credits

Item	Poor	Inappropriate	Average	Appropriate	Good
Waiting time to get credit	9	1	3	2	2
Validation process	10	2	3	--	2
The fitting between the amount provided and the requested credit amount	7	5	3	1	1
How to apply for collateral	9	3	1	1	3
Fees calculation rates	7	2	3	2	3
The era of construction	9	1	6	--	1
Refund period	6	6	5	--	--
How to split the refund	5	4	7	1	--
Imposition of late installment penalties based on government guidelines	11	2	2	--	2

Mean rank = 1.976; Standard deviation = 1.221.

Based on the research findings, it can be mentioned that the level of non-cash support for mechanizations was very low. The findings of the study showed that most of

the mechanized services organizations (94.1%) had a very low level of non-governmental support.

Table 4. Frequency of the quality of government Nonnon-cash support

Percent	Frequency	Non-cash support
94.1	16	Very Low
5.9	1	Low
--	--	Average
--	--	High

Mode: Very Low

Based on the results in Table (5), it can be stated that the vertical and horizontal relationships of mechanization organizations were very low. The findings showed that most of the mechanized

services organizations (41.2%) had very low vertical and horizontal relationships.

Table 5. Frequency of vertical and horizontal relationships mechanization organization

Item	Very low	Low	Average	High	Very high
The extent of cooperation with other mechanization services organizations	5	2	6	2	2
The extent of cooperation with other mechanization services organizations in the province	10	4	1	2	--
The extent of cooperation with the other production cooperative	7	4	4	1	1
The extent of cooperation with other manufacturing cooperatives in the province	10	3	2	2	--
The extent of cooperation with agribusiness companies	6	4	5	1	1
The extent of cooperation with the city's agricultural Jihad centers	1	3	3	5	5
The extent of cooperation with the Jihad Agricultural Management	1	4	5	3	4
The extent of cooperation with Khuzestan Agricultural Jihad Organization	4	4	4	3	2
The extent of cooperation with the Agricultural Bank	7	--	3	6	1
The extent of cooperation with the cooperative office	10	2	1	3	1
The extent of cooperation with the Rural Cooperative Organization	7	4	1	2	3
The extent of cooperation with cooperatives in the city	7	3	5	1	1

Standard Deviation = 0.769; Mode = very Low; Mean Rank = 1.343.

The results showed that the average per capita ownership in the studied organizations was about 3000 USD. The

highest and lowest per capita ownership of the studied organizations are shown in Table 6.

Table 6. Membership per capita in studied mechanization organizations

Membership per capita	Frequency	Percent	Cumulative Percent
Less than 1300 USD	7	41.2	41.2
1300-2600 USD	4	23.5	64.7
2600-4000 USD	1	5.9	70.6
4000-5300 USD	3	17.6	88.2
More than 5300 USD	2	11.8	100
Total	17	100	--

The results revealed that the average economic performance of the surveyed mechanized organizations was 8600

USD/year. The highest and lowest economic performance of the mechanized operations in the studied forms was 54400 USD and 800 USD per year (Table 7).



Table 7. The economic function of the mechanized organizations

Economic Function	Frequency	Percent	Cumulative Percent
666 -6666 USD	13	76.5	76.5
6666-13000 USD	2	11.7	88.2
.....	--	--	--
46000-53000 USD	1	5.9	94.1
53000-60000 USD	1	5.9	100
Total	17	100	--

The results of correlation of research variables with economic performance variables of the survey showed that “the multiplicity and diversity of organization services”, “CEOs’ perception of the concept of organization”, “annual performance of the organization”, “number of available facilities and machinery”, and “non-

government support for the organization” had a significant difference at the 0.01 level. Also, “the number of CEO training courses” and “the amount of government cash support (bank loans and credits)” had a significant relationship (at the 0.05 level) with the variable of “annual economic performance” (Table 8).

Table 8. The correlation of research variables with the economic performance of organizations

First variable	Second variable	Spearman	Pearson	Significant Level
economic performance of organizations	Multiplicity and diversity of service organizations	0.329**	--	0.001
	Vertical and horizontal relations of the organization	0.216	--	0.405
	Number of training courses for the director	--	0.541*	0.025
	Number of villages covered by the organization	--	-0.125	0.681
	CEO's understanding of the concept of organization	0.550**	--	0.002
	Dating Formation	--	0.131	0.615
	Annual performance of the organization	--	0.541**	0.000
	The director’s academic degree	--	0.007	0.978
	Number of available machines	--	0.430**	0.005
	Non-government support for the organization	0.317**	--	0.000
	Membership per capita	--	0.108	0.681
The amount of government cash support (loan and credit)	0.550*	--	0.022	

** = significant at the 0.01 level; * = significant at the 0.05 level

The results of analysis of variance showed no significant difference between the economic performance of organizations

based on founding and supervisory office of the organization.

Table 9. The significant difference between the economic performance of organizations and supervisory office of the organization

Row	Supervisory office	Number	Mean	F	Significant Level
1	Department of Mechanization Development	7	3.42630	0.603	0.624
2	Deputy of Promotion and Operation System	2	1.7840		
3	Rural Cooperative Organization	2	2.7715		
4	Co-operative General Office	6	4.9782		
Total		17	--		

Multivariate regression was used to analyze the role of independent variables; the role of independent variables of research on mechanization organizations that had a significant role on the dependent variable of economic performance of the mechanization organization. The results of the analysis showed that the independent variables of research had a significant role on in the dependent variable of “economic performance of the mechanization organization”. The stepwise multiple regression analysis was used in this research. The correlation coefficient (R), R2 and adjusted R2 were estimated to be 0.695,

0.483, and 0.451, respectively. Independent variables (annual economic performance of the mechanization organization) and a dependent variable (expanding the activities of cooperatives) were used in the multivariate regression analysis (Table 5). The result indicates that 45.1% of variance in the annual economic performance of the mechanization organization in expanding “the annual performance of mechanization organization”, “non-government support for the organization”, “the availability of facilities and machinery”, and “the CEO's understanding of the concept of organization”.

The prediction equation was defined as below:

$$Y=1055.727+1601.545 X1+1319.644 X2+1009.914 X3+523.314 X4$$

X1 = the annual performance of the organization

X2 = non-government support for the organization

X3 = the number of available facilities and machinery

X4 = CEO’s understanding of the concept of organization

Y = annual economic performance of the organization



Table 10. Stepwise multiple regression analysis

Dependent variable	Independent variable	B	SEB	Beta	T	sig	R²	R
Annual economic performance of the organization	The annual performance of the organization.	1601.545	520.192	0.635	3.079	0.008	0.483	0.695
	Non-government support for the organization	1319.644	843.760	0.410	1.564	0.000		
	The number of facilities and machinery	1009.914	1692.004	0.165	0.597	0.007		
	CEO's understanding of the concept of organization	523.314	634.206	0.307	0.259	0.037		
	Constraint	1055.727	1576.748	--	0.670	0.040		

Adj R² = 0.451; F = 9.479

Conclusion

The results showed a significant relationship between the number and variety of mechanized services and the economic performance of their mechanized agricultural organizations. The same result has been reported by Hanson et al. (2010) and Azadi and Karami (2001). It seems that the multiplicity of mechanized services in a more diverse range is a factor that can increase the economic performance of mechanized organizations. The uniform practice and justice in implementing supportive programs in these units, as well as holding educational classes, courses and regular workshops in collaboration with universities, research centers, and companies producing and importing new equipment and machinery.

The results also showed that the vertical and horizontal relationships of mechanization

organizations were at a very low level. It is important to consider the need to interact with government agencies, offices, companies and organizations, its positive and undeniable effects on procedural unity and social cohesion, increasing the organization's annual operating performance need to reducing the organization's unemployment and thus increasing the economic profitability of the organization. □

The results showed that the effect of CEOs' understanding of the concept of organization on economic performance was related to mechanize farming operations. This result is confirmed by Qasemian (2006), Sheikhi et al. (2001), Wei et al. (2018), Glovina and Nelson (2009), Xiang and Sumelius (2010), and Forgács (2008). The results also showed a significant relationship between the number of training

courses for CEOs and the economic performance of their mechanized farming operations. Wei et al. (2018), Sheikhi et al. (2001), Hanson et al. (2010), Azadi and Karami (2001), Xiang and Sumelius (2010), and Johnson and Hou (2006) have confirmed this result. It was found that the number of available facilities and machinery had a significant impact on the economic performance of the mechanized farming operations. This result has been confirmed by Jamshidi (2007), Bayati et al. (2009), and Hanson et al. (2010).

The results showed that the government's non-cash support for the organizations had a significant impact on the economic performance of the mechanized organization. This finding is in agreement with Bayati et al. (2009), Azadi and Karami (2001), Najafi Asal and Talib (2011), and Sarker and Itch (2001).

It was revealed that there was a significant relationship between the amount of cash support (loan and credit) from the establishment and the economic performance of the mechanized agricultural operations of their mechanized organizations. Bayati et al. (2009), Sarker and Itch (2001), Wei et al. (2018), Zhang et al. (2017), and Hou (2008) have confirmed this finding. Given that non-cash government support for the studied organizations was very low and considering the significant relationship between this variable and sustainable participation, government planners and practitioners are recommended to reconsider macro-policies of the government and give priority to the following items in their agenda:

Transferring the implementation of government projects to active mechanized service organizations without tendering
Transferring the privilege for the distribution of agricultural inputs brokerage to active mechanized service organizations
Tax exemptions or lower computational tariffs for mechanized service organizations as a subdivision of agricultural sector
Coordination to promote visits to successful organizations in other cities and provinces
Land-use change permits to mechanized organizations to build parking lots for agricultural machinery and office buildings
Allocation of subsidized fuel quota required for mechanization service organizations proportionate to their use
Introducing mechanized service companies to carry out mechanized projects of agro-industrial complexes of the province
Assigning trust funds to organizations for farmers to work at the approved rates
Focusing on potential, experience, ability and technical knowledge latent in active organizations to implement equipping projects for mechanized service companies.
Needless to say that as the executive and supportive policies of the government goes in line with quantitative and qualitative development of the activities of these organizations, final costs of operation and production will be lower for the beneficiaries who increases productivity, welfare, the possibility to develop quantitative and qualitative activities for beneficiaries, as well as the sustainability of participation.



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