Determination of the most important challenges for agricultural mechanization development in Iran

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Abstract: Development of agricultural mechanization in Iran is an approach to lead to industrial and commercial production. To develop agricultural mechanization in Iran, it is necessary to find out the mechanization challenges and guidelines to solve the problems. To determine the most important challenges for agricultural mechanization development in Iran, a practical research was undertaken with survey and documentation methods. To recognize challenges and gather information, the brainstorming method, interviews and field observations were used. The sample statistical society was composed from 809 experts in social, economic, planning, management, agricultural engineering and mechanization fields from all provinces of Iran. The results showed that the most important challenges for mechanization development in Iran were 13 cases, and they were classified into four groups of social, economical, technical, and planning and management. Furthermore, the study of challenges showed that an important part of the challenges was related to human resources. Therefore, human resources development is one way of solving a lot of agricultural mechanization challenges.

Keywords: agricultural mechanization, development, challenges, Iran

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1 Introduction

It is essential for agricultural beneficiaries to use new findings and technologies to improve the quantity and quality of their products. Agricultural mechanization is an approach which makes possible the development of the agricultural sector. Therefore, mechanization development planning is the main factor in agricultural development planning. Development of agricultural mechanization is mentioned in the all important national documents of Iran such as the "Third National Program of Economical, Social and Cultural Development of Islamic Republic of Iran", "General Policies of the Forth Program of Economical, Social and Cultural Development", "Long-Term Mechanization Strategy at National Level Issues and Recommendations" and especially "The Vision of The Islamic Republic of Iran, year 1404" (Moazzen and Bagheri, 2004).

To develop agricultural mechanization, it is necessary to find out mechanization challenges. So, the main objective of this research is to identify mechanization challenges in the process of agricultural mechanization development.

Numerous attempts were carried out by different countries for development of mechanization. In 1989 a research presented the agricultural mechanization policies and strategies of Thailand which analyzed agricultural mechanization challenges. In this research attention was paid to agricultural mechanization policies and challenges, technological management and designing strategic models for agricultural mechanization development (Rijk, 1989).

In 1989, the FAO supported a project for agricultural mechanization policy and strategy development in Indonesia. Development of local resources in Indonesia

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was suggested as a key for solving agricultural mechanization challenges (FAO, 1989).

In 1993 a report was published about agricultural mechanization challenges in the Slovak Republic. Results showed that technical and financial aids and credits for supplying agricultural machinery were the guidelines of solving mechanization challenges (Clarke et al., 1993).

In 1993, agricultural mechanization development strategy in Malawi was studied which focused on choosing suitable technology levels and necessary support for agricultural mechanization development (FAO, 1993).

Scherr, Hazell and Peter (1993) presented the mechanization challenges for marginal lands.

In 1997, comprehensive research was carried out for agricultural mechanization development in South Africa (Kenya, Lesotho, the United Republic of Tanzania, Uganda, Zambia, Zimbabwe). Because small farms were one of the most important challenges for mechanization development, a specific strategy was recommended for agricultural mechanization of small farms (FAO, 1997; Clarke and Simalenga, 1997).

In 1998 a survey was done in India for long-term mechanization strategy at the national level, which included issues and recommendations. Results showed that the most important challenges for agricultural mechanization development in India were: the lack of a central organization for management of agricultural mechanization development, lack of integrated programs to educate farmers in mechanization and lack of information systems in the mechanization field (Pandy, 1998).

In 2003, a survey was published in the Philippines to solve agricultural mechanization challenges. The result showed that the most important objectives to solve mechanization challenges were: to supply the possibility for farmers to use effectively the mechanized capacities in the agricultural sector, to use proper support for agricultural mechanization development, suitable encouragements to develop the agricultural machinery industry (Philippines, 2003).

In 2005, comprehensive research was carried out in order to use agricultural technology in small farms in the Philippines. In this research, mechanization policies were given. So, results showed that the main approach for development of agricultural machinery in the Philippines was technology transfer and adjusting mechanization to suit small farms (Paras et al., 2005).

Fernando et al. (2005) exhibited the technology transfer strategies for small farm mechanization in the Philippines. The results showed that, the most important challenges for agricultural mechanization were: lack of information, limited-resource farmers, small farm size, lack of appropriate machinery, lack of agricultural mechanization experts, political interference and institutional weaknesses (Fernando et al., 2005). Balasubramanian, Hijmans and Otsuka (2007) described the most important challenges and opportunities for rice production in Sub-Saharan Africa.

2 Methods

This research was a comprehensive project at the national level, and was done at the request of the agricultural ministry to find out the most important challenges for agricultural mechanization development in Iran. To determine mechanization challenges, a practical research with survey and documentation methods was done. To recognize mechanization challenges and attain the expert's views, the method of brainstorming was used (Brainstorming, 2007). Also interviews and field observations were used for information gathering and analyzing questionnaires. To gather information, the existing documents, questionnaires, interviews and field observations and the Delphi method were used. Agricultural mechanization is a multi-dimensional concept and it includes social, economical, technical and agricultural engineering, agricultural machinery engineering, programming and management subjects. So, a sample statistical society was formed of 809 experts in social, economical, planning, management, agricultural engineering and mechanization such as university professors and executives active in the public and private sectors in all over of Iran. Table 1 and Figure 1 show the quantity of participants in interviews from various special fields of

Iran. Also Table 2 and Figure 2 show the quantity of participants in interviews from various provinces of Iran.

Table 1 Quantity of participants in interviews from various special fields of Iran

Field	Number of participants
Agricultural machinery and equipment suppliers	65
Agricultural products suppliers	46
Mechanized services organizations	92
Water and soil, fishery, horticulture & cultivation domains	124
Revenue systems & promotion domain	31
Education & research domain	15
Rural development & industries domain	153
Agricultural bank	13
Agricultural machinery development institution	28
Planning & management domain	22
Rural cooperation organization	6
Guilds organizations	15
Agricultural Jihad organization chiefs	4
Universities	20
Townships agriculture Jihad	175

Table 2 Quantity of participants in interviews from various provinces of Iran

Province Name	Number of participants	Province name	Number of participants
East Azarbaijan	16	west Azarbaijan	24
Ilam	31	Isfahan	21
Ardebil	22	Cahnuj & Jiroft	27
Bushehr	22	Chaharmahal & Bakhtiari	31
Tehran	56	South Khorasan	2
Razavi Khorasan	64	Khuzestan	19
North Khorasan	1	Semnan	34
Zanjan	16	Systan & Bluchestan	13

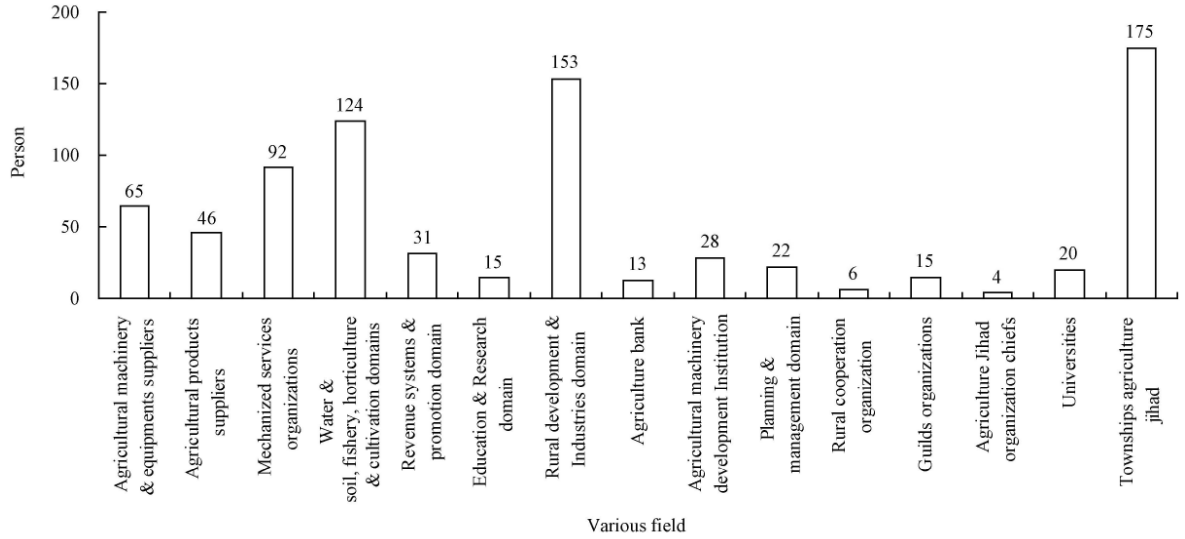

Figure 1 Quantity of participants in interviews from various special fields of Iran

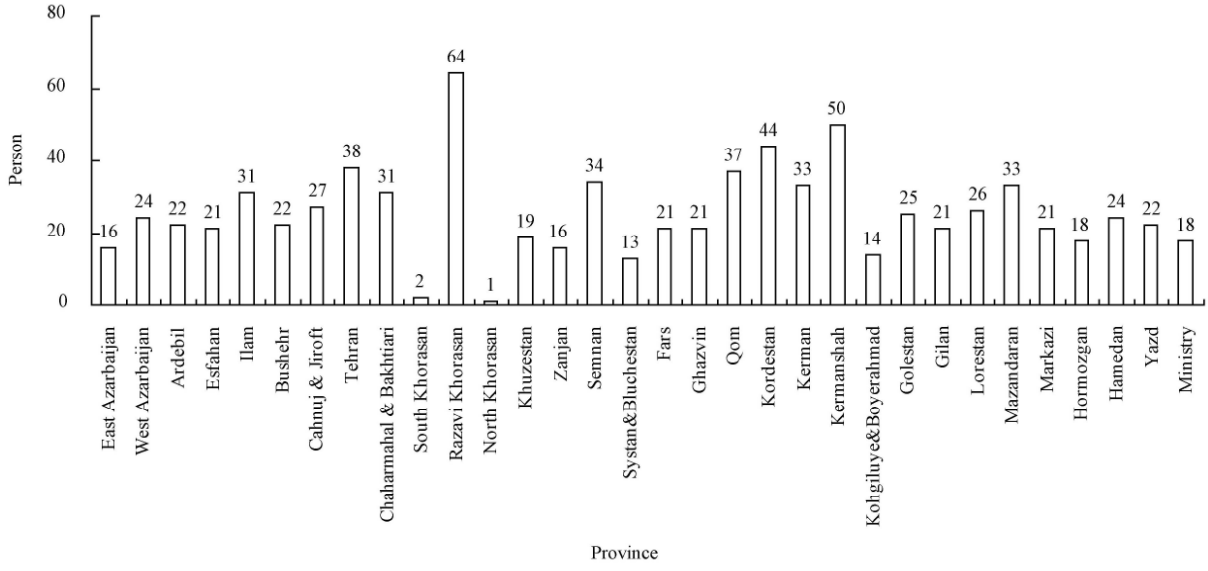

Figure 2 Quantity of participants in interviews from various provinces of Iran

Different national documents were studied to determine challenges, such as: "documentation of the third program of economical, social and cultural development of Republic Islamic of Iran", "Universal policies of the forth economical program, social and cultural development", "Long-term mechanization strategy at national level issues and recommendations" and especially "The vision of the islamic republic of Iran in 1404 solar hegira" (Bagheri and Moazzen, 2009).

3 Results and discussion

Mechanization development has a big effect on all parts of the agricultural sector. The results of gathering questionnaires, brainstorming, interviews and field observations showed that, several problems in the agricultural mechanization area were observed but some of them were more serious than others and need more attention. These challenges were classified based on their subjects. Although, many different challenges were gathered, 13 cases were cited more frequently, and they were recognized as the most important challenges for agricultural mechanization in Iran.

The analysis of results showed that the challenges of agricultural mechanization development in Iran were classified into four groups: "social", "economical", "technical" and "planning and management". Table 3 shows the most important challenges for agricultural mechanization development process in Iran.

Table 3 Most important challenges for agricultural mechanization development in Iran

	Important Challenges	Quantity Percent/%
Social	The weakness of agricultural machinery producers and operators in protecting their guild benefits	7.7
Planning and management	Small and scattered farms Lack of law in agricultural mechanization fields	15.5
Economical	Financial weakness of agricultural machinery producers Financial weakness of the mechanized services organizations (agricultural machinery operators)	15.5
Technical	Usage of worn out agricultural machinery Low quality of the domestic agricultural machinery Lack of suitable after-sales services for agricultural machinery Lack of operators skilled in using agricultural machinery correctly Low technical skills of educated people in this field Lack of testing facilities for agricultural machinery Lack of cooperation between research institute and agricultural mechanization organization Lack of suitable information technology services in the agricultural mechanization field	61.5

Results shows that, agricultural mechanization in Iran had fundamental challenges, and without solving them not only could agricultural mechanization not help to develop the agriculture sector, but also it would create very big challenges for it.

Analyzing Table 3 shows that social, planning and management, economic and technical challenges had 7.7%, 15.5%, 15.5% and 61.5% quantity, respectively. It shows that social challenges have the least effect on mechanization challenges. And, it shows that planning and management and economic challenges have the same level of effect on mechanization. Also, the results shows that a lot of challenges are related to technical areas.

Upon analyzing the results, it can be understood that all technical challenges are related to the weakness of human resources development. So, for solving the majority of agricultural mechanization challenges, it is necessary to develop technical and human resources. Also, compilation of a comprehensive and optimum strategy for development of agricultural mechanization are recommended.

4 Conclusions

To determine the most important challenges for agricultural mechanization development in Iran, a practical research was undertaken using survey and documentation methods. The results of gathering questionnaires, brainstorming, interviews and field observations showed that there are different problems in the agricultural mechanization area. The results showed that agricultural mechanization challenges in Iran fell into

13 categories and were then classified into the four groups: social, economic, technical, planning and management.

Results shows that the social challenges had the least effect on mechanization challenges. Hence, a lot of challenges are related to the technical area.

So for solving the majority of agricultural mechanization challenges, it is necessary to develop technical and human resources.

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