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Factor Affecting on Mechanized Cultivation Technologies Acceptance to Reduce Rice Crop Losses

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ABSTRACT: Reducing agricultural losses causes to increase agricultural products without increase in area that this will lead to less pressure on the environment. For this purpose, this paper is aimed at identifying factors affecting on acceptance of technologies to reduce losses in north of Iran. The methodology used in this study is qualitative method. The sample size was 15 rice producers in Mazandaran province located in the north of Iran by purposeful or judgment sampling. The main tool of study was open-ended questionnaire. The results showed that factors affecting on acceptance of technologies to reduce losses in rice include: facilitating factors and barriers. Facilitating factors include: Economic, educational, psychological, environmental, social-cultural and natural factors. Also barriers include: lack of awareness, lack of government supports, fear and anxiety toward new technologies and psychological factors.

Keywords: Facilitating Factors, losses, Rice Producers, Technologies Acceptance.

INTRODUCTION

The agricultural sector plays a vital role in Iranian economy, because it covers about 11%of GDP, 23% of employment and providing food for more than 80 % of society (Pezeshki Rad *et al.*, 2007). On the other hand, with population growth, a food demand is increasing day after day (Poorghasem *et al.,* 2014). Based current estimations, the amount of 2030 food production in developing countries must be 70% more than its current production so that could keep the pace with the growth population (Pirmoradi *et al.,* 2013).As well as, according to climate conditions, the limited water resources and limited fertile land for production, it is not possible to increase agricultural production in many places. Therefore, to provide food, not only increasing the productivity of production factors, i.e. water and soil, but also agricultural losses reduction is necessary (Pourghasem *et al.,* 2014).

Food loss is defined as "the decrease in quantity or quality of food" and are the agricultural or fisheries products intended for human consumption that are ultimately not eaten by people or that have incurred a reduction in quality reflected in their nutritional value, economic value or food safety (Food and Agriculture Organization of the United Nations, 2014).

Rice is one of the important food crops in the world and ranks second in terms of area and production. It is the staple food for about 50 per cent of the population in Asia, where 90 per cent of the world's rice is grown and consumed (Sita Devi & Ponnarasi, 2009). Due to high per-capita consumption, every year, about 620 thousand hectares of agricultural lands and half of Mazandaran province's lands are devoted to rice cultivation (Nazardad, 2008). Rice, like other agricultural products has high percentage of losses during the production (Paydar, 2013). Losses present one of the main problems in all grain production including rice. Losses in rice can occur during any of the various stages (Guisse, 2010). In this regard, identifying new sources like prevention or reducing agricultural products losses to more exploit of agricultural products, it seems necessary. Reducing losses is to increase agricultural products without increase in area that this will lead to less pressure on the environment. Reducing agricultural products losses cause to reduce product costs and to increase the quality of products. In continue it causes to increase the producer's income especially, small farmers and other workers and nutritional status of people will be improved by increasing their access to agricultural products (Soukhtanloo, 2009).

Agricultural losses reduction has been studied by many researchers such as the following:

Esfahani, Alizadeh, Sabouri, Motamed, & Amiri, (2010) in their study entitled “Analysis of losses and strategies for rice losses reduction “ stated that: including polities to reduce rice losses in country is implementing policy of reduction of transaction costs, implementing policy of guaranteed purchase rice, dissemination of trainings on short and long term and also, developing specific guideline to assess rice losses in order to avoid challenges related to differences statistics and information about rice losses can be mentioned.

Bagheri *et al.* (2008) in their article named "perceptions of paddy farmers towards sustainable agricultural technologies: Case of Harazcatchments area in Mazandaran province of Iran" conclude that Farmers' decisions to adopt a new agricultural technology depend on complex factors. One of the factors is farmers' perception. The results of the study show that farmers had good perception about sustainable technologies such as diversification and rotation, application of manure but in general, they preferred modern technologies to local ones. They perceived agrochemicals as the best means to combat against pests and to increase rice production. Their perception of intangible impacts of modern technologies was weak. It was found that there should be a relationship between a numbers of socio-economic factors, such as human capital factors, information sources use, extension participation and landholding size and the perception towards selected sustainable agricultural technologies. Also, educational level, contact with agricultural experts and extension participation were best predictors of their perceptions.

Malek Mohammadi (2006) in his article named "agricultural waste management extension education (AWMEE) the ultimate need for intellectual productivity" found out that waste management extension is highly significant because of the millions of tons of annual waste in vegetal, animal, environmental and natural resources products as well as millions of hectors of land degradation. Also results show that the greater the use of AWMEE, the less agricultural waste, the higher the agricultural productivity and lower the land degradation.

Findings of research by Amirkhani *et al.* (2013) named "factors affecting on adoption and investment in methods and technologies: case study Varamin city" indicate that social participation, performance and distance between farm and extension or services centers factors are most important factors affecting. Also obstacles and problems in implementation and application of methods and technologies are: lack of credit and loan, government poor policies, lack of financial ability of farmers, highly cost new technologies, lack of facilities and support services, lack of informed extension agents, lack of holding of training courses.

Matni Zadeh and Zamani (2012) in their article titled "Development of farmers' Environmental Behavior model of farmers in Shiraz Country" quoted Fenton asserts that formal education and non-formal education, farm financial features, attitudes and perceptions toward to the change, social contact with source of change and voluntary participation are effective factors on farmers' decisions.

Agriculture is important for all developing and developed countries in the world. The importance of agriculture for different countries varies. For some, it lies in their ability to attract international credit and currency, whereas for some others, it is important as a major source of income for the majority of their population. For Iran, it is important as a guarantee for food security and self-sufficiency. Therefore, we should produce our own food for consumption as well as add value to the raw and processed products and avoid waste to be self-sufficient in food (Malek Mohammadi, 2007). As mention above and importance of rice as second grain with highest worldwide production, importance and necessity of this research seems obvious.

In sum, the main purpose of research is to identify the factors affecting and barriers on acceptance of technologies to reduce losses in rice crop.

MATERIAL AND METHOD

As the aim of the investigation was to gain new and deeper insights into the acceptance of nature conservation measures rather than to test hypotheses, a qualitative approach was performed. This methodical approach is based on the principle of greatest possible openness and flexibility: any information about the topic -expected or not- is desirable. New insights that emerge during the study are allowed to influence the way the ongoing study is structured (Schenk *et al.*, 2007). From a range of possible qualitative techniques, the 'problem-centered interview' developed by Witzel (1985) was chosen. The population was Bishesar villages rice producers in Mazandaran province. The reason for choosing this village is, the first, largest and best equipped NESHA BANK in the country is located in this village and mechanized cultivation of rice has begun in this village since 1993until now and 100% of rice cultivation is done mechanized in this village. 15 were selected by purposeful or judgment sampling. From a range of possible qualitative techniques, the 'problem-centered interview' developed by Witzel (1985) was chosen. The main tool of study was open-ended questionnaire. The interviews conducted for this study consisted of the following parts:

1. The interviewer asked some questions about the interviewees' background, e.g. farmers about their farms. These questions were mainly used as a lead-in and to help reduce interviewees' reserve.
2. The interviewees talked about their attitudes towards, acceptance of technologies in general.
3. The interviewees were asked about their experiences and opinions regarding the new technologies, i.e. about how it was planned and implemented.

All the interviews were recorded and transcribed. Then interviews were classified in codes. Coding and developing category system and creating hierarchical category system were used for data analysis.

RESULT

A. Personal characteristics

The results showed that average age and the average education of rice producers were 45 years and 11 years respectively. Also, the average of farm size was 7 hectares and the average yield per hectare was 7 tons. 50% of farmers used modified seeds. All of the respondents, their main occupation were agriculture, 80% of farmers had agriculture fallow, 95% of farmers were private owner and the average of agricultural income was 600 million rials (Table 1).

Table 1: Characteristics of farmers.

Characteristics	Mean
Age (Years)	45
Education (Years)	11
Farm size (Hectares)	7
Yield per hectare (Tons)	7
Kind of seed (Modified)	50%
Agriculture as main occupation (Persons)	15
Kind of agriculture (Fallow)	80%
Kind of farm ownership (Private)	95%
Total annual agricultural income (Million rials)	600

B. Effective factors on mechanized cultivation technologies acceptance in rice crop

In this study, the effective factors on transition from traditional cultivation to mechanized cultivation of rice are divided into two main categories which include facilitating factors and barriers as follow:

Facilitating factors. Based on results, facilitating factors are divided into 6 categories as follows:

Economic factors. One of the important factors expressed by the respondents for the transition to mechanized cultivation was Economic factors. Economic factors given by farmers are divided in 3 different concepts namely: “Reduce the cost of inputs and raw materials', reduce labor costs” and “enhance the yield”. Farmers said: "in mechanized cultivation was taking half the amount of seed rather than traditional cultivation, less seed means reduce costs, also mechanized cultivation need to fewer nurseries and as a result of the labor costs reduce and in mechanized cultivation enhance the yield about 500-700 kg/h. These sentences were mentioned 75 times by farmers. Thus, economic factors are known as one of most important factors in acceptance and use of mechanized cultivation. Some of the expressions farmers are given in Table 2.

Educational factors. The most important concepts expressed by farmers in this category were named: "Non formal education" and “Informal education”. Farmers in this regard stated that” attending in different training course”, “watching the educational CDs” and also “search through the internet” were very effective in acceptance of technologies. These sentences mentioned 38 times in farmers' statements.

Psychological factors. Another factor affecting to Acceptance of technologies is psychological factors and based on farmers' statements, three concepts namely “risk”, “achievement” and “self-confidence” were located in this category. In this regard the farmers stated, “sometimes, to achieve the specific goals, it need to risk,” people always want to become better. It means progress and improvement. And finally, “achieving the success requires effort and hardworking”. These sentences mentioned 34 times by farmers.

Environmental factors. One of the important factors expressed by the respondents for acceptance of technologies was Environmental factors. Environmental factors given by farmers are divided 2 different concepts include: “Reduce the use of pesticides (lack of air pollution)” and “lack of water and soil pollution”. Farmers said: “in mechanized cultivation; use of pesticides has decreased 30%. It means, use of technologies helps 30% to maintenance and cleanliness of the environment, groundwater and surface water”. These sentences were mentioned 27 times by farmers.

Social-cultural factors. “Trust, confidence” and “communication” were important concepts that farmers mentioned in this category. Farmers expressed: “trust the pioneer farmers”, relationship farmers with service services”, “solidarity and unity among farmers and officials” has led to acceptance and use of mentioned technologies. The frequency of these statements by the farmers was 26.

Natural factors. The last category in facilitating factors was natural factors and concepts of “individual's interest” and “individual's participation” were mentioned in this category. Farmers in this area stated that:”I loved it and my interest led me to continue this work. Since I love it, I continue it. Without love it, you can't continue. As well as, participation between farmers is high and they help each other to achieve their goal and progress. These sentences mentioned 26 times in farmers' statements. (Refer appendix)

Table 2: Facilitating factors for conversion to rice mechanized cultivation.

Concepts	Frequency
Economic factors	
- Reduce the cost of inputs	29
- Reduce labor Costs	21
- Enhance of yield	25
Total	**75**
Educational factors	
- Non formal education	22
- Informal education	16
Total	**38**
Psychological factors	
- Risk	12
- Achievement	10
- Self-confidence	12
Total	**34**
Environmental factors	
- Lack of air pollution	13
- Lack of water and soil pollution	14
Total	**27**
Social - Cultural factors	
- Trust and confidence	17
- Having link	9
Total	**26**
Natural factors	
- Individual's interest	16
- Individual's participation	10
Total	
26	

C. Barriers to conversion to rice mechanized cultivation

Knowledge and awareness. The concepts "lack of rice producer's awareness", "lack of notification" and "poor performance of extension section" mentioned in this category by farmers. They said: "In many areas, farmers aren't aware about modern methods and therefore cultivate traditionally". "So that if they are aware of the benefits and results of new techniques and methods, they definitely use them. Another point is that, "the extension should act as a bridge and provide information to farmers. But unfortunately, the performance of extension is poor. The frequency of these statements was 47.

Legal factors. Lack of government support was as a barrier mentioned for conversion. The most important concepts mentioned in this category included: "lack of financial support" and "lack of timely action". Some of farmers' statements are: "when the government declare guaranteed prices, it must purchase the products". "whatever the government cost on rice of Mazandaran and Gilan provinces, it is profitable". And "the farmers need to financial support from government". These sentences repeated 36 times by rice producers.

Fear and anxiety. Most important concepts in this category is "fear not result activities" and "fear of financial loss" that mentioned by farmers frequently. Farmer's statements include: "we were very concerned, especially in the initial stages of work, because this transplantation is very different with traditional transplantation, "Actually, we were afraid to visit the farm" and "our main occupation is agriculture and we haven't other income". Totally, these two concepts were expressed 30 times by rice producers.

Psychological factors. Another factor is psychological factor and based on farmer's statements, the concept of "inherent characteristics" was located in this category. Farmers said: "There is resistance against every innovation" and "Most of the time, rural communities resist against of changes and new phenomena. These statements were repeated 14 times by farmers. (Refer appendix).

Table 3: Barriers for conversion to rice mechanized cultivation.

Concepts	Frequency
Knowledge and awareness	
- Lack of rice producer's awareness	20
- Lack of notification	15
- Poor performance of extension	12
Total	**47**
Legal factors	
- Lack of Financial support	28
- Non-performing timely activities	8
Total	**36**
Fear and anxiety	
- non-resulting fear of activities	13
- Fear of financial loss	17
Total	**30**
Psychological factors	
- Natural Characteristics	14
Total	**14**

DISCUSSION AND RECOMMENDATION

According to officials' statements, agricultural losses in Iran are estimated 30% to 35% with a value of $5 billion annually and it's about 6 times the world average and about 25% of country's oil revenues. Also, the rice like other agricultural products has high percentage of waste during the production. In this situation, the use of different strategies and methods to reduce waste and waste management in the country has a great importance. Therefore, it's essential to use of appropriate technologies to reduce waste in agriculture and examination factors affecting on acceptance of technologies by farmers.

Research findings show that factors affecting on acceptance of technologies to reduce losses in rice include: facilitating factors and barriers. Facilitating factors include: Economic, educational, psychological, environmental, social-cultural and natural factors. Also barriers include: lack of awareness, lack of government supports, fear and anxiety toward new technologies and psychological factors.

The results of this study are in accordance with the study results of Amirkhani *et al.* (2013), Matni Zadeh & Zamani (2012), Esfani *et al.* (2010), Soukhtanloo (2009), Bagheri *et al.* (2008), Malek Mohammadi (2006).

Thus due to present barriers is recommended:

- help to increase the farmers' knowledge and awareness toward to new technologies and methods.
- Planning to improve performance of extension in transfer knowledge and provide services to farmers.
- supporting farmers by government through granting financial facilities and loans with low interest, guaranteed pricing of products with economical pricing and quick examine to activities and demands.

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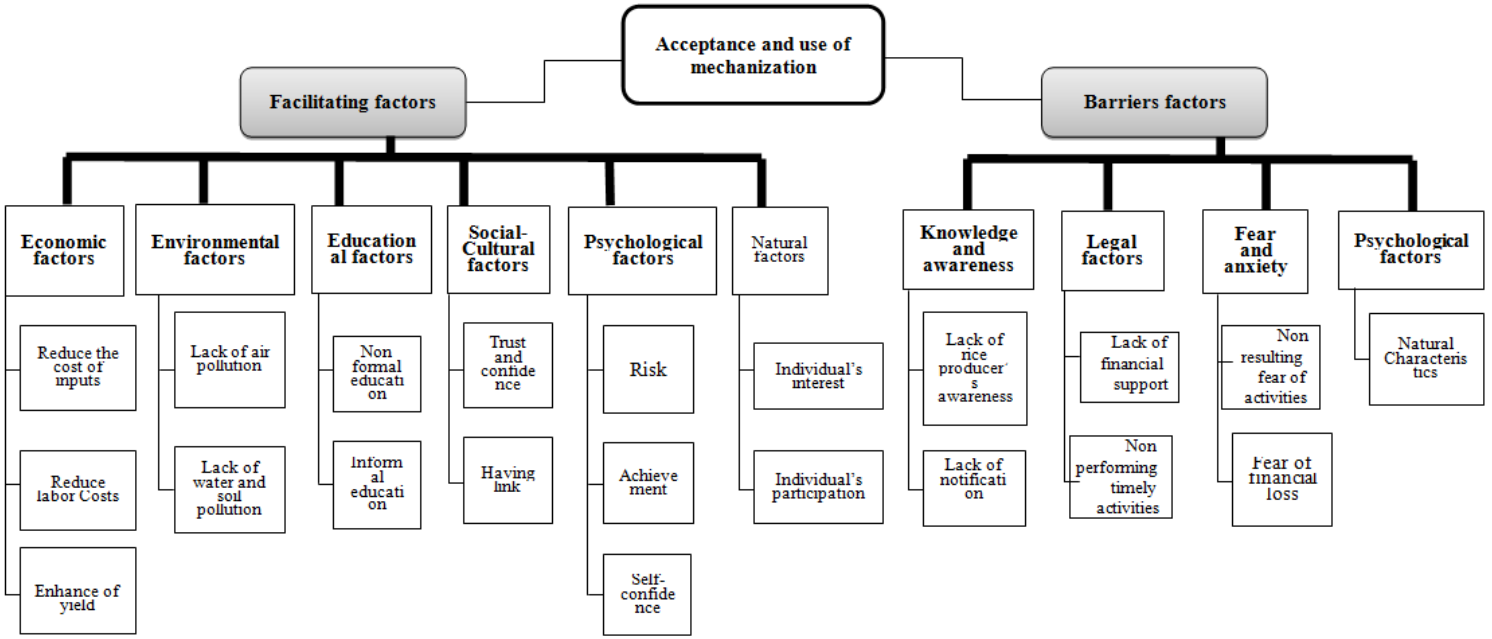

Appendix: Effective factors on mechanized cultivation technologies acceptance in rice crop.