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## Factors Affecting Risk Management among Women Rice Farmers in Sari, Iran

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### Abstract

The present study investigated factors affecting risk management by women rice farmers in the township of Sari in Iran. The statistical population comprised 1677 women who cultivate rice in Sari; 248 women were selected for the study using stratified random sampling. The data was analyzed using descriptive and inferential statistics with SPSSWin16 software. The Chronbach's alpha was 0.84 and the ordinal theta was 0.89. It was found that the women rice farmers were more willing to consult with agricultural experts, were aware of appropriate planting and harvesting times and used collaborative rice farming, such as for planting, in their risk management. Risk management among women rice cultivators in Sari County was influenced by numerous factors. It was found that 29.3% of the variance in risk management by the women was determined by the extent of financial difficulty, their education levels and borrowing resources.

**Keywords:**

*Risk management, Paddy farmers, Borrowing resources, Sari*

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## INTRODUCTION

Agriculture relies on nature and farmers face environmental, social, financial and legal issues that makes farming to be consistently and strongly associated with risk (Fraisie *et al.*, 2006). Agriculture can be considered to be the most risky economic venture. Some risks, such as the risk of natural occurrences, cannot be controlled by farmers, but other types of risk, such as the risk of weeds, can be controlled or eliminated (Ghorbani and Jafari, 2009). Of the 40 recognized types of natural disaster, 31 have been known to occur in Iran (Amini *et al.*, 2002). Given that the range of agricultural activities having critical risk are diverse and the climate can vary widely, more sophisticated services are needed to meet the demands, cope with hazards and decrease risk (Ertiaee and Chizari, 2006).

Risk is the assurance of future failure in relation to previous loss (Amini, 2011). Ahmadi (1999) listed several main sources of risk that farmers face. Economic risk includes price fluctuations for raw materials such as seed and fertilizer and for machinery at the pre-market delivery stage, difficulty obtaining bank credit and loans, price volatility for products in the post market delivery stage, inconsistent government policies for products and global fluctuations in the price of products. Social risk includes theft of crops, produce and agricultural machinery and war. Nature-related risk includes natural disasters, climate change, agricultural pests and disease. Market risk includes changes in the price of raw materials and products and increasing interest rates. The present study investigated factors affecting the risk management among women who cultivate rice in the township of Sari.

Women comprise more than half of the world population. Two-thirds of the global labor force is women, but only 10% of the global income and 1% of global assets are owned by women (Marofi and Hamidee, 2001). While bearing in mind the pivotal role that women play in care and maintenance of the family, they must be considered a key developmental element. The grim reality is that the position of women is undesirable on the international level (Sajadi, 2009). Women in rural Iran participate equally with men seeding, transplanting, and winnowing crops and maintaining livestock (Shahbazi, 2002). The current number of women in rice production in

Sari and its services areas is 1677 (Jihad-e-Keshavarzi Management of Sari, 2012).

Understanding how women rice farmers deal with risk is essential for educators, agriculture-related industries such as insurance, and policy-makers. If the attitudes of these women toward risk are accurately recognized, risk management strategies, risk-related educational programs and risk strategies can be designed to meet their needs. The goal of the present study was to model risk management by women rice farmers in Sari.

Tabatabaee *et al.*, (2013) studied the adoption of risk management among livestock breeders in Tehran. They found that 49% of breeders showed an average level of risk management. Correlation analysis indicated that there was a significant positive correlation between risk management and distance from ranch to home, amount of investment, degree of debt, annual income, and number of livestock and use of information resources. Linear multiple regression analysis revealed that the amount of investment, annual income and the awareness of the risk-related factors prompted 50.90% of breeders to change their approaches to risk management.

Alibigi *et al.* (2012) used a structural model to identify social capital factors affecting risk-taking by rapeseed farmers in Kangavar and concluded that the level of the components and farmer risk management was average. They found there was a significant positive relationship between social capital and the practice of risk management by farmers. Garavandi and Alibige (2012) identified factors affecting the behavioral reaction of corn farmers in Garmsar to risk and concluded that it was mainly devoted to risk aversion and was influenced by age, level of education, field ownership, and participation in extension classes. Age had the greatest effect on the behavioral response of farmers toward risk.

Alipour and Abdolaheefar (2011) maintain that at least 10 major types of risk threaten agricultural producers. Risk that can generally be controlled includes market risk, risk associated with production input, physical risk to the workforce, financial loss, risk associated with the information system and political risk. Risks such as natural disasters cannot be easily controlled and the human resources and capability needed to manage these risks is curtailed by the inade-

quacy and inefficiency of technological and scientific facilities.

Ghorbani and Jafari (2009) investigated factors influencing the degree of agricultural product risk for farmers in north Khorasan province and concluded that the age of the farmer, field ownership and working outside the farm had a significant negative effect on the degree of agricultural product risk. Participation in other agricultural activities, area under cultivation, extent of prior risk, and participation in a wheat supervision project had a significant positive effect on the adoption of risk management by farmers.

Zamani *et al.* (2009) considered agricultural insurance as an important mechanism for dealing with the inevitable risks to agriculture and the most appropriate strategy to decrease loss. Kohansal and Ghorbani (2008) argue that agri-

culture is inherently risky and insurance can be one way to decrease risk. Rostami (2007) asserts that factors such as high level of literacy, having a second non-agricultural job, increasing land ownership and full insurance coverage services increase the reliability and trust in farmers increases the farmer risk factor. Tiraei Yari (2002) showed that there was a significant positive relation between agricultural working record, area under cultivation, total agricultural land, communication with extension agents and experts and close contact with agricultural service centers and risk management.

Torkamani and Ezatabadi (2001) concluded that physical and financial assets, such as off-farm income, area under cultivation and education level had significant positive effects on farmer risk management. Ghorbani (2000) stud-

Table 1: Expert perspective on risk management methods

Variables	Consult experts	Participate in training courses	Use new technologies	Adopt extension recommendations	Use proper drainage	Change economic policies	Insure crops	Diversify investment	Promote maintenance and savings money for farmers	Membership in associations	Combating weeds	Proper planting and harvest	Use new irrigation methods	Have adequate savings	Plant crops with lower risk	Use resistant, high yield and preterm varieties	Diversify production
Expert(s)																	
Deshmukh and Khatri (2012)							*										
Kahan (2008)																	*
Hardaker (2006)																*	
Anderson (2001)							*										
Hueth and Forurtan (1994)						*	*	*									
Shortreed <i>et al.</i> (2003)								*							*		
Khuu and Weber (2012)							*										
Bader (2009)													*				
Anderson and Mapp (1996)				*							*					*	
Rosta (2009)			*														
Tabatabaee <i>et al.</i> (2013)	*	*					*			*				*			
Rostami (2007)							*										
Yaghobi <i>et al.</i> (2007)				*			*										
Mirzad <i>et al.</i> (2013)		*					*										
Barimzadeh (2005)					*		*					*				*	
Bahrami and Agahi (2005)							*		*								
Mazaheri (1998)							*				*						

References: (Deshmukh and Khatri, 2012), (Khatri, 2012), (Hardaker, 2006), (Anderson, 2001), (Hueth and Forurtan, 1994), (Shortreed *et al.*, 2003), (Khuu and Weber, 2012), (Bader, 2009), (Anderson and Mapp, 1996), (Rosta, 2009), (Tabatabaee *et al.*, 2013), (Rostami, 2007), (Yaghobi *et al.*, 2007), (Mirzad *et al.*, 2013), (Barimzadeh, 2005), (Bahrami and Agahi, 2005) and (Mazaheri, 1998)

Table 2: Expert perspectives on factors affecting risk management

Variables	Take out loans	Connect with extension agents	Insurance	Total area under cultivation	Land under cultivation	Off-farm income	Amount of arable land	Communicate with service centers	Agricultural work experience	Social participation	Income	Off-farm income	Farm size	Participate in extension classes	Education level	Age	Use of information resources
Expert(s)																	
Torkamani (1998)												*		*			
Monfared (1995)										*	*		*		*	*	
Tiraei Yari (2002)		*		*			*	*	*								
Torkamani and Ezatabadi (2001)					*	*									*		
Garavandi and Alibige (2012)														*	*	*	
Rostami (2007)				*		*											
Zamani <i>et al.</i> (2009)			*			*											
Kohansal and Ghorbani (2008)			*														
Tabatabaee <i>et al.</i> (2013)	*		*								*						
Lu <i>et al.</i> (2008)					*						*						*
Stevens <i>et al.</i> (2003)																	
Liu <i>et al.</i> (2010)	*					*											*
Velandia <i>et al.</i> (2009)						*								*		*	

References: (Torkamani, 1998), (Monfared, 1995), (Tiraei Yari, 2002), (Torkamani and Ezatabadi, 2001), (Garavandi and Alibige, 2012), (Rostami, 2007), (Zamani *et al.*, 2009), (Kohansal and Ghorbani, 2008), (Tabatabaee *et al.*, 2013), (Lu *et al.*, 2008), (Stevens *et al.*, 2003), (Liu *et al.*, 2010), (Velandia *et al.*, 2009)

ied the effect of insurance on wheat productivity of farmers in Mazandaran Province. He concluded that there was a positive effect for insurance on wheat production and productivity and that the level of insurance coverage by farmers participating in the wheat insurance project, optimal use of machinery and selection of high quality seed based on technical and agricultural advice were the major risk management practices.

Moghadasi (1997) studied risk-taking and concluded that most farmers practiced risk aversion. He recommended extension training about new technologies such as pesticides, fertilizers and improved seed to increase the level of production and as important factors in risk management.

Deshmukh and Khatri (2012) studied agricultural insurance in India and evaluated the development of agricultural insurance in India. They identified the types of risk that threaten crop yield in India and considered agricultural insurance to be a risk-reduction mechanism to decrease risk from natural disasters. Khuu and Weber (2012)

concluded that western Australian farmers take risks for threats such as hail, fire and that paying insurance premiums increased when changes were made to insurance and risk management policies.

Liu *et al.* (2010) assessed the demand for weather index insurance among households in Anhui Province, China. They interviewed 660 households in 22 villages in the region about risks faced by households, mechanisms to deal with risk and the willingness to pay for weather index insurance. The results showed that the biggest weather-related risks were drought and floods. They found that farmers tend to pursue non-agricultural employment and borrow money from relatives and friends. Many farmers were willing to obtain weather index insurance. The farmers who were strongly affected by climatic conditions were more likely obtain insurance.

Lu *et al.*, (2008) reported that the farmers show different risk behaviors depending on their financial potential, type of farming, amount of

arable land and income. The Organization for Economic Co-operation and Development (2009) researched agricultural risk management and found that providing a competitive business environment with guidelines and rules encouraged individual responsibility among farmers for risk management and facilitated the flow of information about risks for effective and efficient risk management.

Velandia *et al.* (2009) examined factors affecting use of an agricultural risk management mechanism and stated that off-farm income, education and age had meaningful relationships with adoption by farmers of risk management mechanisms. Olarinde *et al.* (2007) concluded that natural, social, economic and technical risks existed among the corn farmers of Nigeria.

Steven *et al.* (2003) argued that the best approach to risk management was to obtain information, especially the private sector. Meuwissen (2000) showed that farmers felt that price and production risks are the most important risks. They introduced insurance as a risk management approach and believed that geography, type of farm and organizational infrastructure increased farmer risk management.

Shrapnel and Davie (2000) showed that personal and social features are tools to identifying how people perceive risk. The present study identifies risk factors among women rice farmers in Sari. Tables 1 and 2 show risk management methods and factors influencing risk management and risk from the expert prospective, respectively.

## MATERIALS AND METHODS

The data were analyzed using descriptive and inferential statistics with SPSSWin16 software. The statistical population of the study was all women rice farmers in Sari. As reported by Jihad-e-Keshavarzi in Sari, there are currently 1677 women rice farmers in Sari and its surrounding areas (Jihad-e-Keshavarzi Management in Sari, 2012). Using the Cochran formula, the final sample size was estimated to be 248 subjects. Stratified random sampling and a proportional allocation formula was used to distinguish agricultural services.

To determine the validity of the questionnaire, copies were distributed to experts in the field and their comments were recorded and relevant

corrections were made. Corrected content validity was determined by experts at the Agricultural Organization of Mazandaran Province, and then reliability of the questionnaire was assessed by random completion of 30 questionnaires by women rice farmers in Qaemshahr by interview and survey. Cronbach's alpha was 0.84 and ordinal theta was 0.89. SPSS 16 was used for data analysis.

The questionnaire contained questions about age, work experience, area of land owned, extent of financial difficulty related to rice farming, and educational level of the women rice farmers. The questionnaire contained questions about risk management approaches (17 questions), sources of information for women rice farmers in Sari (12 questions) and sources for borrowing funds (7 questions). The Likert scale was: none (0), very low (1), low (2), moderate (3), high (4), and very high (5).

## RESULTS AND CONCLUSIONS

Table 3 showed the frequency distribution for age and work experience of women rice farmers. The results indicated that the average age of women was 46.68 years and their average work experience was 26.17 years, which represents good work experience on paddy land. Table 3 reveals that 25.2% of women had high school diplomas and 23% had completed intermediate school.

The results showed that the average area of land owned by women was 2845.56 m<sup>2</sup>. Because of inaccessibility of data, the mean was not a good indicator for making conclusions, thus, other central tendency measures were used. The mode and median for the area of rice land owned by women were 1,000 m<sup>2</sup>, which suggests that the area of land owned by women was low. Table 3 indicated that the average financial difficulty for the women was high.

Women rice farmers moderately adopted risk management methods. They were more willing to consult with agricultural experts, have awareness of appropriate planting and harvesting times and collaborate with other farmers for planting (Table 4). The most important sources of information were associations of women rice farmers, other woman rice farmers and participation in agricultural extension classes (Table 5).

The woman rice farmers showed an average level

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Table 3: Frequency distribution for risk factors of women rice farmers

	Variable	f	Valid percent (%)	Cum. (%)	Mean	SD	Min.	Max.
Age (yr)	≤25	8	3.7	3.7	46.68	10.98	20	69
	26-40	55	25.1	28.8				
	41-55	111	50.7	79.5				
	≥56	45	20.5	100				
	No response	29	-					
	Total	248	100					
Work experience (yr)	≤10	16	7.8	7.8	26.17	9.60	2	45
	11-20	61	29.8	37.6				
	21-30	73	35.6	73.2				
	31-40	47	22.9	96.1				
	≥41	8	3.9	100				
	No response	43	-					
	Total	248	100					
	Education							
	Illiterate	32	14.4					
Education	Can read and write	42	18.9		-	-	-	-
	Primary school	51	23					
	Intermediate school	38	17.1					
	High school diploma	56	25.2					
	AA or higher	3	1.4					
	No response	26	-					
	Total	248	100					
	Area of land (m <sup>2</sup> )							
	≤500	47	26.1	26.1	2845.56	5767.84	200	30000
Area of land (m <sup>2</sup> )	501-1500	76	42.2	68.3				
	1501-2500	26	14.4	82.7				
	2501-3500	5	2.9	85.6				
	≥3051	26	14.4	100				
	No response	68	-					
	Total	248	100					
	Financial difficulty							
	None	3	1.4					
Financial difficulty	Very low	20	9	1.4	3.58	1.36	-	-
	Low	26	11.7	10.4				
	Moderate	43	19.4	22.1				
	High	56	25.2	41.5				
	Very high	74	33.3	66.7				
	No response	26	-	100				
	Total	248	100					

Likert -type scale: none (0), very low (1), low (2), moderate (3), high (4), very high (5)

for obtaining loans. They were most likely to obtain loans from friends and neighbors and also to obtain financing from winning the lottery (Table 6).

Table 7 showed there was a statistically significant relationship between information resources, borrowing resources, degree of financial difficulty in rice cultivating, rice cultivation experience and education levels with risk management methods.

The use of risk management by women rice farmers in Sari was influenced by numerous factors; 29.3% of the variance in risk management was determined by degree of financial difficulty, education level and borrowing resources (Table 8). The regression line equation is:

$Y = 0.843 + 0.395 (\text{financial problems}) + 0.209 (\text{education}) + 0.187 (\text{borrowing resources})$

## DISCUSSION AND SUGGESTIONS

There was a significant positive relationship between information resources, borrowing resources, extent of financial difficulty, rice cultivation experience, and educational level with risk management methods. [Tabatabaee et al. \(2013\)](#) stated that the extent of borrowing affected risk management. Three main areas of government intervention for risk management and coping that have been studied broadly in developing countries are: insurance, saving/credit and safety nets. Credit provision may allow for better risk coping ([Cervantes-Godoy et al., 2013](#)). [Tirae Yari \(2002\)](#) pointed to agricultural experience affecting risk management. [Garavandi and Ali-bige \(2012\)](#), [Monfared \(1995\)](#) and [Torkamani and Ezatabadi \(2001\)](#) believe that educational

Table 4: Ranking risk management methods by women rice farmers in Sari

Risk management method	M <sup>1</sup>	SD <sup>2</sup>	C.V <sup>3</sup>	R <sup>4</sup>
Consult with agricultural experts	3.65	1.60	43.77	1
Aware of proper planting and harvest times	3.69	1.62	44.07	2
Collaborate with other farmers	3.55	1.58	44.48	3
Product insurance	3.52	1.65	46.98	4
Collect information for decisions about crops	3.38	1.62	47.9	5
Use new technologies	3.36	1.68	49.89	6
Have an off-farm job	3.38	1.70	50.4	7
Having enough savings	3.33	1.78	53.4	8
Use of herbicides to combat weeds	3.30	1.77	53.53	9
Diversify crops besides rice	3.41	1.88	55.08	10
Implement advice of agricultural experts	3.23	1.76	54.57	11
Participate in educational programs	3.14	1.81	57.72	12
Use pesticides for diseases and pests	2.96	1.83	61.73	13
Use of resistant, high yield and preterm varieties	2.93	1.88	64.24	14
Practice crop rotation	2.76	1.84	66.49	15
Membership in Agricultural Association	2.65	1.81	68.68	16
Use government loans	2.68	1.85	69.17	17

Likert -type scale: none (0); very low (1); low (2); moderate (3); high (4); very high (5)

Table 5: Ranking sources of information for women rice farmers in Sari

Source of information	M <sup>5</sup>	SD <sup>6</sup>	C.V <sup>7</sup>	R <sup>8</sup>
Associations of women rice farmers	3.33	1.80	54.05	1
Other women rice farmers	3.13	1.73	55.51	2
Participate in agricultural extension classes	3.04	1.75	57.49	3
Read educational publications	2.89	1.80	62.25	4
Communicate with agricultural experts	2.79	1.74	62.49	5
TV	2.92	1.85	63.21	6
Private companies provide fertilizers and educational services	2.67	1.76	65.92	7
Farmers	2.92	1.95	66.64	8
Market	2.53	1.94	76.62	9
Radio	2.56	1.99	77.68	10
Jihad-e-Keshavarzi management and service center	2.06	1.99	96.43	11
Internet	2.09	2.02	96.72	12

Likert -type scale: none (0); very low (1); low (2); moderate (3); high (4); very high (5)

level affects risk management, which is consistent with the results of this study. The farm management techniques that sustainably increase productivity and reduce production risk must be delivered to farmers, especially smallholders, by both the private and the public sector (Diouf *et al.*, 2012).

The following recommendations merit attention:

- Women should be encouraged to pursue off-farm income sources and occupations as risk management methods. Collaborative rice farming and consulting agricultural experts are other forms of risk management.
- There is a relationship between information re-

sources and level of risk management. Recommended sources of information are women rice farmer associations, other women farmers, and participation in agricultural educational programs.

- Consulting with experts requires that these experts have technical and communicative skills and be accessible to the women farmers.
- There is a relationship between information resources and the application of risk management methods. Increasing the knowledge and awareness of women farmers about the sources of risk increases risk management. This should be regarded as a mission for agriculture extensions.

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Table 6: Ranking of borrowing sources for women rice farmers in Sari

Borrowing resource	M <sup>1</sup>	SD <sup>2</sup>	C.V <sup>3</sup>	R <sup>4</sup>
Friends and neighbors	3.23	1.79	55.42	1
Women rice farmers	3.22	1.81	56.1	2
Winning the local lottery	2.99	1.85	61.98	3
Relatives	2.90	1.86	64.30	4
Shopkeepers	2.82	1.93	68.38	5
Banks	2.69	1.92	71.33	6
Loan fund	2.68	1.99	74.13	7

1: mean; 2: standard deviation; 3: coefficient of variation; 4: rank

Likert -type scale: none (0); very low (1); low (2); moderate (3); high (4); very high (5)

Table 7: Correlation between research variables and use of risk management methods

Variable	r <sub>s</sub>	p-value
Information resources	0.238**	0.000
Borrowing resources	0.139*	0.028
Extent of financial difficulty	0.447**	0.000
Rice cultivation experience	0.231**	0.000
Education level	0.165*	0.014

\*\*p &lt; 0.01; \*p &lt; 0.05

Table 8: Risk management multiple regression for women rice farmers in Sari

Model	Unstandardized coefficients		Standardized coefficients	t	p-value
	B	Std Error	Beta		
1 (Constant)	0.843	0.321	-	2.626	0.009
Extent of financial difficulty	0.395	0.056	0.448	7.004	0.000
Educational level	0.209	0.054	0.246	3.838	0.000
Borrowing resources	0.187	0.060	0.200	3.121	0.002

R = 0.552; R<sup>2</sup> = 0.305; Adjusted R<sup>2</sup> = 0.293; F = 24.872; sig = 0.000

• Borrowing sources, the extent of farmer financial difficulty, work experience and educational level should be considered when advocating risk management methods to women rice farmers.

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