academicJournals

Vol. 12(22), pp. 1881-1888, 1 June, 2017
DOI: 10.5897/AJAR2017.12249
Article Number: CC07D9B64542
ISSN 1991-637X

http://www.academicjournals.org/AJAR

African Journal of Agricultural Research

Full Length Research Paper

Perceptions of risk and risk management strategies in family agroindustries

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Received 21 February, 2017; Accepted 22 March, 2017

The importance of risk perception and risk management has been addressed by studies of agriculture and livestock activities; however, there have been few studies in other contexts, such as family agroindustries. This study provides information on risk perception and risk management in family agroindustries in the state of Rio Grande do Sul, Brazil. The analysis involves 72 family agroindustries in 43 counties, and the respondents were the individual decision makers of those organizational units. 28 sources of risks and 28 risk management strategies were analyzed. The results suggested that the country's current economic situation, inflation/deflation, changes in product prices and the elimination/reduction of government support are the most important sources of risk. The main types of risk management included updating to new technologies, the use of technical support, maintaining/increasing market liquidity for products, and the commercialization of products without mediators. Two sources of risk (low-qualified staff and lack of motivation) and four risk management strategies (commercialization of products without mediators, acquiring certification, improving production practices and maintaining relationships with customers) were identified in the present study, but not found in the literature reviewed.

Key words: Agroindustries, food production, risk, risk perception, risk management.

INTRODUCTION

The consolidation and strengthening of Brazilian family farming, especially in the 1990s, resulted in more support for the development of public policies aimed at these agricultural establishments (Schneider and Gazolla, 2015). Due to their limited technology and financial resources (as compared to high tech and specialized agriculture that produces commodities, many family farmers do not obtain satisfactory economic results, and need to diversify their activities and products (Nichele and Waquil, 2011). In this regard, agroindustries have emerged as an alternative to family farms (Gazolla et al., 2012; Schneider and Ferrari, 2015).

Family agroindustries are organizational units that play a key role in the composition of the income of families that perform agriculture and livestock activities. These organizations are described by Pelegrini and Gazolla

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Table 1. Studies of risk perception and risk management strategies.

Authors	Study/country	Year
Wilson et al.	Dairy farmers/USA	1988
Meuwissen et al.	Livestock farmers/Netherlands	2001
Flaten et al.	Dairy farmers/Norway	2005
Akcaoz et al.	Dairy farmers/Turkey	2009
Borges and Machado	Producers of agricultural commodities/Brazil	2012
Zhou et al.	Dairy farmers/China	2012
Finger and Waquil	Rice producers/Brazil	2013
Gebreegziabher and Tadesse	Smallholder dairy farmers/Ethiopia	2014
Khan et al.	Dairy farmers/India	2014
Hayran and Gül	Dairy farmers/Turkey	2015

(2008) as undertaking activities that involve the processing of agricultural and livestock products (value is added to the product). Dairy products, sweets, fruit jellies, preserves, pasta, biscuits, pork and beef sausages are examples of family agroindustry products. With the commercialization of these products, these agroindustries can stimulate income generation and improve the social status of family farmers (Gazolla et al., 2012; Schneider and Ferrari, 2015). They are exposed to many risks that may trigger negative results.

The word “risk” comes from the Old Italian word “risicare”, which means “to dare” (Bernstein, 1996). In general, the concept of risk concerns a possible future event and can be understood as a potential loss affecting the desired results in a given personal or organizational activity (Nelson, 1997; Ayala-Cruz, 2016). Risks are present everywhere and are characterized as adverse results associated with a given action (Hardaker, 2000; Huirne, 2003), and risk perception varies according to the dimension and consequences of the risk (van Winsen et al., 2014).

Studies about risks have emerged in several areas, such as physics, biology, engineering and social sciences (Micic, 2016). A number of studies in recent decades have assessed risk perceptions and risk management in agricultural and livestock activities (Flaten et al., 2005; Akcaoz et al., 2009; Borges and Machado, 2012; Finger and Waquil, 2013; Gebreegziabher and Tadesse, 2014; Khan et al., 2014). These studies are important because they show it is necessary to perceive risks to develop strategies to reduce or eliminate them.

Risk management deserves attention due to its importance in organizational management (Borges and Machado, 2012). Risk management strategies involve the use of specific methods (Akcaoz et al., 2009) and are generally considered as one of the factors that determines the financial success or failure of an organization. Management measures are, therefore, essential because although there are several sources of risk, there are also countless mechanisms/strategies with which to manage them (Borges and Machado, 2012).

The aim of this research was to analyze perceptions of risk and risk management strategies based on the perception of decision makers in family agroindustries in the state of Rio Grande do Sul, Brazil. Although, several studies have addressed risk perception and risk management strategies, none of those identified focused on family agroindustries. In addition to attempting to identify the main sources of risk and risk management strategies, the importance of conducting interviews with these decision makers prior to the administration of the questionnaire was assessed.

METHODOLOGY

Study description

The study population undertakes agroindustrial activities in the state of Rio Grande do Sul, a state that has 497 municipalities. The selection of respondents was based on a non-probabilistic sampling method because the respondents were not accessible to be randomly sampled. However, when non-probabilistic sampling is properly done, it can obtain satisfactory results faster, and at lower costs, than the probabilistic method (Curwin and Slater, 2008).

Two procedures were used in development of the questionnaire. At first, based on a bibliographic review of studies of risk perceptions and risk management (Table 1), a preliminary questionnaire was developed for pre-testing its suitability for meeting the objective of the survey. Pre-tests were conducted with the individuals responsible for decision making of family agroindustries and this data was not used in the present study.

The second procedure consisted of semi-structured interviews with the decision makers of family agroindustries, recorded by note taking. This step aimed to identify sources of risk and risk management strategies not considered in the analyzed literature, to identify other variables based on the respondents’ views. The interview was based on two questions: i) what would you consider a source of risk? ii) what would you consider as a risk management strategy? Seven decision makers of family agroindustries were interviewed. The size of this sample was based on saturation of answers.

Sample description and characterization

After construction of the questionnaire, it was used with respondents

Table 2. Descriptive statistics of the decision makers.

Variable	Average	Minimum	Maximum	Std[c]
Age (years)	42.56	21	78	12.66
Farm area (ha-own)	13.53	0	68	13.17
Farm area (ha-leased)	1.93	0	27	4.8
Total farm area (ha)	15.47	0.5	68	13.27
Variable			**Relative frequency (%)**	
Schooling	Incomplete elementary education		18	
	Elementary education		7	
	Incomplete secondary education		4	
	Secondary education		39	
	Incomplete higher education		9.7	
	Higher education		19.3	
	Postgraduate studies		2.8	
Marital status	Single		19.44	
	Married		79.16	
	Separated		1.4	

respondents from April to July 2015. The participants were 72 family agroindustries located in 43 counties. These agroindustries produce items such as baked goods, pasta, juices, sweets, wines, dairy products and sausages. The respondents were the decision makers in the agroindustries, the managers of family agroindustries.

The respondents were identified with the aid of the Federação dos Trabalhadores na Agricultura Familiar da Região Sul (FETRAF/SUL) and Empresa de Assistência Técnica e Extensão Rural (EMATER/RS) in the counties of Ajuricaba and Ijuí. The 72 questionnaires were administered as follows: at the producer fairs often held weekly in the municipalities (Ajuricaba) (3); at the 6th Feira de Negócios das Indústrias de Ijuí (FENII) (12); during visits to family agroindustries (13) and by e-mail through Google Docs (44), (in total, 246 emails were sent with the questionnaire, and 47 were completed and returned, of these, three were excluded due to inappropriate or incomplete responses).

Data processing and analysis

Based on the sources of risk and risk management strategies, as well as the variables identified by semi-structured interviews, the participants indicated their perceptions using a Likert scale (where 1 = not relevant and 5 = very relevant). The data was analyzed using descriptive statistical measures and factor analysis. Factor analysis is a multivariate technique and aims to consolidate the information contained in a series of original variables into a smaller number of variables (factors), (Hair et al., 2006). The Bartlett's test of sphericity (which analyzes the hypothesis that the variables are not correlated in the population) and Kaiser-Meyer-Olkin (KMO) test were used to evaluate the factor analysis. It is considered an acceptable condition when KMO > 0.5 (Bezerra and Corrar, 2006).

The variation between variables in each factor was expressed by latent root criterion (Eigenvalue > 1) (Hair et al., 2006). The factorial matrices were rotated using the orthogonal method (Varimax). Varimax method maximizes the variance of squared loadings of a factor.

The factorial analysis also takes into account the communalities. Communalities values represent the proportion of the variance for each variable included in the analysis that is explained by the components extracted. Usually, is acceptable, a variable with communalities ≥ 0.5 (Hair et al. 2006). In interpreting factorial coefficients, significance were considered when presenting value ≥ $\left|0.30\right|$ according to Flaten et al. (2005). These factorial coefficients are in bold in Tables 4 and 6.

RESULTS AND DISCUSSION

General characteristics of respondents

The main characteristics of the respondents are shown in Table 2. Age and farm area were examined by average, minimum, maximum and standard deviation. Also, the relative frequency was used to examine schooling and marital status.

According to the results, farmers are average 42.56 years old and the average of total farms size is 15.47 ha. In addition, most farmers (79.16%) are married and 19.3% have concluded the higher education. On the other hand, many respondents have a low education level (7% have concluded elementary education and 18% have elementary education incomplete).

Perception of risk sources

In total, 28 sources of risks were considered and presented to the respondents. Table 3 shows the ranking, mean, mode and standard deviation of these risks, which are classified in descending order, considering the mean values.

The source of risk with the highest mean was the country's economic situation followed by inflation/deflation (in 2015, the inflation rate was higher than 10%). One possible reason to explain these results is the concern of these respondents about the economic and political scenario in Brazil and in the study region. On the other

Table 3. Risk perception (ranking).

Risks	Rank	Mean	Mode[d]	Std[e]
Country's economic situation	1	4.05	5	1.18
Inflation/deflation	2	3.84	5	1.21
Changes in product prices	3	3.83	5	1.26
Elimination/Reduction of governmental support	4	3.81	5	1.38
Difficulties faced in finding skilled labor[a]	5	3.81	5	1.36
Changes in governmental policies	6	3.66	5	1.25
Changes in prices of inputs[a]	7	3.63	4	1.30
Poor hygiene[a]	8	3.59	5	1.63
Health and safety of manager/staff	9	3.54	5	1.46
Death of manager/staff	10	3.47	5	1.69
Emergence of new technologies	11	3.44	5	1.37
Development of new production techniques	12	3.41	5	1.40
Lack of raw material[a]	13	3.40	5	1.42
Low-qualified staff[c]	14	3.38	5	1.54
Non-occurrence of family succession	15	3.37	5	1.55
Excess supply	16	3.36	5	1.41
Changes in interest rates	17	3.36	4	1.39
Lack of technical support	18	3.34	5	1.43
Market competition	19	3.34	4	1.38
Climate changes	20	3.30	3	1.32
Indebtedness	21	3.27	5	1.38
World economic situation	22	3.16	3	1.35
Lack of motivation[b,c]	23	3.15	3	1.42
Occupational accidents	24	2.98	1	1.52
Robbery/theft	25	2.76	1	1.52
Fires	26	2.56	1	1.43
Family conflicts	27	2.54	1	1.39
Division of labor between the participants	28	2.43	3	1.16

[a]Variables with one missing value were replaced with the mean of that variable for all the cases; [b]Variables with two missing values were replaced with the mean of that variable for all the cases; [c]Source of risks not found in the literature reviewed. They were detected in the interviews; [d]Value that appears most often in the set data; [e]Standard deviation.

hand, the third highest mean was changes in product prices, or the risk of financial fluctuations that might result in losses. This risk had the third highest mean in the studies conducted by Flaten et al. (2005) and Meuwissen et al. (2001), and the second highest mean in the study of Borges and Machado (2012), also conducted in Rio Grande do Sul (geographic micro-region of Vacaria).The elimination/reduction of governmental support was the fourth largest mean, possibly also due to the economic crisis in Brazil. This risk also ranked among the top four risks in the study by Gebreegziabher and Tadesse (2014). However, it appears in a middle ranking position in the study by Meuwissen et al. (2001). These results may demonstrate the importance of government actions targeted at some productive activities in countries characterized as emerging economies.

The health and safety of manager and staff variable was in the upper part of the table, however Flaten et al. (2005) found this source of risk in a middle ranking position, and Gebreegziabher and Tadesse (2014) found it in the last ranking position. These differences are addressed by Patrick et al. (1985), Renn (1998) and Finger and Waquil (2013), who reported that the perception of risk differs considerably between groups of individuals and cultures.

Sources of risks not found in the literature studied but identified during the interviews were: low-qualified staff and lack of motivation. These risks were not placed in the first few positions, but respectively in the 14th and the 23rd positions. Low-qualified staff and lack of motivation may have a negative impact on agroindustrial production, affecting the production system and thus economic results.

Following the descriptive analysis of the sources of risks, a factorial analysis was performed, as shown in Table 4. The value obtained for Bartlett's sphericity test

Table 4. Factor analysis of the sources of risks– rotation matrix (Varimax).

Sources of risks	Factors									Commonality
	1	2	3	4	5	6	7	8	9	
Changes in interest rates	**0.81**	0.01	0.09	-0.10	0.01	-0.03	0.19	0.01	0.01	0.723
World economic situation	**0.77**	0.08	0.03	-0.01	0.13	0.09	-0.06	-0.01	0.12	0.654
Country's economic situation	**0.64**	-0.04	-0.18	**0.37**	**0.39**	-0.01	0.23	0.09	-0.02	0.803
Inflation/Deflation	**0.62**	0.02	0.02	0.21	**0.39**	-0.08	0.24	0.05	0.03	0.734
Lack of technical support	**0.55**	**0.41**	0.01	0.06	0.29	0.26	0.16	0.01	-0.21	0.720
Lack of raw material	**0.53**	0.16	0.17	0.07	-0.01	0.02	-0.13	**0.55**	0.18	0.707
Changes in product prices	**0.52**	0.14	-0.06	**0.34**	-0.01	**0.31**	0.22	0.07	0.02	0.628
Poor hygiene	-0.03	**0.78**	-0.01	0.06	-0.24	0.01	0.20	0.26	0.02	0.793
Health and safety of manager/staff	-0.11	**0.77**	0.20	-0.04	0.16	0.15	-0.06	-0.13	0.14	0.754
Death of manager/staff	0.26	**0.63**	**0.37**	0.11	0.14	-0.10	-0.08	-0.03	0.12	0.678
Robbery/Theft	0.03	**0.58**	-0.05	0.26	0.10	-0.12	0.02	0.04	0.28	0.592
Low-qualified staff	**0.43**	**0.57**	-0.08	0.11	-0.15	-0.13	0.17	0.22	-0.16	0.693
Non-occurrence of family succession	0.18	**0.57**	0.29	-0.13	0.07	0.13	0.18	-0.16	-0.16	0.580
Occupational accidents	-0.10	0.06	**0.87**	-0.01	-0.03	0.14	0.03	0.02	0.01	0.811
Fires	-0.01	0.27	**0.83**	-0.01	0.06	0.14	-0.03	0.21	0.01	0.842
Excess supply	0.11	0.03	0.03	**0.80**	0.12	-0.07	-0.08	**0.33**	0.12	0.821
Market competition	0.06	0.14	-0.26	**0.65**	0.05	**0.33**	0.05	0.08	0.23	0.699
Family conflicts	0.03	0.13	**0.50**	**0.58**	0.03	-0.01	0.29	-0.14	-0.02	0.771
Indebtedness	**0.37**	**0.36**	0.18	**0.42**	0.28	-0.19	-0.08	-0.19	-0.22	0.690
Changes in governmental policies	0.18	0.01	0.06	0.01	**0.83**	0.04	0.07	0.14	0.18	0.796
Elimination/Reduction of governmental support	0.17	0.1	-0.01	0.17	**0.77**	0.05	0.11	0.13	0.01	0.771
Development of new production techniques	0.03	-0.03	0.11	0.03	0.06	**0.88**	-0.01	0.05	0.08	0.814
Emergence of new technologies	0.05	0.04	0.15	0.03	0.01	**0.79**	0.14	0.05	-0.11	0.704
Difficulties faced in finding skilled labor	0.19	0.10	-0.10	0.02	0.24	0.00	**0.71**	0.10	-0.07	0.646
Division of labor between the participants	0.18	0.08	0.19	0.01	0.01	0.21	**0.68**	0.02	0.25	0.651
Lack of motivation	0.03	0.13	**0.50**	**0.58**	0.03	-0.01	**0.36**	-0.14	-0.02	0.771
Changes in prices of inputs	-0.09	-0.13	0.10	0.23	**0.35**	0.04	0.21	**0.66**	0.05	0.708
Climate changes	0.08	0.08	0.01	0.10	0.12	-0.01	0.09	0.03	**0.83**	0.740
Cumulative percentage of variance	23.34	34.03	42.59	49.41	54.89	59.37	63.54	67.42	71.13	-

was 1014.763 (p-value < 0.05), indicating that variables were uncorrelated. The result of the KMO test was 0.602, validating the adequacy of the present sample. Regarding commonality, no variables were excluded. Nine factors with Eigenvalues higher than 1 were identified and they explain more than 71% of variance.

The factors were defined and named considering the variables with greater loads (Hair et al., 2006). The nomenclatures created are as follows: (1) external environment, (2) internal environment, (3) casual losses, (4) market, (5) institutional, (6) innovation, (7) personal relationships, (8) financial planning and (9) climate changes. Borges and Machado (2012) also found that external environment was the factor with the highest value of variance explanation. Similarly, family issues (variables that compose the factor internal environment) were also factors with values that explained a significant amount of variance in the researches by Meuwissen et al. (2001) and Borges and Machado (2012).

Considering the cumulative percentage of variance, the factors extracted are shown in descending order, based on the most explained variance. The total variance explanation of these factors is 71.13%. In this regard, the sum of the three factors with higher variance explanation is 42.59%.

Risk management strategies

Following the analysis of risk perception sources, the same methodology was used to analyze risk management strategies. In total, 28 risk management strategies were considered and presented to the respondents. Table 5 shows the ranking, mean, mode and standard deviation of these strategies which are classified in descending order based on the mean values.

Risk management based on updating with new technologies was highest in the ranking, followed by the

Table 5. Risk management strategies (ranking).

Strategies	Rank	Mean	Mode[d]	Std[e]
Updating with new technologies	1	4.33	5	1.01
Use of technical support	2	4.23	5	1.05
Maintaining/Increasing market liquidity of the end product	3	4.20	5	0.90
Commercialization of products without mediators[a c]	4	4.19	5	1.09
Maintaining reserves of resources (in general)	5	4.16	5	1.08
Acquiring certification [b c]	6	4.07	5	1.19
Cooperative practices	7	4.04	5	1.19
Negotiating loans	8	4.02	5	1.37
Improving production practices [c]	9	3.98	5	1.09
Obtaining information about new production techniques	10	3.93	5	1.19
Obtaining accounting information	11	3.93	5	1.30
Selecting companies with low levels of risks	12	3.90	5	1.11
Obtaining information about new regulations	13	3.88	5	1.19
Relationships with several organizations	14	3.87	5	1.28
Getting loans (funding)	15	3.84	5	1.21
Performing external activities (outside the agroindustry)	16	3.83	5	1.33
Diversifying production	17	3.80	5	1.24
Maintaining reserve credit	18	3.77	5	1.28
Personal insurance	19	3.75	5	1.32
Maintaining flexible costs	20	3.73	5	1.11
Family succession plan	21	3.73	4	1.17
Maintaining relationships with customers[c]	22	3.66	5	1.39
Spreading sales throughout the year	23	3.65	5	1.16
Negotiating through contracts	24	3.60	4	1.26
Property insurance	25	3.47	4	1.29
Being informed about government actions	26	3.47	3	1.16
Equipment insurance	27	3.26	4	1.29
Workers compensation program	28	3.09	3	1.25

[a]Variables with one missing value were replaced with the mean of that variable for all the cases; [b]Variables with two missing values were replaced with the mean of that variable for all the cases; [c]Risk management strategies not found in the literature reviewed. They were detected in the interviews. [d] Value that appears most often in the set data. [e]Standard deviation.

use of technical support. These results demonstrate that decision makers attach importance to the advice of experts and possible innovations that might contribute to family agroindustries. However, according to research carried out by Flaten et al. (2005), Borges and Machado (2012) and Gebreegziabher and Tadesse (2014), these management strategies appear in middle ranking position.

The third highest mean is concerned with maintaining/ increasing the market liquidity of the product to be marketed. This strategy suggests that agroindustry products are easily marketed and hence converted into money. For Borges and Machado (2012), this strategy appeared in a middle ranking position. However, in the study by Flaten et al. (2005), strategies targeting liquidity was in the highest position.

The strategies identified in the interviews were: the commercialization of products without mediators, acquiring certification and maintaining relationships with clients. These appeared respectively in the 4th, 6th, 9th and 22nd positions. Commercialization without mediators means selling directly to the final consumer, maximizing the possible financial return. Acquiring certification increases the credibility of the agroindustry product, and contributes to its commercialization in other regions or fairs (Schneider and Ferrari, 2015), in wholesale and retail sales. Improving production practices is associated with taking courses, graduating from education and other similar activities that contribute to the development of the family agroindustry. Maintaining relationships with customers is about interacting with consumers, in order to increase the levels of confidence between consumer and agroindustry.

Most strategies obtained a value of five for the mode. This indicates that many respondents considered them very important in risk mitigation. Based on this assumption, the role of management processes should be stressed, and the decision made by an individual regarding the appropriate combination of actions or

Table 6. Factor analysis of risk management strategies– Rotation matrix (Varimax).

Risk management strategies	Factors								Commonality
	1	2	3	4	5	6	7	8	
Acquiring certification	**0.75**	0.22	0.14	0.04	0.24	0.13	0.14	0.03	0.734
Maintaining appropriate market liquidity of the end product	**0.68**	0.18	0.11	0.07	-0.07	0.13	0.12	0.21	0.604
Selecting companies with low levels of risks	**0.67**	-0.03	0.11	**0.36**	0.18	0.16	-0.04	0.03	0.668
Maintaining reserve credit	**0.65**	0.23	-0.05	0.22	0.18	-0.11	0.09	0.27	0.672
Maintaining flexible costs	**0.63**	**0.83**	-0.02	0.01	-0.02	0.01	0.03	-0.07	0.715
Improving production practices	0.08	**0.83**	0.03	0.17	0.07	-0.01	0.03	0.03	0.740
Distributing sales throughout the year	0.12	**0.64**	0.02	-0.04	0.06	0.15	-0.09	**0.46**	0.687
Being informed on government's actions	**0.41**	**0.59**	0.05	0.01	0.10	0.10	0.05	0.01	0.556
Negotiating loans	0.22	-0.10	**0.81**	0.01	-0.01	0.02	0.07	-0.01	0.734
Workers compensation program	-0.05	**0.32**	**0.72**	0.16	0.02	0.10	0.05	-0.08	0.675
Performing external activities (outside the agroindustry)	-0.01	-0.25	**0.58**	**0.42**	-0.08	0.26	0.12	-0.08	0.685
Obtaining accounting information	0.12	0.16	**0.56**	-0.09	0.26	0.13	0.10	**0.54**	0.765
Getting loans (funding)	0.24	-0.08	**0.47**	**0.36**	-0.02	0.17	**0.43**	-0.14	0.667
Use of technical support	0.28	0.12	**0.42**	**0.32**	0.23	-0.05	0.24	**0.45**	0.709
Cooperative practices	0.12	0.04	0.13	**0.77**	0.10	0.07	0.13	0.08	0.669
Maintaining reserves of resources (general)	0.20	0.21	0.09	**0.63**	-0.05	0.13	0.09	0.14	0.603
Obtaining information on new production techniques	0.16	-0.01	0.03	-0.06	**0.76**	-0.02	0.10	0.18	0.665
Obtaining information on new regulations	0.07	0.04	0.13	**0.38**	**0.71**	0.26	0.09	-0.16	0.787
Family succession plan	-0.22	0.22	-0.10	0.27	-0.09	**0.75**	-0.03	0.11	0.840
Commercialization without mediators	0.28	-0.07	0.14	-0.07	0.07	**0.68**	0.27	0.08	0.730
Updating with new technologies	0.21	0.07	**0.38**	0.21	0.16	**0.62**	0.01	0.02	0.654
Maintaining relationships with customers	0.17	0.20	**-0.39**	-0.10	0.03	**0.59**	0.12	0.20	0.697
Negotiating through contracts	0.41	-0.03	0.16	0.07	**0.41**	**0.57**	0.18	-0.24	0.806
Equipment insurance	0.18	**0.42**	-0.06	-0.15	-0.13	0.02	**0.72**	0.13	0.796
Property insurance	-0.08	-0.09	0.12	0.14	0.03	-0.01	**0.70**	0.03	0.665
Relationships with several organizations	0.17	-0.07	**0.30**	0.27	**0.36**	**0.32**	**0.42**	-0.12	0.704
Personal insurance	0.23	-0.01	0.16	0.23	0.15	0.23	**0.69**	0.02	0.756
Diversifying production	0.20	-0.03	-0.20	0.15	0.01	0.01	0.02	**0.79**	0.744
Cumulative percentage of variance	26.59	38.75	46.06	52.07	57.21	61.94	66.39	70.45	-

practices depends on the relative analysis of the expected return, considering risk perception. Once risk management strategies are developed to address the perceived risks, decision makers can use them as tools and methods of risk management in the organization (Ghadim and Pannell, 1999).

Table 6 shows the factorial analysis of risk management strategies. This analysis obtained a value of 968.020 (p-value < 0.05), for Bartlett's test of sphericity, indicating that the variables were uncorrelated. The KMO test results also validated sampling adequacy, with a value of 0.746, validating the adequacy of the present sample. Regarding commonality, no variables were excluded. Eight factors with eigenvalues higher than 1 were identified and they explain more than 70% of variance.

The factors obtained were named as follows: (1) financial management, (2) marketing tactics, (3) strategic planning, (4) flexibility, (5) innovation, (6) personal relationship, (7) security and (8) diversification. The factors were named considering the variables with greater loads, which had a great impact on the development of the nomenclature of each factor (Hair et al., 2006). Financial management had the highest variance explanation value. Similar results were found in the study by Borges and Machado (2012), where variables related to financial management comprised the two factors that explained most of the variance (respectively, consulting and price control).

The factors extracted are shown in descending order (from those with higher variance explanation values to those with lower variance explanation values) and the total variance explanation of these factors is 70.45%. The sum of the three factors with higher variance explanation is 46.06%.

Conclusion

The present study aimed to assess risk perception and risk management strategies in family agroindustries

through the administration of questionnaires to decision makers of these organizational units. Based on a literature review and the methodological procedures performed, 28 sources of risks and 28 risk management strategies were analyzed. The results revealed that the country's current economic situation, inflation/deflation, changes in product prices and the elimination/reduction of government support were perceived as the most important sources of risks. Updating with new technologies, the use of technical support, maintain/increase market liquidity of product and commercialization of products without mediators were considered the main risk management strategies. Besides, sources of risk and risk management strategies were grouped, respectively, in nine and eight factors.

These results may contribute to the development of management tools for the decision makers of family agroindustries. Such information can also be valuable for institutions, providing guidance to experts in technical extension services and technical assistance to producers, such as the EMATER. These data may support the creation of public policies aimed at strengthening family agroindustries. In addition, the importance of conducting interviews with these decision makers prior to the administration of the questionnaire was demonstrated. Contact with the respondents is important in studies on perceptions and it is can result in the identification of "new" sources of risks and risk management strategies not detected in the literature analyzed.

CONFLICT OF INTEREST

The authors have not declared any conflict of interest

REFERENCES

Akcaoz H, Kizilay H, Ozcatalbas O (2009). Risk management strategies in dairy farming: A case study in Turkey. J. Anim. Vet. Adv. 8(5):949-958.

Ayala-Cruz J (2016). Project risk planning in high-tech new product development. Acad. Rev. Latinoamericana de Administración 29(2):110-124.

Bernstein PL (1996). Against the gods: The remarkable story of risk. New York: Wiley.

Bezerra FA, Corrar LJ (2006). Utilização da análise fatorial na identificação dos principais indicadores para avaliação do desempenho financeiro: uma aplicação nas empresas de seguros. Rev. Contabilidade Finanças 17(42):50-62.

Borges JAR, Machado JAD (2012). Risks and Risk Management Mechanisms: An Analysis of the Perceptions of Producers of Agricultural Commodities. Interdiscipl. J. Res. Bus. 2(5):27-39.

Curwin J, Slater R (2008). Quantitative methods for business decisions. London: Cengage Learning.

Finger MIF, Waquil PD (2013). Percepção e medidas de gestão de riscos por produtores de arroz irrigado na Fronteira Oeste do Rio Grande do Sul. Ciênc. Rural 43(5):930-936.

Flaten O, Lien G, Koesling M, Valle PS, Ebbesvik M (2005). Comparing risk perceptions and risk management in organic and conventional dairy farming: empirical results from Norway. Livest. Prod. Sci. 95(1):1-25.

Gazolla M, Niederle PA, Waquil PD (2012). Agregação de Valor nas Agroindústrias Rurais: uma análise com base nos dados do Censo Agropecuário. Rev. Paranaense de Desenvolvimento 122:241-262.

Gebreegziabher K, Tadesse T (2014). Risk perception and management in smallholder dairy farming in Tigray, Northern Ethiopia. J. Risk Res. 17(3):367-381.

Ghadim AK, Pannell DJ (1999). A conceptual framework of adoption of an agricultural innovation. Agric. Econ. 22(2):145-154.

Hair JW, Black B, Babib R, Anderson RE, Tatham R (2006). Multivariate Data Analysis. 6th ed. Upper Saddle River, NJ: Pearson Education.

Hardaker JB (2000). Some issues in Dealing with risk in Agriculture. University of New England: Graduate School of Agric. Resour. Econ.

Huirne RBM (2003). Strategy and risk in farming. NJAS-Wageningen. J. Life Sci. 50(2):249-259.

Hayran S, Gül A (2015). Risk Perception and Management Strategies in Dairy Farming: A Case of Adana Province of Turkey. Turkish J. Agric.-Food Sci. Technol. 3(12):952-961.

Khan MA, Chander M, Bardhan D (2014). Risk perceptions and risk management strategies of insured and non-insured dairy farmers: A comparative study. Indian J. Anim. Sci. 84(6):694-698.

Meuwissen MPM, Huirne RBM, Hardaker JB (2001). Risk and risk management: an empirical analysis of Dutch livestock farmers. Livest. Prod. Sci. 69(1):43-53.

Micic T (2016). Risk reality vs risk perception. J. Risk Res. pp. 1-14. .

Nelson AG (1997). Teaching agricultural producers to consider risk in decision making. Texas: Faculty Paper Series, Departament of Agricultural Economics, Texas A&M University.

Nichele FS, Waquil PD (2011). Agroindústria familiar rural, qualidade da produção artesanal e o enfoque da teoria das convenções. Ciênc. Rural 41(12):2230-2235.

Patrick GR, Wilson PN, Barry PJ, Boggess WG, Young DL (1985). Risk perceptions and management responses: producer-generated hypotheses for risk modeling. Southern J. Agric. Econ. 17(2):231-238.

Pelegrini G, Gazolla M (2008). A agroindústria familiar no Rio Grande do Sul**:** limites e potencialidades a sua representação social. Frederico Westphalen: URI.

Renn O (1998). Three decades of risk research: accomplishments and new challenges. J. Risk Res. 1(1):49-71.

Schneider S, Ferrari DL (2015). Cadeias curtas, cooperação e produtos de qualidade na agricultura familiar – o processo de relocalização da produção agroalimentar em Santa Catarina. Organizações Rurais Agroindustriais 17(1):56-71.

Schneider S, Gazolla M (2015). Seeds and Sprouts of Rural Development: Innovations and Nested Markets in Small Scale On-Farm Processing by Family Farmers in South Brazil. In: Constructing a New Framework for Rural Development. 22:127-156.

Wilson PN, Luginsland TR, Armstrong DV (1988). Risk perceptions and management responses of Arizona dairy producers. J. Dairy Sci. 71(2):545-551.

Van Winsen F, de Mey Y, Lauwers L, Van Passel S, Vancauteren M, Wauters E (2014). Determinants of risk behaviour: effects of perceived risks and risk attitude on farmer's adoption of risk management strategies. J. Risk Res. 19(1):56-78.

Zhou H, Nanseki T, Takeuchi S (2012). Dairy Farmers' Risk Perception and Risk Management in China – Evidence from Hebei Province and Inner Mongolia. Agric. Inform. Res. 21:20-27.