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Regression Analysis of Innovation Management in Processing and Complementary Industries of Livestock Products

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Abstract

The purpose of research was analysis of innovation management in processing and complementary industries of livestock products. The method of research was correlative descriptive. The statistical population of this study was all managers in processing and complementary industries of livestock products of Khouzestan Province (N=486). The sampling method was stratified random sampling. The sample size was a (n=125). A questionnaire was developed to gather information regarding innovation management in processing and complementary industries of livestock products. Data collected were analyzed using the Statistical Package for the Social Sciences (SPSS). According to the results, the correlation between innovation management with participation in special course, accountability, risk taking, tend to be creative, competitiveness, attitude to innovation management and obtained credit was significant. Based on regression analysis participation in special course, accountability, risk taking, tend to be creative, competitiveness and attitude to innovation management may well explain for 42.9% changes (R^2=0.429) in level of innovation management. According to path analysis, competitiveness and attitude to innovation management were the most important variables influencing the innovation management.

Keywords:
Innovation Management, Regression analysis, Processing and Complementary Industries

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INTRODUCTION

Agricultural innovation management is widely considered as a key factor in achieving food security through innovative agricultural systems and by raising production and incomes, especially of smallholder farms. Also, innovation allowing companies and firms or enterprises to stay competitive in ever changing world markets. For all of the talk about the importance of innovation, innovation management and creativity in business, the topics are hardly generally well understood (Riederer *et al.*, 2005).

Innovation is not new and it comes in many forms. Also, as many authors argue, it is important for organizations to innovate (Eveleens, 2010, Evitt, 2007, Francis and Bessant, 2005, Hamel and Prahalad, 1994). The innovation process is defined as the development and selection of ideas for innovation and the transformation of these ideas into the innovation (Eveleens, 2010). Andrew *et al.* (2007) argue that the management of an innovation project is essentially like any other business projects, though it comes with more risk and uncertainty.

According to Ommani (2015), the innovation management level in processing and complementary industries of Khuzestan province is not desirable. Therefore, practitioners should be required to provide increasing levels of innovation management. Based on the results of this study variables such as income, competitiveness, accountability, risk taking, tend to be creative, level of education and attitude to innovation management played a critical role in improving innovation management. Improve psychological characteristics such as risk taking, competitiveness, accountability for innovation through workshops, specialized training and scientific visits, will play an important role in the management of innovation.

Agricultural innovation is vital to promoting agricultural and rural development and poverty reduction. Innovation in the agriculture sector is critical to achieving the necessary growth in production in an environmentally sustainable way (Sunding and Zilberman, 2001).

Also, according Ommani (2011), 76% of farmers of Kouzestan Province had moderate to very low knowledge regarding innovation management. In this study, there was a significant relationship between the farmer's knowledge regarding innovation management with accessing to communications channels, level of education, income, crop yield, size of farm, social participation, and level of participation in extension classes. Level of education, income, crop yield, size of farm, social participation, level of participation in extension classes may well explain for 53% (R^2 =0.534) changes in farmer's knowledge regarding innovation management.

Innovations management uses the systems and business to make the organization more innovative. The aim of innovations management is to maintain and improve the competitive position of the business by usage of innovation. Figure 1

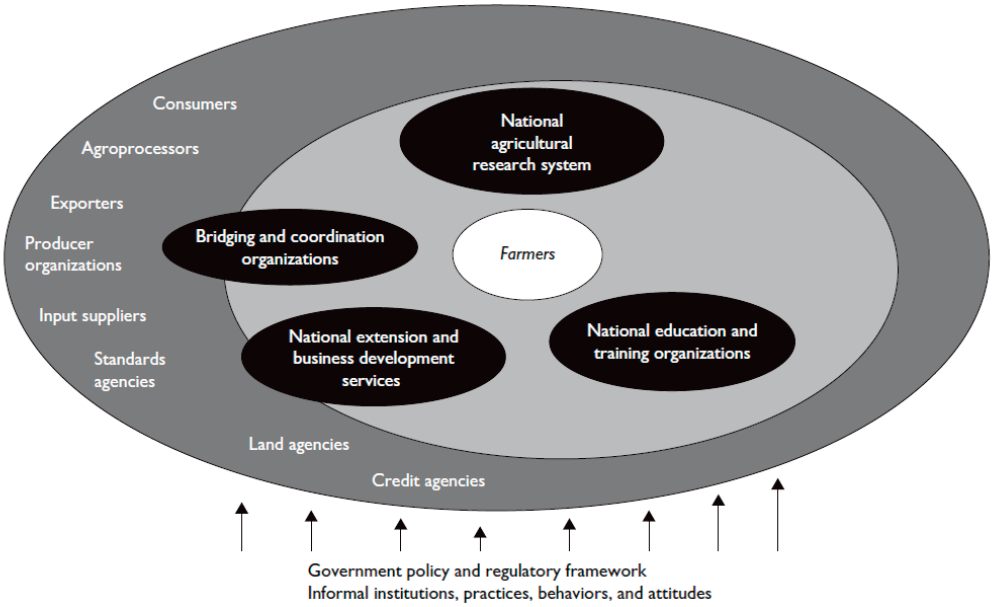

Figure 1: An agricultural innovation system Source (World Bank, 2012).

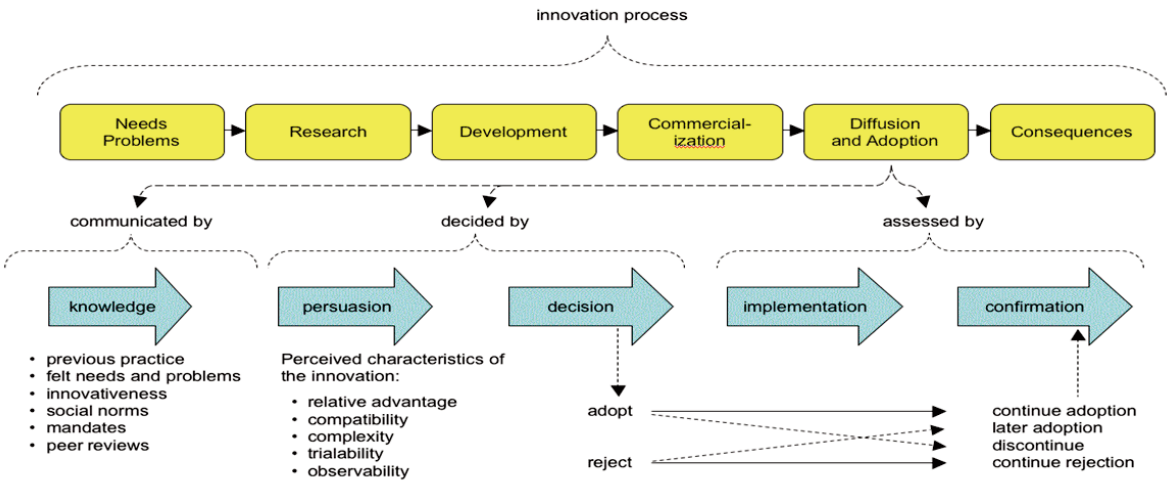

Figure 2: Agricultural innovation process.

presents a conceptual framework for an agricultural innovation system. The figure shows the main actors (typical agricultural knowledge and technology providers and users, as well as the bridging or intermediary institutions that facilitate their interaction); the potential interactions between actors; and the agricultural policies and informal institutions, attitudes, and practices that either support or hinder the process of innovation (World Bank, 2012).

Based on Figure 2 the process of innovation as part of innovation management including:

-Assessment of problem and determining need problem

- Research

-Development

-Commercialization

-Diffusion

-Adoption

-Analyzing consequences

MATERIALS AND METHODS

The method of research was descriptive-correlative. The statistical population of this study was all managers in processing and complementary industries of livestock products of Khouzestan Province (N=486). Using by stratified random sampling, a random sample was selected for participation in the study (n=125). The researchers used survey research method in which data was gathered by the questionnaire. A first step Khouzestan Province was divided into three areas, North, Central and South. Then, in proportion to the population of each section, a sample was selected.

A questionnaire was developed to gather data regarding innovation management in processing and complementary industries of livestock products. To determine the validity of the questionnaire a panel of experts was used and agricultural experts' comments were considered. The questionnaire was pilot tested and reliability was estimated by calculating Cronbach's alpha (Cronbach's alpha=0.89). Reliability was Data collected were analyzed using the Statistical Package for the Social Sciences (SPSS19). In this study, Regression model was used for data analysis. Regression analysis is a statistical procedure for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between dependent variable and one or more independent variables. More specifically, regression analysis helps one understand how the typical value of the dependent variable (or 'criterion variable') changes when any one of the independent variables is varied, while the other independent variables are held fixed. Regression analysis is widely used for prediction and forecasting. Regression analysis is also used to understand which among the independent variables are related to the dependent variable, and to explore the forms of these relationships. In restricted circumstances, regression analysis can be used to infer causal relationships between the independent and dependent variables.

Path analysis is used to describe the directed

dependencies among a set of variables. This includes models equivalent to any form of multiple regression analysis, as well as more general families of models in the multivariate analysis of variance and covariance.

For assessment the level of innovation management in processing and complementary industries of livestock products were used seven subsystems. The items of each subsystem in Likert scale were analyzed.

RESULTS

Descriptive result

The ages of the respondents ranged from 24 to 67 years. The mean age was 42 (SD=7.87, n=125). The majority (38.4%, n=48) of respondent were 41-50 years old. Most of the respondents in the study were male (88%) and only 15 persons (12%) were female. Three person of managers had a doctoral degree and 64% (n = 80) of respondents were a bachelor's degree holders.

Correlation study

Based on the results status of all subsystems of innovation management were moderate. For assessment of correlation between dependent and independent variables was used spearman correlation coefficient. Based on results, correlation between innovation management and participation in special classes, accountability, risk taking, tendency to be creative, competitiveness, attitude to innovation management and obtained credit was significant (Table 1).

Regression analysis

Based on regression analysis, participation in special courses, accountability, risk taking, tend to be creative, competitiveness and attitude to innovation management may well explain for 42.9% changes (R^2=0.429) in level of innovation management. Based on Table 2, we can see that the predictor variables of participation in special course, risk taking, competitiveness and attitude are significant because their p-values are <0.01. However, the p-value for tendency to be creative (0.731) and accountability (0.967) are greater than the common alpha level of 0.05, which indicates that it is not statistically significant.

In consideration to Variance Inflation Factor (VIF), we can argue about co-linearity statistics. If VIF is less than 10, co-linearity will not be significant. According to results, it is considered

Table 1: correlation between dependent and independent variables.

Predictor Variables	Response Variable	r_s	p-value
Income		0.154	0.086
Age		0.017	0.853
Level of Education		0.121	0.181
Experience		0.118	0.190
Participation in special courses		0.287	0.001
Tendency to be creative	Innovation management	0.373	0.000
Risk taking		0.420	0.000
Accountability		0.197	0.000
Competitiveness		0.480	0.000
Attitude		0.439	0.000
Credit		0.198	0.000

Table 2: Regression analysis between dependent and independent variables.

Independent Variables	B	SE B	Beta	t	p-value
Participation in special courses	8.493	2.406	0.270	3.531	0.001
Tendency to be creative	0.940	2.728	0.031	0.345	0.731
Risk taking	8.249	2.554	0.256	3.230	0.002
Accountability	0.126	3.044	0.003	0.042	0.967
Competitiveness	10.74	2.837	0.325	3.804	0.000
Attitude	0.733	0.232	0.243	3.164	0.002
Constant	-41.06	14.04	----	-2.925	0.004

amount of co-linearity is less than 10 for predictor variable in the last stage of regression analysis. Considering to quantity of beta (ß) can be arbitrated ratio and proportion predictor variables in explanation of dependent variable. Quantities of beta (the fourth column of Table 2) show that per unit of variation in participation in special course, risk taking, competitiveness and attitude can be varied standard deviation of dependent variable.

Path analysis

In addition to being thought of as a form of multiple regression focusing on causality, path analysis can be viewed as a special case of structural equation modeling (SEM) – one in which only single indicators are employed for each of the variables in the causal model. That is, path analysis is SEM with a structural model, but no measurement model. Other terms used to refer to path analysis include causal modeling, analysis of covariance structures, and latent variable models (Figure 3). A path coefficient indicates the direct effect of a variable assumed to be a cause on another variable assumed to be an effect. Path coefficients are standardized because they are estimated from correlations (a path regression coefficient is unstandardized). Path coefficients are written with two subscripts (Table 3).

Effects of independent variables on dependent variable:

1) Participation in special courses on innovation management:

Direct Effect= P_{71}=0.270

2) Tendency to be creative on innovation management:

Direct Effect =P_{72}=0.031

Indirect Effect = $P_{62}\times P_{76}$=0.112×0.325= 0.036

Total effect-0.031+0.036=0.067

3) Risk taking on innovation management:

Table 3: Effects of independent variables on dependent variable.

Independent Variables	Direct effect	Indirect effect	Total Effects
Participation in special courses	0.270	---	0.270
Tendency to be creative	0.031	0.036	0.067
Risk taking	0.256	0.044	0.300
Accountability	0.003	0.098	0.101
Competitiveness	0.325	---	0.325
Attitude	0.243	0.093	0.336

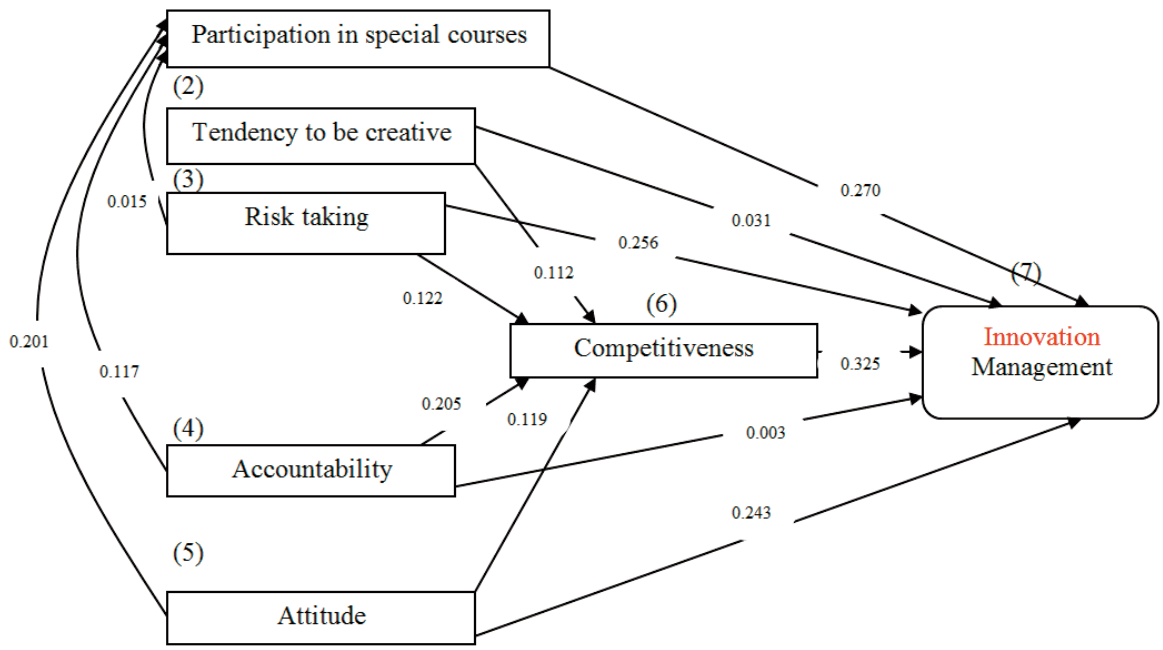

Figure 3: Path analysis of innovation management.

Direct Effect= P_{73}=0.256

Indirect Effect= (P_{63}×P_{76})+ (P_{13}×P_{71}) = 0.122 × 0.325+0.015×0.270=0.04+0.004=0.044

Total effect-0.256+0.044=0.3

4) Accountability on innovation management:

Direct Effect= P_{73}=0.003

Indirect Effect= (P_{64}×P_{76})+ (P_{14}×P_{71}) = 0.205× 0.325+0.117×0.270=0.098

Total effect-0.003+0.098=0.101

5) Attitude on innovation management:

Direct Effect= P_{73}=0.243

Indirect Effect= (P_{65}×P_{76}) + (P_{15}×P_{71}) = 0.119× 0.325+0.201×0.270=0.093

Total effect-0.243+0.093=0.336

DISCUSSION AND CONCLUSION

In today's competitive world, innovation is considered as a key factor to success and survival for organizations. According to the results, the correlation between innovation management with participation in special courses, accountability, risk taking, tend to be creative, competitiveness, attitude to innovation management and innovation management was significant. Based on regression analysis participation in special classes, accountability, risk taking, tend to be creative, competitiveness and attitude to innovation management may well explain for 42.9% changes (R^2=0.429) in level of innovation management. The some of this finding was supported by Bylin *et al*. (2004), Coash *et al.* (2003), Fulton *et al.* (2003) Kwamena (2008), Quinn (1999), Reeve and Black (1998), Riederer *et al.* (2005), Ryan and Oestreich (1991) observed incidences where a risk-averse attitude became the organizational norm due to an atmosphere of perceived fear, resulting in decreased innovation.

Improve psychological characteristics such as risk taking, competitiveness, accountability for innovation through workshops, specialized training and scientific visits, will play an important role in the management of innovation. In the current study, analysis of the results demonstrates a positive and significant relationship between the dimensions of psychological characteristics and innovation management. This finding is in line with previous studies (e.g. Abbas and Raja, 2015; Jafri, 2012; Rego *et al*. 2012).

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