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Factors Affecting Farmers' Perception and Adaptation Behavior in Response to Climate Change in Hamedan Province, Iran

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ABSTRACT

The climate is changing and agriculture sector is heavily dependent on climatic changes. Considering the key role of perception and its impact on behavior and given the importance of climate changes in today's world, the present research was conducted with the aim of investigating the factors affecting perception and adaptation behavior of farmers in response to climatic changes in Hamedan, Iran. For this aim, first, the factors affecting the farmers' perception and adaptation behavior were extracted from literature review. Then, a questionnaire was developed, and to determine its validity, the questionnaire was examined by a panel of experts. Further, to measure the reliability of the research instrument, a pilot test was conducted. The statistical population of the research consisted of 115,160 farmers in Hamedan Province and the sample size based on Krejcie and Morgan table was determined as n= 384 farmers. Then, a stratified random sampling with proportional allocation was used. The findings indicated that among the studied variables, knowledge, perception, and belief with path coefficients of, respectively, 0.53, 0.32, and 0.18 had the maximum impact on the adaptation behavior, while the maximum impact on perception belonged to belief and knowledge with path coefficients of, respectively, 0.56 and 0.35. According to the results, knowledge, which had the highest contribution in explaining behavior, was not seen in the Arbuckle *et al*. (2015) model. Therefore, to make it easier for the farmers to communicate and facilitate the transfer of information on climate change, establishment of community-based organizations is suggested. In addition, by enhancing the level of farmers awareness about climate-smart agriculture, it is possible to take major steps to improve their adaptation to climate changes.

Keywords: Climate changes adaptation models, Farmers' Belief, Knowledge, Perception.

INTRODUCTION

Specific atmospheric conditions governing a certain region for a short time is called weather, while the long-term average of these atmospheric conditions is called climate (IPCC, 2014). Climate change refers to variations in climatic parameters such as temperature and precipitation resulting from different factors including human activities, biological-thermal changes, greenhouse effects, and rotation of planets (Bast, 2010). Although different economic sectors including agriculture, forestry, water, industries, tourism, energy, and even financial markets and insurance are affected by climate changes (Kemfert, 2008), the agriculture sector is one of the most important economic sectors that is vulnerable to climate changes (Rejesus *et al.*, 2013). In response to these changes, in many parts of the world, increasing agricultural productions will become more difficult in the future (Hardy, 2003) (FAO, 2017). Thus, to deal with this problem,

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adaptation of this sector to climate change is essential (Karimi *et al.,* 2018). Adaptation is a key strategy that can reduce the severity of climate change on agriculture and food production (Alam *et al.,* 2017). Adaptation of agriculture to climate change involves corrections in the agriculture system in response to current or future climate change, which reduces vulnerability to climate change (Smit and Skinner, 2002; Walthall *et al*., 2013). A large number of previous researches suggest that the people's understanding about the risks resulting from climate change has a close relationship with mitigating measures and behavioral change to adapt to these changes (Wei *et al*., 2014; Alam *et al.,* 2017). Similarly, in the agriculture sector, the ability of farmers in understanding the risks resulting from climate change is a key prerequisite for the selection of adaptive behaviors by them (Gbetibouo, 2009; Wang *et al.,* 2014). Iran is considered an arid and semi-arid region, which is strongly influenced by climate change. Hamedan Province in Iran is no exception to this rule, and climate change clearly reflects itself these days and has increasingly attracted the attention of authorities to this issue (Jamshidi *et al.,* 2019). The reason of importance is that climate change has incurred irrecoverable damages to this region especially to the agriculture sector (Jamshidi *et al.,* 2019). Climate change can be detected based on changes in indictors including precipitation, temperature, evaporation (Tanny *et al.,* 2018), snow depth (Croce *et al.,* 2018) and dust (Schweitzer *et al.,* 2018). In Hamedan Province, within the period of 1982-2017, the mean annual precipitation, mean annual snow depth, and mean precipitation decreased from 55.19 to 43.45%, from 41.83 to 1.34 cm, and from 34.06 to 21.37 mm, respectively. In contrast, the mean annual evaporation, total days with dust, and mean temperature increased from 0 to 152.40 mm, from 38 to 48 days, and from 11.50 to 12.94^{0}C, respectively (Iran Meteorological Organization, 2017). Thus, it can be concluded that climate change has occurred in this province. Hamedan Province is one of the key zones of agriculture across Iran, it is superior in producing 15 agricultural products (Agricultural Department of Hamedan Province, 2017) and climate change has brought about different effects including diminished crop yield, increased unemployment, reduced income, increased migration and drought, lowered soil fertility, devastation of the vegetation, and jeopardized live-stock health, etc. (Agricultural Department of Hamedan Province, 2017). Therefore, investigating farmer's perception and adaptation measures to cope with extreme climate events resulting from climate change is so important. According to the library and documentary studies, similar research has not been conducted to investigate the factors affecting farmers' perception and adaptation in Iran simultaneously. Many studies have been conducted to investigating factors affecting behavior of adaptation, beliefs and perceptions facing climate change, some of them are mentioned in Table 1. This research will expand the literature in this regard, where farmers are responsible for adapting to climate. Adaptation to climate change requires recognizing and understanding local changes in climatic conditions such as changes in temperature and precipitation in the long run (Bryan *et al.,* 2013; Arbuckle *et al.,* 2013; Ndamani and Watanbe, 2015). Therefore, the aim of this study was to investigate the factors affecting farmers' perception and adaptation behavior in Hamedan Province of Iran in response to climate change.

MATERIALS AND METHODS

In this research, the climate change adaptation model of Arbuckle *et al.* (2015) was adopted as an appropriate framework for analysis. But this model suffers from the lack of variables such as knowledge and

Table 1. Studies related to climate change beliefs, perceptions, and behavior.

Tittle	Researchers	Comparison	Variable
Farmers' climate change beliefs and adaptation strategies for water scarce future in Australia.	Wheeler *et al.*, 2013	Found that the belief and perception of farmers about incidence of climate change have affected their adaptation behavior, ignored indirect and direct effects of Knowledge	Belief, perception, adaptation behavior
Understanding Farmer Perspectives on Climate Change Adaptation and Mitigation: The Roles of Trust in Sources of Climate Information.	Arbuckle *et al.*, 2015	In which the variable of knowledge about climate change has not been considered as a factor affecting perception and adaptation. In Iran and Hamedan there are not lots of sources of information for farmers to add trust to the model.	Trust, belief, perception, support for adaptation
Vulnerability to climate change of smallholder farmers in the Hamadan Province, Iran.	Jamshidi, *et al.*, 2015	This paper measures the vulnerability of farmers and does not address the direct and indirect factors affecting it.	Sensitivity criteria, adaptive capacity
Climate change beliefs and perceptions of agricultural risks: An application of the exchangeability method.	Menapace *et al.*, 2015	Concluded that knowledge and belief of individuals have affected their perception about climate change and ignored the behavior	Knowledge, belief, perception
Relating farmer's perceptions of climate change risk to adaptation behavior in Hungary.	Li *et al*,. 2017	Perceiving climate change and the behavior of adaptation has been considered as a unique variable, While this is a limitation on this model, perceiving climate change and adaptation measures are separate variables and they can't be seen jointly.	Knowledge, belief and behavior of adaptation
Assessing farmers' perceptions about climate change: A double-hurdle approach.	Hitayezu *et al.*, 2017	This research ignores the direct impact of belief and the indirect impact of variables through perception on behavior.	Extreme coping behavior, ex-ante adaptation, perceptions about climate change, Attention and trust, Emotive factors (affect heuristics), Experiential factors (availability heuristics), Socio-cultural factors (values and worldviews), Cognitive factors (knowledge).
Raising awareness of climate change causes? Cross-national evidence for the normalization of societal risk perception of climate change.	Luis *et al*., 2018	This research ignores the effect of perceptions on behavior	Awareness, risk perception, CO_2 emission
Climate change and Chinese farmers: perceptions and determinants of adaptive strategies.	Zhai *et al*., 2018	Found that knowledge about climate change and belief in occurrence of climate change have affected the adaptation strategies of the farmers, but this research ignored indirect effects of knowledge and belief through perception on adaptive strategies	Perceptions, adaptive strategies, knowledge and belief.
Perception, Knowledge, and Behavior towards Climate Change: A Survey among Agricultural Professionals in Hamadan Province, Iran.	Jamshidi, *et al.*, 2019	This paper measures the Perception, Knowledge, and Behavior of Agricultural Professionals not farmers and evaluate the status of the variables not the relations between them	Perception, Knowledge, and Behavior

individual factors, which have been identified in literature reviews as variables affecting perception and adaptation behavior. It should be mentioned that in Iran, there are not different sources of information for evaluating the effect of trusting them on perception of farmers, so, instead we added knowledge that is one of the most important factors affecting perception and behavior of farmers. Hence the development of a single and integrated model in the field of perceived and behavioral adaptation by farmers is necessary. Therefore, the proposed model of research is presented in Figure 1.

In terms of extent of controlling the variables, this research has been non-experimental and with regards to strategy, it has been of survey type. Considering the objective, it is an applied research, and regarding time, it is cross-sectional, since it has been performed at a specific section of time. The studied region in this research was Hamedan Province located in the west of Iran, including nine towns (Figure 2). In the present research, the statistical population consisted of 115,160 farmers in Hamedan Province, Iran. The sampling method was stratified random sampling with proportional allocation. To determine the sample size, Krejcie and Morgan table (1970) was used, based on which the number of farmers was determined as 384 (Table 2). To measure the dependent variables of perceiving climate changes, 7 items (Alam *et al.*, 2017; Arbuckle *et al.*, 2015), and to measure the adaptation behavior in response to climate change 4 items (Alam *et al.* 2017; Mase *et al*., 2017; Fadina and Barjolle, 2018) were used. Also, in order to measure the

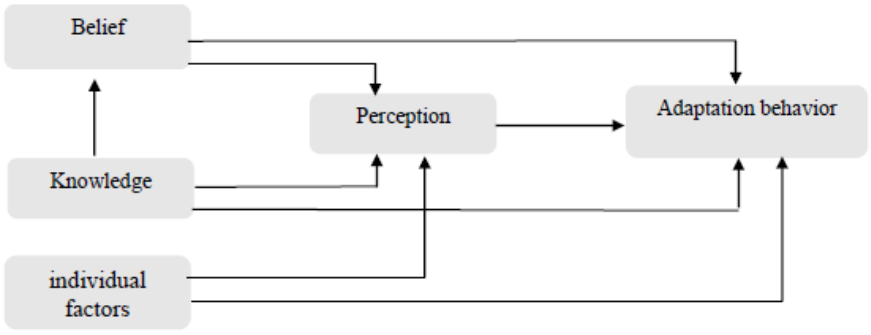

Figure 1. The conceptual model of the research.

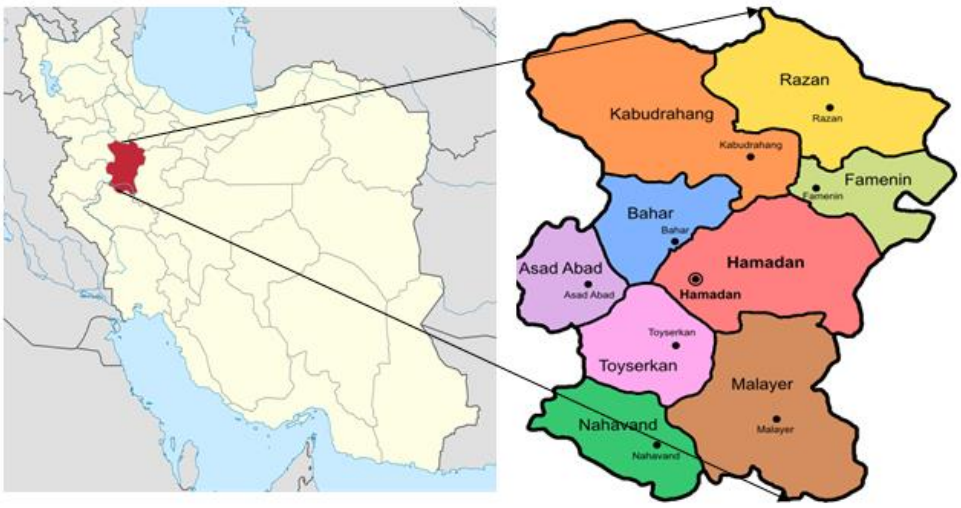

Figure 2. The geographical location of Hamedan Province, Iran.

Table 2. Number of samples in different counties.

County	Statistical Population	Samples
Asad Abad	9166	31
Bahar	10833	36
Toyserkan	11253	38
Razan	12990	43
Kabudrahang	15517	52
Malayer	20530	68
Nahavand	13551	45
Hamedan	16295	54
Famenin	5026	17
Total	115160	384

independent variable of knowledge about climate change, 7 items (Stoutenborough and Vedlitz, 2014; Salehi *et al*., 2016) and for belief in climate change 4 items (Arbuckle *et al*., 2015) were used (Table 3). Each of these items was measured through 5-point Likert scale (1= Absolutely disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Absolutely agree). In this research, the content and face validity of the research instrument were investigated and modified based on the comments of a panel of experts. To measure the reliability of the designed questionnaire, first, 30 questionnaires were completed by a pilot test in Avaj Town. The Cronbach Alpha coefficient for the completed questionnaires was calculated by SPSS 22, whose results are provided in Table 3. Based on the obtained coefficients, it was found that the questionnaire enjoyed a high reliability, since the Cronbach Alpha coefficient for all sections of the questionnaire was over 0.7. Further, based on the results obtained from AMOS23, for each of the four latent studied variables as knowledge, belief, perception, and adaptation behavior in response to climate change, the Composite Reliability (CR) values calculated were larger than 0.6 and the Average Variance Extracted (AVE) was larger than 0.5 (Table 3). The collected data were analyzed by SPSS 22. Then, to confirm the model, AMOS23 software was utilized.

RESULTS

The age of 46.9% of the farmers was less than 39 years, the farming experience of most of them was less than 21 years (68.5%), and a large number of farmers had an annual income level of less than 200 million Rials (58.6%) (Table 4).

A total of 339 of the respondents were male (88.3%), and 45 of them (11.7%) were female. In terms of level of education, 174 farmers (45.3%) had primary school level, and 25 (6.5%) were illiterate (Table 5).

According to Table 6, there was a positive and significant relationship between the variables of perception as well as knowledge and adaptation behavior at the level of 1%, along with a significant relationship between belief and adaptation behavior at the level of 5%.

Also, no significant relationship was found between variables such as age, annual income, agricultural experience, and level of education and adaptation behavior.

According to Table 7, there is a positive and significant relationship between the variables of belief, knowledge, and perceiving climate change at 99% level. Also, no significant relationship was found between variables such as age, annual income, agricultural experience, and level of education and perceiving climate change.

Based on Table 8, the model is consistent with fit statistics, which shows the goodness of fit of the model. Furthermore, considering the structural equation modelling of the research (Figure 3), three external latent variables (perception directly, knowledge directly and indirectly, and belief indirectly) accounted for 65% of the variance of adaptation behavior in response to climate change. Also, two external latent variables

Table 3. The items of the studied variables and results of SPSS 22 analysis.

Variable	Items	Abbreviated name	Reference	CR[a]	AVE[b]	Cronbach-Alpha coefficient
Knowedge about climate change (Knowledge)	I am familiar with different types of greenhouse gases.	Knowledge 1	(Stoutenborough and Vedlitz, 2014)	0.86	0.59	0.79
	In response to climate change, the temperature of the air increases.	Knowledge 2	(Stoutenborough and Vedlitz, 2014)			
	In response to climate change, the level of precipitation declines.	Knowledge 3	(Stoutenborough and Vedlitz, 2014)			
	Scientists believe that in upcoming years, the level of seawaters will rise due to climate change.	Knowledge 4	(Stoutenborough and Vedlitz, 2014)			
	Biodiversity diminishes in response to temperature rise.	Knowledge 5	(Stoutenborough and Vedlitz, 2014)			
	Some say that the new findings indicate that ultraviolet radiation has no effect on global climate.	Knowledge 6	(Salehi *et al*., 2016)			
	Iran is one of the top 10 countries that produce greenhouse gases in the world.	Knowledge 7	(Salehi *et al*., 2016)			
The adaptation behavior in response to climate change (Behavior)	Fallow the cultivated land for 2 or 3 years	Behavior 1	(Mase *et al.* 2017) (Fadina & Barjolle 2018)	0.78	0.58	0.71
	Diversification of income-generating activities and seasonal migration	Behavior 2	(Alam *et al.*, 2017) (Fadina and Barjolle, 2018)			
	Adjusting planting time and techniques	Behavior 3	(Alam *et al.*, 2017) (Fadina and Barjolle, 2018)			
	Crop–livestock diversification and other good practices (mixed cropping, crop rotation, mulching, organic fertilizer)	Behavior 4	(Fadina and Barjolle, 2018) (Alam *et al.*, 2017)			
Perception of climate change (Perception)	I am worried about the potential effects of climate change on the performance of my farm.	Perception 1	(Arbuckle, 2015)	0.86	0.61	0.72
	I believe that extreme climatic changes will occur more often in the future.	Perception 2	(Arbuckle, 2015)			
	Small farmers rarely get help from other farmers.	Perception 3	(Alam *et al.*, 2017)			
	The income resulting from agriculture has diminished due to declined soil fertility, crops, and performance.	Perception 4	(Alam *et al.*, 2017)			
	A major part of trees have been devastated due to climate change.	Perception 5	(Alam *et al.*, 2017)			
	The soil quality has diminished in response to climate change.	Perception 6	(Alam *et al.*, 2017)			
	The level of precipitation has decreased over the past 15 years.	Perception 7	(Alam *et al.* 2017)			
Belief in climate change (Belief)	I believe that climate change is happening.	Belief 1	(Arbuckle, 2015)	0.79	0.53	0.72
	I believe that there is enough evidence clearly demonstrating that climate change is happening.	Belief 2	(Arbuckle, 2015)			
	I believe that climate change is happening and mostly develops in response to natural changes.	Belief 3	(Arbuckle, 2015)			
	I believe that climate change is happening and is mostly developed by human activities.	Belief 4	(Arbuckle, 2015)			

[a] CR= Composite Reliability of the studied constructs, [b] AVE= The square root of Average Variance Extracted.

Table 4. The frequency distribution of the sample farmers in terms of age, farming experience, and annual income.

Variable	Variable levels	Frequency	Percentage	Maximum	Minimum	Mean
Age (Years)	39 x≤	180	46.9			
	x≤ 57< 39	174	45.3	75	21	41
	x> 57	30	7.8			
Farming experience (Years)	21 x≤	263	68.5			
	x≤ 41< 21	107	27.9	60	1	19
	x> 41	14	3.6			
Annual income (Million Rials)	20 x≤	225	58.6			
	x≤ 50< 20	132	34.4	300	1	24
	x> 50	27	7			

Table 5. The frequency distribution of farmers based on gender and level of education.

Variable index	Variable levels	Frequency	Percentage	Mode
Gender	Male	339	88.3	Male
	Female	45	11.7	
Level of education	Illiterate school	25	6.5	Primaryschool
	Primary school	174	45.3	
	Guidance school	59	15.4	
	Highschool diploma and above	126	32.8	
Total		384	100	

Table 6. The results obtained from correlation between the independent variables and the adaptation behavior. [a]

First variable	Second variable	Type of correlation	Correlation coefficient (r)	Significance level
Perceiving climate change	Adapation behavior	Pearson	0.187**	0.000
Belief in climate change	Adapation behavior	Pearson	0.127*	0.013
Knowledge about climate change	Adapation behavior	Pearson	0.288**	0.000
Age	Adapation behavior	Pearson	0.072	0.160
Annual income	Adapation behavior	Pearson	0.012	0.201
Agricultural experience	Adapation behavior	Pearson	0.053	0.302
Level of education	Adapation behavior	Kendall's tau	0.039	0.321

[a] * Significance at 5% level, ** significance at 1% level.

Table 7. The results obtained from correlation between independent variables and perceiving climate change. [a]

First variable	Second variable	Type of correlation	Correlation coefficient (r)	Significance level
Belief in climate change	Perceiving climate change	Pearson	**0.441	0.000
Knowledge about climate change	Perceiving climate change	Pearson	**0.361	0.000
Age	Perceiving climate change	Pearson	0.097	0.057
Annual income	Perceiving climate change	Pearson	0.055	0.294
Agricultural experience	Perceiving climate change	Pearson	0.018	0.175
Level of education	Perceiving climate change	Kendall's tau	0.033	0.319

[a] * significance at 5% level, ** significance at 1% level.

Table 8. Results of the compliance of the total measurement model with fitness indices. [a]

Fit statistics	Fit values*	Research results**
Chi-square to Degree of Freedom ratio (CMIN/DF)	Less than 3	1.675
Comparative Fit Index (CFI)	Larger than or equal to 0.90	0.92
Goodness of Fit Index (GFI)	Larger than or equal to 0.90	0.93
Normalized Fit Index (NFI)	Larger than or equal to 0.90	0.83
Tucker-Lewis Index (TLI)	Larger than or equal to 0.90	0.90
Incremental Fit Index (IFI)	Larger than or equal to 0.90	0.92
Root Mean Square Error of Approximation (RMSEA)	Less than or equal to 0.08	0.04

[a] Source: Kalantari, 2013 ; * significance at 5% level, ** significance at 1% level.

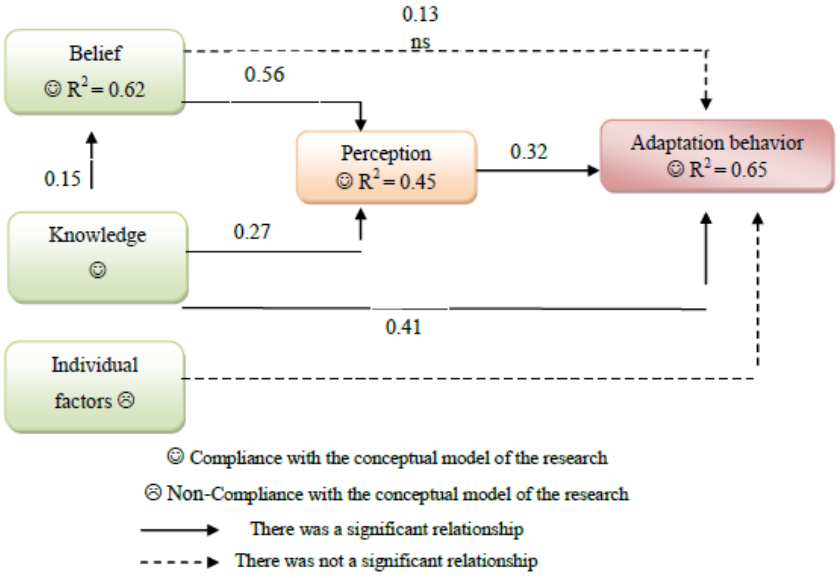

Figure 3. The general standardized fitness of the model.

(knowledge directly and indirectly, and belief directly) accounted for 45% of the variance of perceiving climate change by farmers in this province.

Total Effect of Independent Variables on Dependent Variable

Tables 9 and 10 present the effects of all independent variables on the perception and adaptation behavior in response to climate change. The maximum impacts on adaptation behavior are related to knowledge about climate change (0.53) that was ignored in Arbuckle's model, perceiving climate change (0.32), and belief in climate change (0.18), respectively. Furthermore, the maximum effects on perceiving climate change are related to belief in climate change (0.56) and knowledge about climate change (0.35).

DISCUSSION

The general results of the fitted model indicated that the factor of perceiving climate change directly affects the adaptation behavior of farmers, since not perceiving climate change is the main barrier against adaptation behavior. This finding is in line with the research by Escarcha *et al.* (2018) and Fang and Yu (2015).

Table 9. The total effect of independent variables on the variable of adaptation behavior in response to climate change.

Independent variable	Dependent variable	Total effect
Knowledge about climate change	Adaptation behavior	0.53
Perceiving climate change	Adaptation behavior	0.32
Belief in climate change	Adaptation behavior	0.18

Table 10. The total effect of independent variables on the variable of perceiving climate change.

Independent variable	Dependent variable	Total effect
Belief climate change	Perceiving climate change	0.56
Knowledge about climate change	Perceiving climate change	0.31

The results obtained from the research suggest that belief does not influence adaptation behavior directly. This finding is in accordance with Li *et al.* (2017). On the other hand, belief directly affected perception, and this finding is congruent with the research by Arbuckle *et al.* (2015) and Le Dang *et al*. (2014). Therefore, it can be concluded that the belief of individuals in incidence of climate change first affects their perception and, in turn, influences their adaptation behavior.

Based on the obtained results, knowledge directly affected the behavior. Therefore, raising awareness of individuals about climate change will be an important issue to develop adaptation behavior. This finding is in accordance with the research by Obery and Bangert (2017), Li *et al.* (2017), and Khanal *et al*. (2018).

Furthermore, the general results of the fitted model indicated that knowledge directly affected belief. Therefore, enhancing the knowledge of farmers about climate change causes them to believe incidence of climate change further. Thus, knowledge affects the perception of farmers through the mediating role of belief, causing enhanced adaptation behavior in them. This finding is in accordance with the research by Brulle *et al*. (2012) and Li *et al*. (2017). In addition, the knowledge had also a direct impact on perception. Therefore, enhancing the knowledge of farmers causes promotion of perception about climate change, and thus it has been influential for adaptation behavior through increasing perception of farmers. This finding is in line with the research by Dong *et al*. (2018).

CONCLUSIONS

The results indicated that there was a positive and significant relationship between knowledge about climate change and perception and adaptation behavior of farmers in response to climate change. Therefore, it is suggested that by enhancing the level of knowledge of farmers about Climate Smart Agriculture (CSA), one can take important steps to enhance their adaptation to climate change. The CSA approach promotes development of the necessary technical conditions, investment, and policymaking to achieve development of sustainable agriculture, thereby providing food security in a changing climate. This type of agriculture has three main objectives including increasing productivity and income of agriculture, adaptation, and developing resistance to climate change and reducing greenhouse gases. CSA is in line with climate change, and it is an approach striving for taking the necessary measures to

transform and change agricultural systems in line with climate changes.

The results showed that there was a significant and positive relationship between belief in climate change and perception and adaptation behavior of farmers in response to climate change. Therefore, it is suggested that public awareness be raised through social networks. Through this, proper and up-to-date information can be shared about the problems related to climate change with rural and farmer families. Furthermore, by creating community-based organizations, it is possible to help establish better communication to transferred information related to climate change among farmers, thereby strengthening their belief in incidence of climate change.

The results revealed that there was a positive and significant relationship between perception of climate change and adaptation behavior of farmers in response to climate change. Therefore, the following suggestions are made:

Authorities should take actions by explaining the current and future conditions resulting from this phenomenon and the problems that may be ahead in the future, especially for farmers' livelihood, to enhance the perception of farmers, thereby encouraging them to adopt adaptation mechanisms against climate change;

By using the knowledge and skills of subject matter experts it is possible to raise awareness and present the necessary training to farmers about climate change and its resulting consequences;

By designing up-to-date databanks and using this information to predict the future situation and sharing information with farmers, one can enhance their perception about climate change;

Sharing the knowledge and information through developing cooperatives and NGOs can contribute to enhancing the perception of farmers about climate change;

Holding educational courses and providing specific information to farmers about the effects caused by climate change in the agriculture sector is necessary to enhance their level of perception about climate change;

Meteorological reports and alerts should be designed and presented in a form understandable for farmers;

Improving the extension services in the region and improving the knowledge and skill of extension workers about climate change and its results are required to enhance the perception of farmers about climate change.

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عوامل مؤثر بر ادراک و رفتار سازگاری کشاورزان در پاسخ به تغییرات اقلیمی در استان همدان، ایران

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چکیده

اقلیم در حال تغییر است و بخش کشاورزی به شدت وابسته تغییرات اقلیمی است این در حالیست که بخش کشاورزی نقش مهمی در اقتصاد ایران ایفا می‌کند. با توجه به اهمیت تغییرات اقلیمی در دنیای امروز، تحقیق حاضر با هدف بررسی عوامل مؤثر بر ادراک و رفتار سازگاری کشاورزان در پاسخ به تغییرات اقلیمی در همدان، ایران انجام شده است. شایان ذکر است که مقالات دیگری در زمینه ادارک و رفتار افراد در مقابله با تغییر اقلیم موجود است؛ ولی آنها ادارک و رفتار متخصصان را مورد توجه قرار دادند و موثرترین افراد در مقابله با تغییر اقلیم که همانا کشاورزان هستند را نادیده گرفتند. برای تحقق این هدف ابتدا با استفاده از مرور منابع کتابخانه‌ای و اسنادی اقدام به استخراج عوامل مؤثر بر ادراک و رفتار سازگاری شده است؛ شایان ذکر است هیچ تحقیقی در خصوص بررسی عوامل موثر بر رفتار سازگاری و ادراک کشاورزان به طور مستقیم و تاثیر غیر مستقیم عوامل به طور همزمان انجام نگرفته است، که از جمله نوآوری تحقیق حاضر بشمار میرود. جهت تعیین روایی، پرسشنامه در اختیار پنلی از متخصصان قرار گرفت و به منظور سنجش پایایی ابزار تحقیق از آزمون مقدماتی استفاده شد. جامعه آماری تحقیق شامل ۱۱۵۱۶۰ نفر از کشاورزان در استان همدان ایران بود و حجم نمونه با توجه به جدول کرجسی و مورگان(n= 384) تعیین گردید. برای نمونه‌گیری از روش نمونه‌گیری طبقه‌ای با انتساب متناسب استفاده شد. یافته‌ها نشان داده که در میان متغیرهای مورد مطالعه، به ترتیب دانش، درک و اعتقاد با ضرایب مسیر ۰/۵۳، ۰/۳۲ و ۰/۱۸ بیشترین تأثیر را بر رفتار سازگاری و اعتقاد و دانش با ضرایب مسیر ۰/۵۶ و ۰/۳۵ بیشترین تأثیر را بر ادراک داشتند. همانطور که از نتایج ملاحظه میشود دانش که بالاترین سهم را در تبیین رفتار داشته است در مدل آرباکل و همکاران دیده نشده بود. لذا پیشنهاد می‌شود با تشکیل سازمانهای اجتماع محور به برقراری ارتباط بهتر میان کشاورزان اقدام کرده و انتقال اطلاعات مربوط به تغییرات اقلیمی تسهیل گردد. بعلاوه با ارتقا سطح آگاهی کشاورزان در زمینه‌ی کشاورزی اقلیم- هوشمند می‌توان در جهت افزایش سازگاری آن‌ها در برابر تغییرات اقلیمی گام اساسی برداشت.