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Agricultural Land Use Conservation Model in Hamedan Province

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ABSTRACT

Today land-use change is one of the most important challenges facing the agricultural sector, and the conservation of agricultural lands is an important goal worldwide. So, this study aimed to design a model for the protection of agricultural lands in Hamedan province using structural equation modeling (SEM). The statistical population was composed of all farmers in the province (N = 117,571) out of whom 384 people were sampled based on Krejcie and Morgan's table with a multi-stage sampling method. The main research instrument was a researcher-made questionnaire for collecting and analyzing the required data. The reliability of the questionnaire was confirmed by Cronbach's alpha and its validity by a group of experts in the fields of agricultural extension and sustainable development. Results revealed that six strategies including social, economic, access, regional, policy, and technical-agricultural strategies should be considered for the conservation of agricultural lands. The result of the Friedman test showed that technical-agricultural strategies are the top priority for the conservation of agricultural lands. The use of SEM showed that the model has a good fit and there is a good correlation between the six factors and the related indicators. Increasing the economic efficiency of the agricultural sector prepares agriculture for competing with other economic sectors, and increasing the economic power of farmers is the most important factor in protecting agricultural lands.

1. Introduction

One of the challenges of the agricultural sector in many countries, including Iran, is the issue of land and land use. The land is considered the main pillar of the agricultural economy (Amini et al., 2016) and it is essential for sustainable agriculture development, ecosystem functioning, and food security (FAO, 2015). In fact, the land is an indispensable alternative source that is not recycled easily and economically, so land use must be thoughtful, well-planned, and fully optimized, like water use (Kalali Moghadam, 2015). The agricultural sector that is the main user of land and water should maintain the quality and quantity of these resources so that they can survive.

The issue of land use and its changes is a central issue in sustainable development. This is especially evident regarding some issues, such as food security, climate change, soil quality, water resources, the biological cycle of the environment, biodiversity, and human health (Engstrom et al., 2016). These changes are one of the most significant effects of human inter vention on the Earth and can affect both human health and ecological systems (Erdogan et al., 2011). Land-use change, which may occur at different spatial levels and across different time periods, reflects the dynamic and changing environmental needs and human communities and interaction between them (Briasssoulis, 2001a). Today, the expansion of urban areas is one of the reasons for land-use changes, as the world has been undergoing severe urbanization for the past 60 years and the United Nations has predicted that the present rate of urbanization that is over 50% will be 60% by 2030 and 67.2% by 2050 (Schilling et al., 2014). In the United States, the rate of conversion of agricultural land to developmental uses exceeds the rate of population growth, and one-third of the total areas with land-use changes (more than 16 million hectares) have changed to developmental uses over the years of 1982 to 2007 (Schilling et al., 2014). In India, urbanization is the reason for the rapid conversion of agricultural lands to non-agricultural lands. In China, the process of expanding urbanization has increased the use of high-quality agricultural land, with urban areas reaching from 31076 km^2 in 2001 to 80887 km^2 in 2013, and this wide expansion of urbanization have destroyed 24783 km^2 (1.37% of total agricultural land) (Shi et al., 2016). It can be said that the trend of urbanization in the villages around the major cities continues at a very fast pace (Amini et al., 2016). In Iran, due to social, economic, and political system changes (Pourahmad et al., 2011), changes in agricultural land use have become increasingly common in residential, commercial, service, and industrial areas, especially in rural areas around metropolises (Amini et al., 2016).

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On the other hand, due to economic development, villages have begun to play other roles, such as tourism, recreation, housing, and services, and land use has been changing by the constant re-organization of land to adapt to social demands (Bacior & Prus, 2018). Changes in rural land use have led to changes in the economic structure of villages and the destruction of agricultural land as one of the main production bases in these areas. As well, it has seriously damaged other resources including water resources, wildlife habitats, and soil resources including, but not limited to, the loss of organic matter, changes in moisture content, and soil salinity (Haraeini et al., 2016). Land-use changes from gardens and farms to residential, commercial, and service structures, as well as the reduction of agricultural and livestock production and the loss of the natural beauty of the environment, have also been effective in causing some natural disasters such as floods and landslides in villages (Sadr Mousavi et al., 2016). Therefore, agricultural land conservation is a common goal today (Perrin et al., 2018) and agricultural land conservation policy is widely used worldwide as an effective approach to resource allocation (Liu et al., 2017).

In recent decades, due to extreme expansions of urban and rural areas, the increasing tendency to prosperity, and the illegal construction of villas and other settlements, more than one million hectares of agricultural lands have been changed and got out of the production cycle, which is a serious warning to the security of the community. In Iran, only in 2016, 3096.5 hectares of agricultural lands underwent land-use changes to implement agricultural projects, 1686.3 hectares underwent land-use changes to implement non-agricultural projects, and 3787 hectares of illegal land-use changes were identified (Land Affairs Organization, 2017).

In Hamedan province (which is the spatial scope of the present study) in 2016, 124.4 hectares of lands were changed to the implementation of agricultural projects, 56.69 hectares were changed to the implementation of non-agricultural projects, and 22 hectares of illegal land-use change were detected (Land Affairs Organization, 2017).

The results of the research conducted by Saidi et al. (2016) in Hamedan province entitled "the role of rural creep and land-use change in the villages around the city of Hamedan" showed that many changes had occurred in the study area (24 rural settlements around the city of Hamedan) and over 1995-2015, including the increase in the number of villas, orchards, and gardens from less than 100 at the beginning of the period to more than 1,500 and the increase in the number of walls of agricultural land from less than 50 cases to more than 500 cases at the end of the study. According to the results, a total of more than 250 hectares of agricultural land had been changed in the studied villages, and agricultural land per capita had decreased from 1.5 hectares per household to 0.9 hectares at the end of the period.

Therefore, the present study is an attempt to identify the causes and factors affecting agricultural land-use change in Hamedan province. The importance of this research is that it can help the provincial authorities in planning for agricultural land conservation. Also, designing an agricultural land-use conservation model in this research can help fill the gap in the field of introducing new protection strategies and preventing land-use change.

1.1.Determinants of agricultural land conservation

Before considering and analyzing methods and models of agricultural land conservation, it is necessary to briefly overview the causes of land-use change. Land-use and land cover change means changes in the area (increase or decrease) of a particular type of land use and cover. Land-use change may involve the conversion of one type of land use to another; that is, changes in the composition and pattern of land use in an area or a change in a particular land use type (Briasssoulisb, 2001). Although land-use change often occurs locally, it has the potential to produce ecological effects at local, regional, and global scales. Long et al. (2007) state that, according to World Bank (1992) and Verburg et al.'s (1999) analyses, major land-use changes occur as a result of increased demand for non-agricultural land due to urban and industrial development. Industrialization, urbanization, and population growth are also considered the most common forces affecting land-use change on a global scale.

Concerning the factors affecting agricultural land-use change, quoting from Firman (1997), Azadi et al. (2010) state that two main groups of factors are involved in changing agricultural land use, including the external factors such as industrialization, urbanization, road infrastructure development, and government policies and the internal factors such as land productivity and technology. In a study entitled " factors affecting urban development and agricultural land change in 25 EU countries", Ustaoglu and Williams (2017) listed a combination of socio-economic factors, policy-making factors, and environmental and location factors as the main factors affecting the processes of agricultural land-use change. The results of a research study entitled "destroying agricultural land in the suburbs in the northern parts of Italy", Mazzocchi et al. (2017) showed that the degradation of agricultural lands is mainly related to urban pressure, including population density, average housing price, dispersion, (subsidies) payments in the form of general agricultural policies, and distance from towns to farms.

In a study on the urbanization and destruction of agricultural land in India (Pandey and Seto, 2015), it was found that agricultural lands were mainly destructed in cities and regions where active economic areas or affirmation and agricultural land use are concentrated in several areas and states with high economic growth rates. Ultimately, agricultural lands were found to be mainly degraded in states whose arable lands were of higher quality. By analyzing 137 case studies of land-use change in Europe, Velit et al. (2015) found that economic, technological, organizational, and socio-cultural factors, along with situational factors, and the characteristics of farmers and farms were effective in land-use change.

Protecting agricultural lands is a long-term investment in social infrastructure and economic development. In fact, it

can be said that planning for agriculture and preserving agricultural lands provide flexibility for future growth and development, prevent sporadic growth around cities, and provide a diverse economic foundation. Land conservation for agriculture coupled with improved management practices provides the greatest potential for producing or retrieving environmental and social benefits while enhancing food security and independence (Francis et al., 2012). In a study on agricultural land conversion management in which China was compared with the Netherlands and Germany, Tan et al. (2009) stated that there was no specific policy for the conservation of agricultural lands in the Netherlands and Germany, but protecting these lands is embedded in the spatial planning system of the country. There were plans at different levels of government, and land use planning involved all levels of public participation, which involved not only different levels of government but also all other stakeholders.

Perrin et al. (2018) concluded that effectiveness and social acceptance in land conservation policies were a top priority. The tools for the conservation of agricultural lands are considered effective when they (1) reduce the conversion (change) rate of agricultural lands, (2) farmlands continue to be actively cultivated, and (3) these support tools help to meet social demands for multifunctional farming around cities, provide goods and services (sights, natural hazard management, short food supply chains). Also, a support tool is socially acceptable if (1) the results assigned to it are legal in accordance with the established laws and are justifiable according to common beliefs if it is implemented, (2) they do not cause conflict or anger, and (3) they do not lead to the elimination or isolation of shareholders. In the United States, farmers and ranchers are legally protected against urban neighborhoods and rural areas that invade agricultural land (Hansen & Francis, 2007). By examining the available literature on the subject, the research model can be designed as Figure 2. In this model, social, economic, regional (urban-rural), access (service), technical-agricultural, and policy-making strategies are proposed as effective strategies for preserving agricultural land use.

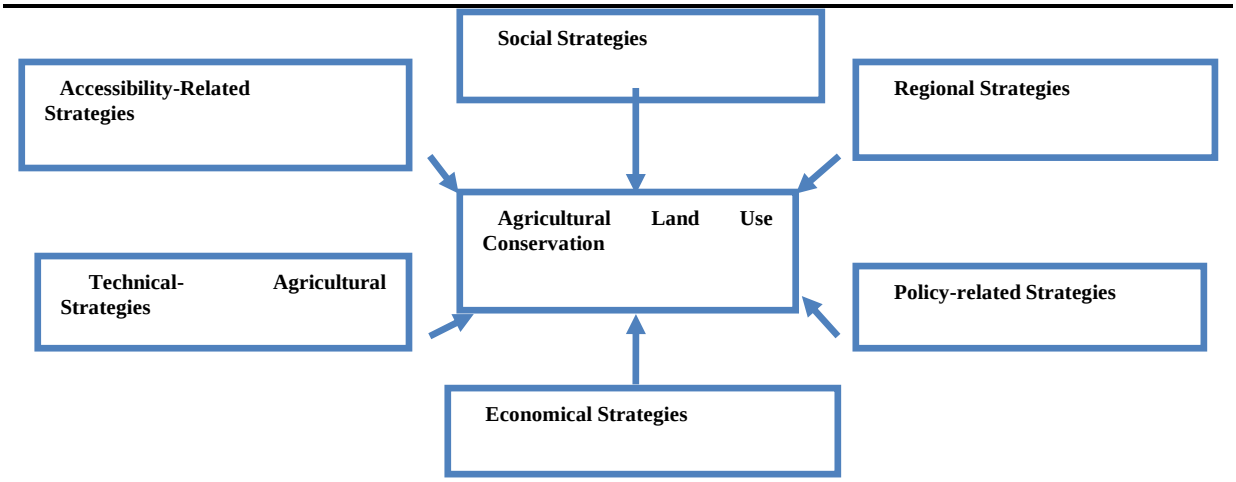


Fig 1. Conceptual Framework of Study

2. Materials and Methods

The study was conducted to design a model for agricultural land use conservation in Hamedan province. The research was carried out in the form of a descriptive survey in which a researcher-made questionnaire was used for data collection. To confirm the validity of the questionnaire, the views of the professors in the Faculty of Agriculture, Bu-Ali Sina University and a number of experts in the field of agriculture and land use were used. Cronbach's alpha coefficient was used to measure the reliability of the research instrument. According to the results (Table 1), the questionnaire had good reliability.

The statistical population of the present study was the farmers of Hamedan province (N=117571) according to the latest census of agriculture in Iran (2016). In this study, after the sample size was determined to be 384 using Krejcie and Morgan's (1970) table, the multi-stage sampling technique was used. First, among nine counties in Hamedan province, five cities were selected, and then the central part of each city was considered. In the next stage, random sampling was employed to select the villages located in the central part of each city based on a proportional method. SPSS and Smartpls3 software were used for data analysis in this study.

Table 1. Cronbach's alphas for the variables

Latent Variables	Symbol in model	Number of observed variables	Cronbach's alpha
Social strategies	SO	4	0.694
Economical strategies	E	7	0.788
Regional strategies	R	5	0.653
Policy-related strategies	P	11	0.835
Technical-agricultural strategies	AG	12	0.860
Accessibility-related strategies	A	4	0.634

3. Results and Discussion

3.1. Demographic Characteristics

The age of the farmers in this study was in the range of 17 to 83 years (m = 40.9). The main occupation of 97.4% of the study population was agriculture and the rest were not related to agriculture. The highest frequency (37.5%) of the respondents had high school and diploma education level, and the least frequency (0.5%) had a Ph.D. degree, while 8.6% of the respondents were illiterate. Investigating the variable of agricultural work experience of the studied population shows that the highest frequency regarding agricultural work experience (m = 24.2) belongs to farmers with 20.1 to 30 years of experience (26.8%). The average irrigated land area of the respondents was 3.4 ha (m = 3.4) and their average rain-fed land area was 3.1 ha (m = 3.1).

Table 2. Prioritizing the economic strategies on agricultural land conservation

Economical Strategies	**Mean**	**Standard deviation**	**Coefficient of variations**	**Priority**
Supporting rural youth employment through low-interest loans and creating cooperatives	4.107	1.282	0.312	1
Guaranteed purchase of crops	3.992	1.286	0.317	2
Providing special facilities (loans and credits) for farmers in the margins of cities	3.745	1.210	0.322	3
Proper pricing of agricultural products	3.971	1.293	0.325	4
Providing facilities (loans and credits) to farmers	3.952	1.292	0.3269	5
Directing and supporting farmers towards proper processing and packaging of crops	3.818	1.281	0.335	6
Assisting farmers in marketing their crops	3.807	1.344	0.353	7

3.2.Social strategies

Among the social strategies, proper culture building was the highest priority among the social strategies regarding the consequences of agricultural land-use change through mass media (mean = 3.704, SD = 1.188, CV = 0.320).

3.3. Policy and institutional strategies

Among policy and institutional strategies, the highest priority referred to identifying and using leaders and individuals with local influence to contribute to agricultural land conservation (mean = 3.874, SD = 1.144, CV = 0.295).

Table 3. Prioritizing the social strategies on agricultural land conservation

Social Strategies	Mean	Standard deviation	Coefficient of variations	Priority
Culture building regarding the consequences of agricultural land-use change through mass media	3.704	1.188	0.320	1
Involving people and surveying them in formulating agricultural land-use conservation programs	3.788	1.238	0.3268	2
Informing farmers about the consequences of agricultural land-use change through training classes	3.793	1.249	0.329	3
Creating attractions in the villages to prevent migration	3.921	1.370	0.349	4

Table 4. Prioritizing the policy and institutional strategies on agricultural land conservation

Policy strategies	Mean	Standard deviation	Coefficient of variations	Priority
Identifying and using leaders and individuals with local influence to contribute to agricultural land conservation	3.874	1.144	0.295	1
Paying more attention to the agricultural sector than other sectors	4.036	1.207	0.299	2
Coordinating institutes that monitor agricultural land conservation of the country	3.801	1.160	0.306	3
Facilitating the process of obtaining the ownership document for agricultural lands	4.036	1.235	0.305	4
Developing agricultural insurance	4.102	1.2705	0.309	5
Granting subsidies to farmers to support income through agriculture	4.199	1.304	0.310	6
Determining the legal obligation of unauthorized agricultural land use in the least possible time	3.685	1.168	0.317	7
Continuously monitoring how permissions are implemented for issued land-use change	3.811	1.217	0.319	8
Forecasting points for implementing industrial and agricultural projects and prevention of giving license in scattered areas	3.733	1.260	0.337	9
Ensuring availability of equipment and tools to destroy unauthorized buildings in agricultural lands in the case of ignoring the warnings	3.666	1.286	0.350	10
Recruiting individuals in Agriculture Organization to conserve agricultural lands (such as environmentalists at the Environmental Protection Agency)	3.770	1.402	0.372	11

3.4. Regional strategies

The results showed that the most important regional item on agricultural land conservation was attention and efforts for rural development and provision of amenities, health, education, etc. in villages (mean = 4.018, SD = 1.225, CV = 0.305). Therefore, it can be said that the comprehensive development of villages and the prevention of migration on the one hand and the prevention of urban creep in

agricultural lands on the other are important issues in preventing agricultural land-use change.

Table 5. Prioritizing the regional strategies of agricultural land conservation

Regional strategies	Mean	Standard deviation	Coefficient of variations	Priority
Attention and efforts for rural development and provision of amenities, health, education, etc. in villages	4.018	1.225	0.305	1
Optimal use of inefficient and worn-out urban textures instead of changing agricultural land use around cities	3.774	1.225	0.324	2
Prevention of construction common in adjacent agricultural lands (adjoining, neighboring lands)	3.724	1.214	0.325	3
Non-incorporation of agricultural land into rural development plans	3.662	1.252	0.341	4
Non-conversion of large villages into cities	3.556	1.338	0.376	5

3.5. The service and accessibility strategies

Among the accessibility strategies, the existence of roads and routes and ease of access to city markets was the top priority (mean = 4.124, SD = 1.142, CV = 0.276) and the establishment of small industrial units around the villages was the second priority (mean = 3.918, SD = 1.233, CV = 0.314).

3.6. Technical-agricultural strategies

Among the technical-agricultural strategies, facilitating access to seeds, fertilizers, pesticides, etc. was the top priority (mean = 4.244, SD = 1.075, CV = 0.253). Therefore, it can be concluded that providing suitable conditions for agriculture can have a significant impact on preventing agricultural land-use change.

Table 6. Prioritizing the accessibility-related strategies of agricultural land conservation

Accessibility strategies	Mean	Standard deviation	Coefficient of variations	Priority
The existence of roads and routes and ease of access to city markets	4.124	1.142	0.276	1
Establishment of small industrial units around the villages (conversion and supplementary industries)	3.918	1.233	0.314	2
Developing green spaces and leisure areas in cities and creating recreational environments for families	3.866	1.233	0.319	3
Failure to provide services such as electricity, gas, etc. to agricultural land construction	3.664	1.310	0.357	4

The Fridman test was used to compare the research model components. According to the results of this test, there was a significant difference at the 99% level among the six groups of strategies presented in the research model. According to the results of this test, technical-agricultural strategies had the highest mean of 3.97 and regional strategies had the lowest mean of 3.03.

In this research, a component-based Structural Equation Modeling (SEM) or Partial Least Squares (PLS) method was used to investigate the research model. Also, among the three modeling strategies in SEM (model validation strategy, model comparison strategy, and model development strategy), model validation strategy was emphasized. Conventional models in SEM consist of two parts: (1) a measurement model (internal model) that

examines how to explain the hidden variables by the relevant explicit variables and specifies the relationships between the parameters (observed variables) of a structure and the hidden variables; (2) a structural model (exterior model) that shows how the hidden variables are linked together and represents the relationships among several structures. To fit the measurement model, item reliability, convergent validity, and divergent validity should be investigated. The item reliability can be measured by three criteria of Cronbach's alpha, Composite Reliability (CR) or Rho, and factor loadings coefficients. The results of model reliability analysis using the above three criteria are presented in Tables 2 and 3.

Table 7. Prioritizing technical-agricultural strategies of agricultural land conservation

Technical-agricultural strategies	Mean	Standard deviation	Coefficient of variations	Priority
Facilitating access to seeds, fertilizers, pesticides, etc.	4.244	1.075	0.235	1
Developing new irrigation methods	4.267	1.084	0.254	2
Maintaining the quality of agricultural soils by observing crop rotation, proper fertilization, soil fallow, and so on	4.148	1.081	0.260	3
Educating and promoting proper planting and harvesting techniques to the farmers	4.135	1.103	0.266	4
Developing less water-intensive crops	4.172	1.126	0.269	5
Supporting agricultural production cooperatives	4.046	1.118	0.276	6
Providing appropriate technical-engineering services in the reclamation of agricultural lands	1.005	1.150	0.287	7
Promoting planting or climate-compatible varieties of the region	4.089	1.217	0.297	8
Promoting and training ways to deal with climate hazards such as frostbite	4.028	1.216	0.302	9
Taking structural measures in the agricultural sector, including land integration	3.868	1.218	0.315	10
Supporting changes in the pattern of cultivation when previous crops are damaged (from agriculture to gardening, for example)	3.799	1.202	0.316	11
Prevention of land fragmentation as a result of inheritance law, etc.	3.751	1.224	0.326	12

Table 8. The Friedman test

Variable	Mean rank	Sig
Agriculture	3.97	0.00
Economic	3.71	0.00
Access	3.50	0.00
Policy	3.49	0.00
Social	3.30	0.00
Regional	3.03	0.00

Table 9. Cronbach's alpha, composite reliability, AVE of the variables

Latent variables	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
Access	0.638	0.784	0.478
Agriculture	0.856	0.884	0.412
Economic	0.785	0.844	0.436
Land conservation	0.699	0.806	0.454
Policy	0.833	0.869	0.399
Reginal	0.643	0.774	0.409
Social	0.694	0.815	0.526

As shown in Table (9), Cronbach's alpha of all structures was above 0.6 and desirable. Also, all composite reliability values, which are a new criterion for determining the reliability of structures, were higher than 0.7, indicating a good internal consistency of the measurement model. In other words, there is a good correlation between each structure and the relevant indices. Average Variance Extracted (AVE) is a measure of convergent validity that indicates the degree of correlation of a structure with its indices. AVE values above 0.4 indicate acceptable convergent validity of the measurement model. Another measure of reliability is the factor loadings index. In this study, variables with factor loadings less than 0.5 were omitted. The factor loadings of the remaining variables are presented in Table (10).

Table10. Loadings and t-values of the variables

Latent variable	Observed variables	Loadings
ACCESS	A1	0.629
	A2	0.762
	A3	0.708
	A4	0.659
POLICY	P1	0.577
	P2	0.618
	P3	0.640
	P4	0.601
	P5	0.630
	P6	0.660
	P7	0.656
	P8	0.615
	P9	0.667
	P10	0.649
ECONOMY	E1	0.594
	E2	0.673
	E3	0.655

	E4	0.653
	E5	0.712
	E6	0.718
	E7	0.608
SOCIAL	SO1	0.602
	SO2	0.790
	SO3	0.773
	SO4	0.772
AGRICULTUR	AG1	0.635
	AG2	0.715
	AG3	0.607
	AG5	0.506
	AG6	0.616
	AG7	0.698
	C1	0.618
	C2	0.695
	C3	0.648
	C4	0.697
REGIONAL	R1	0.713
	R2	0.568
	R3	0.583
	R4	0.684
	R5	0.637

As can be seen from the table of factor loadings for access and service strategies, the apparent variable A2 (creating small industrial units around the villages including conversion and supplementary industries) with a factor loading of 0.762 had the greatest impact on agricultural land use conservation. Therefore, it can be concluded that the existence of a permanent market for agricultural products, including the conversion industries using agricultural products, can be effective in preventing agricultural land-use change. Among the policy-related strategies, the P9 variable (subsidizing farmers to support income through agriculture) with a factor loading of 0.667 had the highest impact on agricultural land use conservation. Regarding economic strategies, the E6 variable (providing facilities for farmers), with a factor loading of 0.718, is in the first place and the next place is the support of rural youth employment in the agricultural sector by granting low-interest loans, the creation of cooperatives, and so on. Therefore, it can be concluded that strategies to increase farmers' income and make agricultural labor more economical can prevent agricultural land-use change. Also, among the variables related to social strategies, the So2 variable (building culture to the consequences of agricultural land-use change through mass media), which has a factor loading of 0.790 and then informing farmers about the implications of agricultural land-use change through the training classes have the greatest impact. As a result, it can be said that, among other factors, culture building and information are of particular importance in agricultural land use conservation. The Ag2 variable (providing appropriate technical-engineering services in agricultural land reclamation) with a factor loading of 0.719 is the most

important factor in technical-agricultural strategies. Among the regional strategies, the R1 variable (optimal use of inefficient and worn-out urban textures instead of changing land use around cities) has the greatest impact on agricultural land use conservation. Therefore, it can be said that urban creep is one of the important factors in changing agricultural land use.

3.7. Checking the model's fit measures

The main criterion for checking the fit of a structural model is the t-value. These values are given in Table (2). A t-value of greater than 1.96 indicates the correct relationship between the structures and confirms the research hypotheses at the 95% confidence level. Therefore, the present research hypotheses regarding the impact of economic, social, regional, agricultural, access and services, and policy-related strategies on agricultural land use conservation are confirmed at the 95% level.

Another measure of a model's fit is the R^2 criterion. This criterion indicates the impact of an exogenous variable on an endogenous variable and is calculated only for the dependent structures of a model. The value calculated in this study is 0.454, which shows the suitability of the fitting of the structural model and the effectiveness of all structures in agricultural land use conservation in Hamedan province.

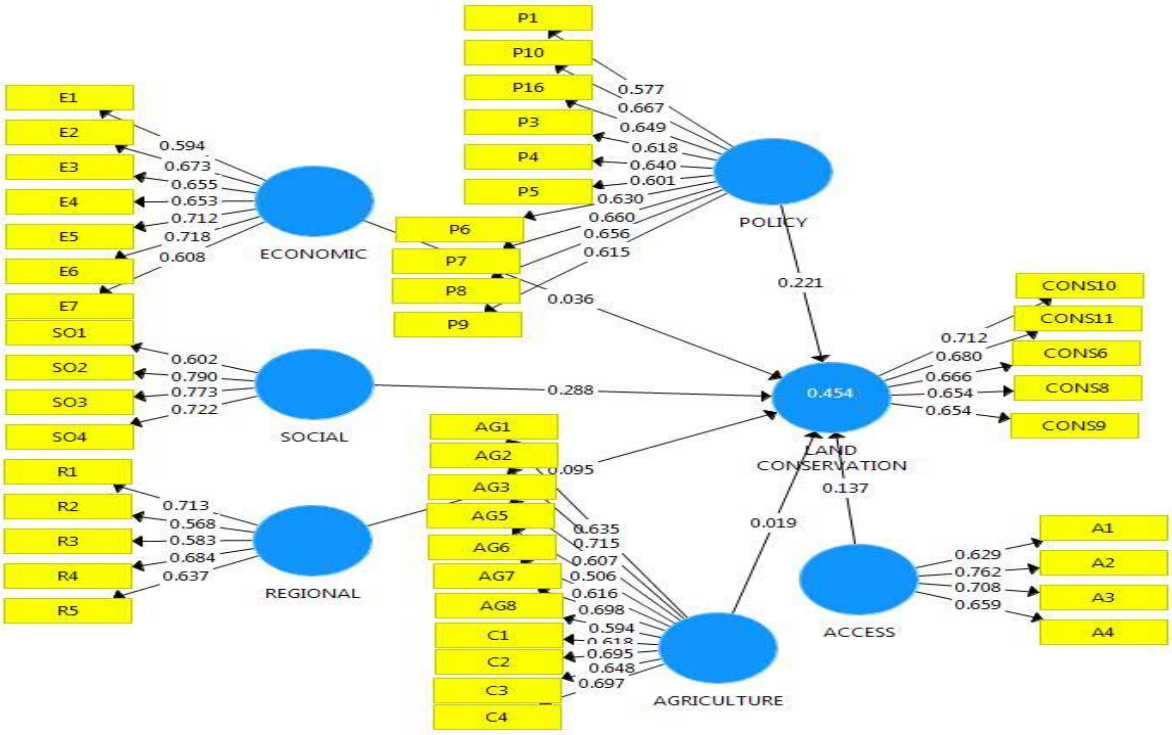


Fig 2. The factor loadings of the variables

4. Conclusion

Land-use change is one of the most prominent effects of human interaction with the environment, with many factors contributing to its occurrence and appearance. Due to population growth and greater need for food production on the one hand and the increasing rate of migration, urbanization, and urban creep and phenomena such as second homes, rural tourism, urbanism, and numerous intertwining of economic, social, and environmental effects on the other hand, it is necessary more than ever to conserve agricultural land use. According to the results of the present study, it can be concluded that the most important strategies for agricultural land use conservation are economic, social, access, regional, policy-related, and technical-agricultural strategies.

The conceptual model of the present study was fitted using Smartpls3 software. The research hypothesis based on the results of this study shows that the six strategies examined including socio-economic, policy-related, regional, accessibility, climate and meteorological hazards, and technical-agricultural, are fitted well, and it is confirmed that the six proposed strategies are effective in land use conservation. This result is consistent with Ustaoglu and Williams's (2017) research on the impact of socio-economic, situational, policy-making, soil characteristics, geological and climatic factors, and regional factors on agricultural land-use change. The

results showed that the policy-related strategies with a factor loading of 0.667 had the greatest impact on agricultural land use conservation. Therefore, given the above studies and the results obtained from the present research on regional strategies and policymaking to prevent urban creep and the use of inefficient and worn-out textures instead of advancing cities in agricultural lands, these strategies are confirmed.

Based on the results about the economic strategies, it can be said that efforts should be made to increase the economic efficiency of the agricultural sector in order to compete with other sectors and increase the economic potential of farmers. It is also suggested to make appropriate plans to provide the basis for changing the current and prevailing planting patterns according to climatic and environmental conditions, thereby reducing the damage to farmers. In terms of social strategies, it seems that extensive culture building should be carried out with various tools and methods, especially with the use of new communication tools, to develop a culture of conservation of natural resources, including agricultural lands, as well as to enhance awareness of the consequences of agricultural land-use change. On the other hand, it can be concluded that to meet the needs of other sectors in the field of land development and the establishment of industrial units alongside agricultural development, detailed and comprehensive planning of large-scale land use should be carried out relying on land planning and agricultural land zoning. Also, optimal land use should be determined in each area, and the land use of each area should be mapped in development plans, including urban and rural development. The creep of cities and villages should be prevented in the fertile agricultural lands. According to the results, it can also be said that to increase the economic efficiency of the agricultural sector, it is necessary to provide the necessary services to the farmers

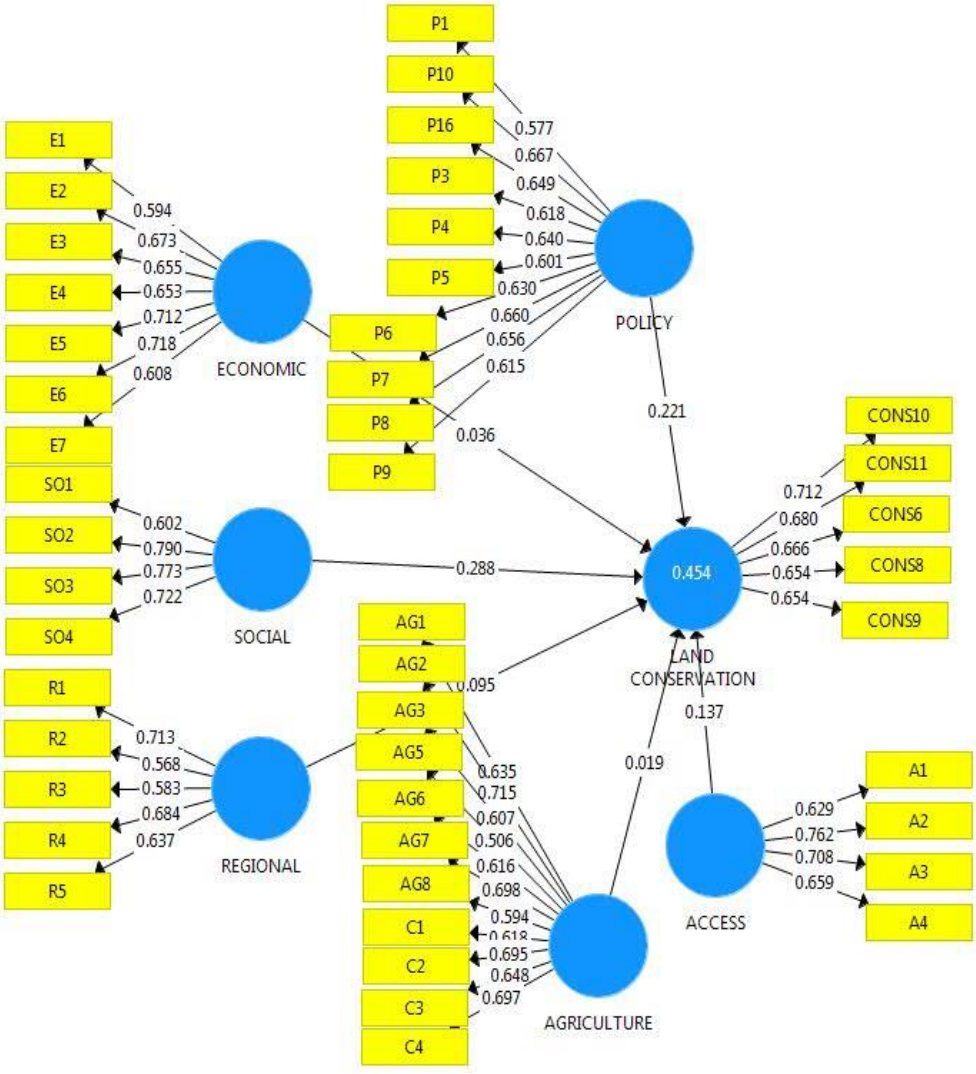


Fig 3. The R^2 and beta measures

in the field of agricultural land reclamation, integrate these lands, and develop modern irrigation methods.

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References

1. Amini, S. Rahmani, B. and Majidi Khamenei, B. 2016. Economic Consequences of Land Use Changes in Pirashari Villages Case: Jie Village in Isfahan. Space Economy and Rural Development, 6 (2), 17-40.
2. Azadi, H., Ho, P. and Hasfiati, L. 2010. "Agricultural land conversion drivers: A comparison between less developed, developing and developed countries". Land degradation and development, 22 (6), 596-604.
3. Bacior, S. and Prus, B. 2018. "Infrastructure development and its influence on agricultural land and regional sustainable development". Ecological Informatics.44: 82- 93.
4. Briassoulis, H. 2001a. "Analysis of Land Use Change: Theoretical and Modeling Approaches". The Web Book of Regional Science, Regional Research Institute, West Virginia University.
5. Briassoulis, H. 2001b. "Policy-Oriented Integrated Analysis of Land-Use Change: An Analysis of Data Needs". Environmental management. 27: 1-11.
6. Engstrom, K., Rounsevell, M. D. A., Murray-Rust, D., Hardacre, C., Alexander, P., Cui, X., Palmer, P. I. and Arneth, A. 2016. "Applying Occam's razor to global agricultural land use change". Environmental Modelling & Software.75: 212- 229. Retrived from www.researchgate.net/publication/279514798.
7. Erdogan, N., Nurlu, E. and Erdem, U. 2011."Modeling land use change in Karaburun by using CLUE-s". A|Z ITU Journal of Faculty of Architecture. 8(2), 91-102.
8. FAO. 2015. FAO Statistical Yearbook 2015. Rome, Italy.
9. Firman T. 1997. Land conversion and urban development in the Northern region of West Java, Indonesia. Urban Studies 34: 1027–1046.
10. Francis, C. A., Hansen, T. E., Fox, A. A., Hesje, P. J., Nelson, H. E., Lawseth, A. E. and English, A. 2012. "Farmland conversion to non-agricultural uses in the US and Canada: current impacts and concerns for the future". International Journal of Agricultural Sustainability. 10 (1): 8- 24.
11. Hansen, T. M. and Francis, C. A. 2007. "Economic, Environmental, Policy and Social Impacts of Land Use Changes in Nebraska". University of Nebraska-Lincon.
12. Heraeinin, M., Anbarlou, M. and Ojagh, A. 2016. Urban Sprawl and its effects on agricultural land use changes (Case study: Khomein County during the last 30 years). Paper presented in the first international conference on urban economy, pp. 929-937 Tehran, Iran.
13. Kalali Moghaddam, Z. 2015. An Investigation of the Factors Affecting Land Use Changing of Agricultural Lands (Case Study: Rural Areas of Rasht Town-Iran). Journal of Research and Rural Planning, 4(1), 113-132.
14. Krejcie, R. and Morgan, D. (1970) Determining Sample Size for Research Activities. Educational and Psychological Measurement, 30, 607-610.
15. Liu, X., Zhao, C. and Song, W. 2017. "Review of the evolution of cultivated land protection policies in the period following China's reform and liberalization". Land Use Policy. 67: 660- 669.
16. Land Affairs Organizoton of Iran Wbsite: WWW.laoi.ir
17. Long, H., Tang, G., Li, X. and Heiling G. 2007. " Socio-economic driving forces of land-use change in Kunshan, the Yangtze River Delta economic area of China". Journal of Environmental Management. 83: 351-364.
18. Mazzocchi, C., Corsi, S. and Sali, G. 2017. "Agricultural Land Consumption in Periurban Areas: a Methodological Approach for Risk Assessment Using Artificial Neural Networks and Spatial Correlation in Northern Italy". Spatial Analysis.10: 3-20.
19. Pandey, B. and Seto, K. C. 2015. "Urbanization and agricultural land loss in India: Comparing satellite estimates with census data". Journal of Environmental Management. 148: 53- 66.
20. Perrin, C., Nougarèdes, B., Sini, L., Branduini, P. and Salvatiuca, L. 2018. "Governance changes in peri-urban farmland protection following decentralisation: A comparison between Montpellier (France) and Rome (Italy)". Land Use Policy. 70: 535-546.
21. Pourahmad, A. Seyfoddini, F. and Parnon, Z. 2011. Migration and Land Use Change in Islamshahr City. Arid Regions Geographic Studies, 2 (5) :131-150.
22. Sadr Mousavi , M.Hossienzadeh, A. Moradi Mofrad , S.and Jamshidi, M. K. 2016. Evaluation and Monitoring of Agricultural Land Use Changes Geographic Information System (Case Study: Dastjerdi Village- Tarom County). Journal of research and rural planning, 5(2), 161-175.
23. Saidi, A. Taleshi, M. Musakazemi, SM. and Zianushin, M.M. 2016. Rural Sprawl and Land use Transformation The Case of Periurban Settlements in Hamedan (Iran), Geography, 14(50), 5-32

24. Schilling, B., Attavanich, W., Sullivan, K. and Marxent, L. 2014. "Measuring the effect of farmland preservation on farm profitability". Land Use Policy, 41: 84-96.

25. Shi, K., Chen, Y., Yu, B., Xu, T., Li, L., Huang, C., Liu, R., Chen, Z. and Wu. Jianpiang. 2016. "Urban Expansion and Agricultural Land Loss in China: A Multiscale Perspective". Sustainability, 8 (8),790. https://doi.org/10.3390/su8080790

26. Tan, R., Beckmann, V., Van Den Berg, L. and Qu, F. 2009. "Governing farmland conversion: Comparing China with the Netherlands and Germany". Land Use Policy. 26: 961- 974.

27. Ustaoglu, E. and Williams B. 2017."Determinants of Urban Expansion and Agricultural Land Conversion in 25 EU Countries". Environmental Management, 60 (4), 717-746.

28. Verburg, P.H., Veldkamp, A., Fresco, L.O., 1999. Simulation of changes in the spatial pattern of land use in China. Applied Geography 19: 211–233.

29. Vliet, van.J., Groot, de.H.L.F., Rietveld, P., and Verburg, P.H. (2015) Manifestations and Underlying Drivers of Agricultural Land Use Change in Europe. Landscape and Urban Planning. 133: 24-36.

30. World Bank, 1992. Indonesia: agricultural transformation challenges and opportunities. Report No. 1054-IND, Washington