Land use Changes Scenarios for Rural Areas
(Case study: Bash Qaleh Dehestan –Urmia County)

Aliakbar Taghilou[*1]

1- Associate Prof. in Geography & Rural Planning, Urmia University, Iran

Abstract

Purpose- The purpose of the study is to determine the land use change scenarios in Bash Qaleh dehestan.

Design/methodology/approach- Research methodology is based on futures studies and scenario studies. First, a list of drivers using documents 34 domestic and foreign research in the field of land use was prepared and then through the view of villagers and farmers (318) (Using Likert scale) and experts (22) the importance and their impact on land use were studied. For development scenarios, a team of five experts (2 rural planners, 2 regional planners, one natural resource expert) was used. Mick Mac software and Wizard scenario were also used for data analysis.

Findings- The results showed that people's income, production level, return on investment in activity, industrial agriculture and agricultural margin were the most effective and uncertain drivers of land use change. For these drivers, eight scenarios were developed and developed.

Practical implications- Food security, encouragement of conservation of resources, encouraging policies for population growth, increasing community well-being, droughts, climate change, soil erosion, the emphasis of civil society on the rights of citizens and protection of the rights of the next generation, the emphasis of governments on economic self-sufficiency is only part of the opposite trends which has faced land use challenges. It is suggested that specific programs be developed and monitored to avoid them for any scenario.

Key words- Land use, scenario, future studies, Bash Qaleh Dehestan, Urmia**.**

* Corresponding Author Email: a.taghilo@gmail.com   Tel: +98912 741 2692

1. Introduction

S cenario mapping is a disciplined method which is used in discovering the key propulsion forces of rapid changes texture, extraordinary complexities and multiple uncertainties. Existence of various forces with high uncertainty has made future planning ambiguous significantly (Dong. Gerrit & Nick, 2013). Scenario is one of the most practical tools of future studies. The scenario opens up the present time; determines the limit of the lack of certainty (Taghilou, 2015). Scenario planning is one of the methods which increasingly is being used to analyze the possible future changes of social, economic and biophysical conditions (Johnson & Kathleen, Mario, Teisl, 2016; Swart, Raskin & Robinson, 2004; GSC, 2014). Researchers in different countries have done a lot of research in the scenario into land use changes. Existing scenarios can be pointed out: markets, local focus and growth based on security in Brazil (Johnson & et al, 2016). Business scenario (typical scenario) Regulatory scenario, baseline stimulus scenario in Ireland (Ustaoglu, Brendan & Enda. 2016). Maintenance scenario of the current pattern, liberation, land lease, crops conservation and decreasing other crops in China (Yang, Wang, Xie, Zhang & Wu, 2017). Unlimited growth scenario, free survival, limited welfare and controlled crisis in the Netherlands (Van Dijk, 2003)

Villages located on the Urumieh-Salmas connecting axis in Bash Qale rural district are underwent many changes. In this connection axis, the land use is subjected to change in the intensity of the function as a result of the expansion and urban dispersion, and population congestion as well as high development of service activities and functional change, so programming the future with these trends and emphasizing on food security and depopulation, rising rural incomes, protecting from agricultural lands in different programs of government at the supranational level, and population growth and the growth of industry and urbanization in the area of financial corruption, dividing land and reducing their size allocation to private recreational utilities, demographics changes, water quality degradation and water crisis, develop and expand spatial connections (rural and inter-urban) on a local scale are many current trends in this area, which many of them are contradictory which has faced the future planning of land use with problem. So planning for different future scenarios in order to proper use of lands and protection of the rights of all direct and indirect beneficiaries of land resources is necessary.

In this research, the researcher tries to answer this question: what are backup scenarios and compatible and effective scenarios in land use change?

2. Research Theoretical Literature

2.1. Land use

Land use application is an important tool for management the growth of non-agricultural land use (Zhang et al., 2017). The land use which sometimes is named as land application, ground use, ground application, how to use land or how to use ground is defined at the levels of pasture, forest, made land, watery levels and agricultural lands (Mancosu, Gago, Barbosa, de Bono, Ivanov, Lehmann & Fons., 2014; Lin, Nien-Ming, Pei-Jung & Chien-Ju, 2007; Maimaitijiang Abduwasit, Onésimo &, Matthew, 2015; Xystrakis, Thomas & Nikos, 2017) including agricultural, watery, dry and garden lands.

2.2. Scenario mapping

Scenarios in planning were introduced after World War II (2013). Hermann Kun, father of scheduling plans, believes that scenario-based planning as a way to help long attitude in the world, is full of uncertainties (Snoek, 2003; Dong et al., 2013). The scenario is a quantitative and qualitative image of an organization or group that has developed in the context of special assumptions (Christine & MacNulty, 1977). Colb (1984) believes that the scenario uses depicted story to view, schedule and act about the possible future. Also, Langley (1995) believes these stories are used for analysis and interpretation of present and past events (Freeman & et al, 2010). The goal of a scenario is not to achieve the most likely future or the most probable route through the complex routes, but it is a set of variables, events, system dynamics and their industrial consequences. Compiling the scenario is the first step in selecting the right policy in order to achieve an important goal (Bozorgi, 2009). Scenarios can organize seemingly unrelated economic technological, competitive, political and

social variables effectively in the framework of judges and decisions (Bradfield, James & George, 2016). Also, the scenarios express the following facts in planning Provo, Wendy, Ruona, Lynham & Roger (1998):1-Detection organizational propulsion forces that change a system, 2 – Determining the relations between the forces of the propulsion and 3 – Identifying uncertainties in the future environment. Future in scenarios can be classified in four categories: 1- The Possible future, 2 -The Trendy Future, 3 - The Likely Future and 4 - The Preferred Future. According to the theoretical literature and review of scenario mapping literature, theoretical model research with critical uncertainty approach and scenario methodology would be a tree network (Boroumand, Abbasi & Bahrami 2014).

2.3. Uncertainties

Uncertainties are the drivers that likelihood of their occurrence is not due to their high dependence on numerous predictable events.

3. Research Methodology

3.1. Geographical Scope of the Research

The area of the study is the Bash Qale rural district which has 45 villages. Population of this villages was 9994 people in 2016 in the form of 2830 families. It is one of the rural districts which is located in the Orumiyeh plain.

3.2. Methods

Information collection methodology in this study was survey and documentary. Survey data was for measurement and determining the significance, effect and choosing critical drivers using experts and villagers. To do this, first a list of drivers through documentary review of 34 internal and external research into land use was prepared and then through the opinion of villagers and farmers (318 people) and experts (22 people) their importance and their impact (using questionnaire on the Likert spectrum) in land use and also the likelihood of changes and their interaction were evaluated. And finally the critical propulsion through soft structural analysis technique by MICMAC software was identified. After the determination of critical propulsion, logical space of land Use scenario using network scenario mapping method and critical uncertainty approach by five people expert groups (2 people, 2 regional planners, 1 natural sciences expert) were developed in the form of a brain storm technique, and then the scenarios in the logical space frame of each scenario and using the interconnected collection of propulsion examined in Software wizard was developed. Also effective propulsions in the land use were extracted related to user changes, which are shown in following table(1).

Table 1. Research Propulsion

Propulsion	Description	resources
Technological	Agricultural mechanization, expansion of transportation New inputs	Levers, 2016; Pratt, 2009; Fox, Jeanine, Navin & Corey, 2017; Shao, Chao & Xie, 2006.
Economic	Production level, people's income, return on investment in activity, cheap product imports, price of products in the market, export trends, demand for products, local trade, alternative products in the market, industrialization, land ownership regime, commercialization of agriculture, labor transfer , poverty and relative wealth of exploiters	Kristensen & Bech, 2016; Wang & et al, 2016; Shao & et al, 2006; Nguyen, Huu, Patrick & Ammar, 2017; Fox et al., 2017; Pratt, 2009; Ding & 2015; Gollnow, Jan, Leticia, Viana, Rudiger & Tobia, 2017; Johnson et al., 2016; Ustaoglu et al., 2016; Silva Ramon, Mateus & Emilio et al., 2016; Newman, Kurt, McLaren, Byron & Wilson, 2014
Physical	Uses distances, spatial connections and communication Spatial dependency, distance from road, city, village and beaches, Small land size	Mottet, Sylvie, Nathalie & Annick, 2006; Zhang & Wu, 2017; Eraso, Dolors & Javier, 2013; Van dijk, 2003; Fox et al. 2017.
Natural	Quality and quantity of water, drought	Ding, Davi & Silvia, 2015.
Political and Organizational	coded land use planning, land reform programs, subsidies, government strategies on agricultural water supply (damping and water management), the absence of organizations and institutions, and the lack of monitoring of changes, weak land rights, weak law enforcement, lobbying and Corruption	Vliet, Henri, Groot & Peter, 2015; Pratt, 2009; Ustaoglu & et al, 2016.
Social and Cultural	Population growth, migration, demographic changes of the population, blame and abjection feeling of agricultural labor, education of beneficiaries, livelihoods, diet, strong perception of land prices	Nguyen & et al, 2017; Lu, Fuyuan, Xiaoli, Rodney & Zhiping, 2011; Kristensen & Bech, 2016; Fox et al., 2017; Newman et al., 2014: Wang et al 2016; Alexander et al., 2015; Gollnow et al., 2017.

To select the critical drivers in land use, the structural analysis technique in the MICMAC software environment was used, and wizard scenario software was applied to develop the scenario (Taghilou 2017). According to the effects matrix is mutually based. Basic information from the viewpoint of experts about the likelihood of occurrence of one uncertainty is a function of occurrence of another uncertainty in the form of verbal statements was obtained. Then through calculation of direct and indirect effects of states on each other, scenarios that are consistent with studied system are extracted. In this method the following steps took place: (Weimer, 2016) First; structural analysis; second; impact information counterpart; third; computation of syngas and fourth Compatibility Scenarios Analysis;

4.1. Identifying uncertainties and critical propulsion

To obtain and determine the uncertainties, interactive impact analysis method was employed using a structural model in MICMAC software. In this model, the critical uncertainties were determined through the classifying direct influence and its repetition on the classifying effective and indirect effects of land use decision making. According to the results the direct impressive propulsions and repeated indirectly affected propulsions includes: Increasing people's income, production levels, commercial agriculture, return on investment in activity, prosperity of local business, alternative products on the market, transfer of labor force (from agriculture to non-agriculture), industrialization and drought (figure 1 & table 2).

4. Research Findings
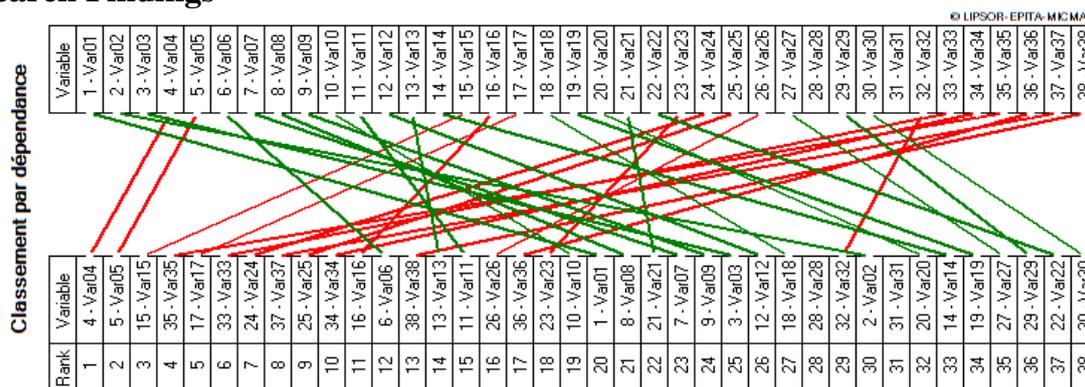
Figure 1. Classifying the Impact of Variables from Each Other

Table 2. Uncertainties and their effect on land use

code	Propulsion	Change in land function	Change in the intensity of land use
var 4	Production level	4.09	2.29
var 5	people's income Increase	3.65	3.08
var 6	Return on investment in activity	3.65	3.13
var 11	Local business boom	3.91	2.00
var 12	Alternative products in the market	2.29	3.26
var 13	industrialization	3.78	3.54
var 15	Commercialization of agriculture	3.83	2.42
var 16	Transfer of labor force (from agriculture to non-agricultural)	2.96	3.71
var 24	Drought	3.61	3.88

4.2. Definition the modes of the propulsion

At this stage for each uncertainty scenario different definitions are given in the table(3) below.

Table 3. Definition of possible situations for any critical uncertainty
Source: Research findings, 2017

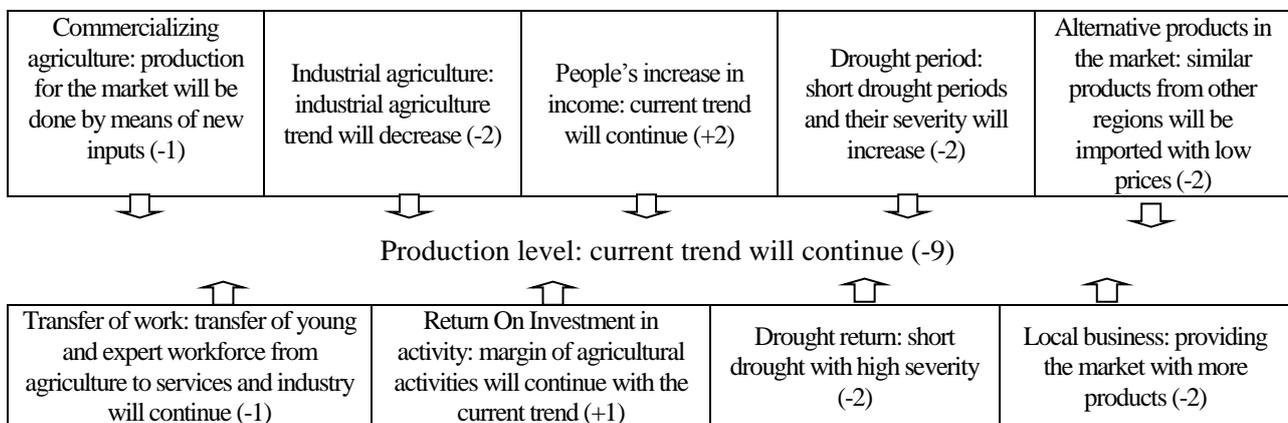| propulsions	Uncertainty scenarios	propulsions	Uncertainty scenarios
Production level	The current trend will continue, the current trend will decline, improvement of the current trend, the current trend Will increase.	Alternative products in the market	Similar products from other areas will be imported at low prices, similar products from other areas will be imported at high prices, and similar products will be scarce in the area.
People's Income Increase	The current trend continues. People's income will rise in compared with their cost. People's income will decrease in compared with costs	Transfer of labor force	The young and expert force will be transferred from agriculture to service and industry is moving forward, the young and expert forces in agriculture, services and industry will be balanced, the young and expert forces will be specialized in agricultural activities.
Commercialization of agriculture	Production in the market is done using new inputs, Production in the market is done using organic methods, and agricultural tourism thrives, agricultural duality. Modern and traditional forms will prevail.	Industrial Agriculture	The process of industrial agriculture will slow down. The industrial process of agriculture will get faster. The current trend of industrial agriculture will continue.
Return on investment in activity	The profit margin of agricultural activity continues with the current trend, the profit margin of agricultural activity continues with a high trend, the profit margin of agricultural activity will be decreasing.	Drought return period	The return period of drought will be short but its severity will increase. The return period of the drought will be short and its severity will decrease. The return period of drought and its severity will increase. The return period of drought and its severity will decrease.
Local business boom	More products deliver from the local market. Demand will be greater than the supply of products. Supply and demand will have a decent system.	Duration of the drought	Long periods of drought and intensity will increase Short periods of drought and severity will increase Long periods of drought and severity will decrease Short periods of drought and severity will decrease

4.3. Development of the first scenario, the probable scenario

The first scenario was determined based on the key factor of production level "Production will continue with the current process"

This scenario shows that the change in the current land use will occur. This scenario is supported by scenarios with positive influences and is compatible with negatively impacted scenarios. The total score of this scenario is equal to -9. Therefore, the contradictory arguments in this premise are prevailing (figure 2).

Commercializing agriculture: production for the market will be done by means of new inputs (-1)	Industrial agriculture: industrial agriculture trend will decrease (-2)	People's increase in income: current trend will continue (+2)	Drought period: short drought periods and their severity will increase (-2)	Alternative products in the market: similar products from other regions will be imported with low prices (-2)

Production level: current trend will continue (-9)

Transfer of work: transfer of young and expert workforce from agriculture to services and industry will continue (-1)	Return On Investment in activity: margin of agricultural activities will continue with the current trend (+1)	Drought return: short drought with high severity (-2)	Local business: providing the market with more products (-2)

Figure 2. Scenario 'Product level: current trend will continue'.
Source: Research findings, 2017

Given the inconsistency of the scenario, the alternative hypothesis "The current trend will be reduced" is more convincing. The elements of the scenario are as follows. This scenario is supported by positive-weight scenarios. Based on this scenario, land use change will continue intensely. Another words, Realization of backup scenarios provides proof of this assumption and causes a change in land use and is compatible with scenarios with negative weight. This adaptation means that replacement hypothesize will be optimal by increasing the field of their realization and land use changes will be done with intensity in use (table 4).

Table 4. Support and Compatible Scenarios
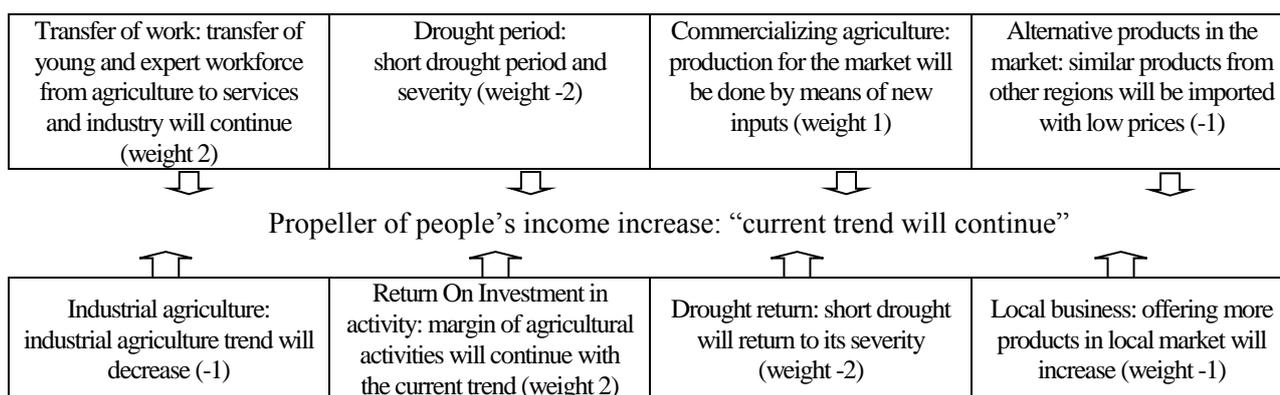Source: Research findings, 2017

Backup scenarios	Compatible scenario
people's income Increase: The current trend continues(Weight 2)	Agricultural commercialization: Production is done for the market using new inputs.(Weight 2)
Return on investment in activity: The profit margin of agricultural activity continues with the current trend (weight 3)	
Local Business: Deliver more products to the local market(Weight 2)	
Alternative products in the market: Similar products from other areas will come at a low price(Weight 2)	
Transfer work: young and expert force transfer from agriculture to service and industry(Weight 2)	
Industrial agriculture: The trend of industrial agriculture is reduced.(Weight 2)	
Return of Drought: Short Drought Returns Extremely. (Weight 3)	
Period of drought: short period of drought and high intensity (weight 3)	

The default effect score is +17 and is considered as the believable scenarios. This means that the alternative hypothesis is more acceptable in comparison with assumption of "The current trend will continue".

4.4. Second scenario, the probable scenario
In the second scenario, according to the propulsions of people's income increase, the "current trend continues" hypothesis is selected.

This hypothesis is supported based on elements of positive weight scenarios and scenarios which are compatible with this scenario have negative weight. These assumptions show the impact score of -2. In this assumption, the backup scenarios causes a change in land use intensity and consistent scenarios change the type of land use. Therefore, the inconsistent arguments are dominant in this premise (figure 3).

Transfer of work: transfer of young and expert workforce from agriculture to services and industry will continue (weight 2)	Drought period: short drought period and severity (weight -2)	Commercializing agriculture: production for the market will be done by means of new inputs (weight 1)	Alternative products in the market: similar products from other regions will be imported with low prices (-1)

Propeller of people's income increase: "current trend will continue"

Industrial agriculture: industrial agriculture trend will decrease (-1)	Return On Investment in activity: margin of agricultural activities will continue with the current trend (weight 2)	Drought return: short drought will return to its severity (weight -2)	Local business: offering more products in local market will increase (weight -1)

Figure 3. Scenario Propeller of people's income increase: current trend will continue'
Source: Research findings, 2017

Effective scenarios on the scenario element "Increase people's income: "The current trend will continue "According to the contradictions of the scenario, the opposite hypothesis that is, "people's income decrease relative to their costs" is more convincing. This hypothesis is supported by the following elements and some other assumptions are compatible with it. Based on this scenario and depending on the nature of the backup scenarios a change in the type of user is possible and change in

land use would happen. According to the nature of consistent scenarios changes in both use and use intensity will happen. The default replacement score is +7. This means that the alternative

hypothesis is more acceptable in comparison with "Income with Trend" scenario and is fewer contradictory (table 5).

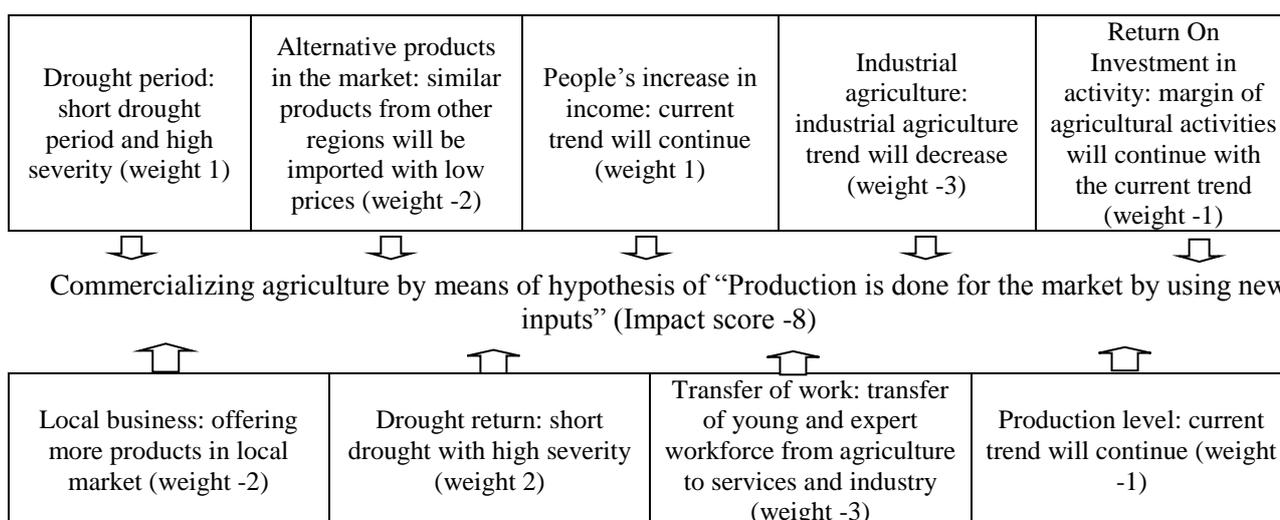<div align="center">Table 5: Support and Compatible Scenarios
Source: Research findings, 2017</div>

Backup scenarios	Compatible scenario
Production level: the current trend will continue (Weight 2)	Agricultural commercialization: production for the market using new inputs (Weight 1)
Local business boom: Deliver more products from the local market(Weight 2)	Return on investment in activity: Profit margin Agriculture with current trends (weight -2)
Alternative products in the market: Similar products from other areas at low prices Will achieve (Weight 1)	
Industrial agriculture: The trend of industrial agriculture will reduce (Weight 1)	Work Transfer: the Young and Experienced Force from Agriculture to Services and industry (Weight 2)
Return of Drought: Short Drought Returns Extremely (Weight 3)	
Period of drought: short period of drought and severity (weight 3)	

4.5. Third scenario, the probable scenario

In this scenario, commercialization of agriculture with hypothesis of "production for the market using new inputs" is selected. This hypothesis is supported by the following scenario elements (positive weight). According to the results of table 2 the backup scenarios causes a change in the type of land use, and compatible scenarios make changes in intensity of land use. In short, this hypothesis shows the impact score of -8. So, the

contradictory arguments are predominant. Given the contradictions of the scenario, if replaced with the hypothesis of "tourism agriculture will be developed" it would be more convincing. Because according to experts, the following scenarios support this scenario. The backup scenarios (with positive weight) and compatible scenarios will change the type of use so this scenario has fewer contradictory (figure 4).

Figure 4: influential scenarios on scenario element: "communization of agriculture: production for market using new inputs.
Source: Research findings, 2017

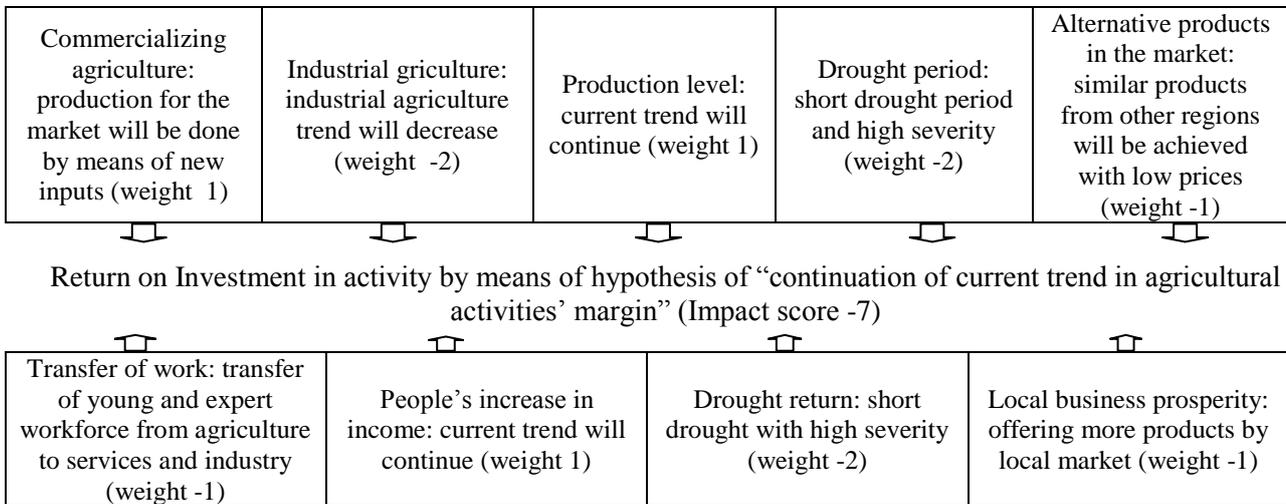**Table 6. Support and Compatible Scenarios**
Source: Research findings, 2017

Backup scenarios	Compatible scenario
Production level: the current trend will continue(Weight 1)	Work labor Transfer: Young and experts Forces from agriculture to services and industry(Weight 1)
People's income increase: The current trend continues(Weight 1)	
Return on investment in activity: The profit margin of agricultural activity continues with the current trend (weight 1)	
Local Business: product supply will increase to the local market(Weight 1)	
Alternative products in the market: Similar products from other areas will be available at low prices (Weight1)	Industrial agriculture: Industrial agriculture trend will be reduced (Weight 1)
Return of drought: the short period of its return is extremely high(Weight 3)	
Period of drought: Short period of drought and its severity (weight 2)	

The default score is +8. This assumption is more acceptable in comparison with the assumption of the scenario of "production for the market will be done using new entries". Therefore, the assumption of this scenario is contradictory (table 6).

4.6. Fourth scenario, the probable scenario

This scenario is titled "Return on investment activity ", and the hypothesis of "Continuity of the profit margin of agriculture activities will continue with the current trend" has been selected. This hypothesis is supported by elements of the following scenario. Backup scenarios of this scenario indicates a change of land use type has a higher chance of changing in intensity of use, but compatible scenarios with this scenario show the land use intensity more probably. In short, this hypothesis shows a score impact of 7. So, the paradoxical arguments are dominant in this assumption (figure 5).

Commercializing agriculture: production for the market will be done by means of new inputs (weight 1)	Industrial griculture: industrial agriculture trend will decrease (weight -2)	Production level: current trend will continue (weight 1)	Drought period: short drought period and high severity (weight -2)	Alternative products in the market: similar products from other regions will be achieved with low prices (weight -1)

Return on Investment in activity by means of hypothesis of "continuation of current trend in agricultural activities' margin" (Impact score -7)

Transfer of work: transfer of young and expert workforce from agriculture to services and industry (weight -1)	People's increase in income: current trend will continue (weight 1)	Drought return: short drought with high severity (weight -2)	Local business prosperity: offering more products by local market (weight -1)

Figure 5: Impact of scenario elements "Return on investment in activity: sustaining the profit margin of agricultural activities with current trends"
Source: Research findings, 2017

Given the contradictions if the hypothesis of "margin agricultural activities will decrease." replace the alternative will be more persuasive. The backup Scenarios of this assumption will make a change in the type of land user in rural areas. The compatible scenario also changes the intensity of land use but it's less powerful (table 7).

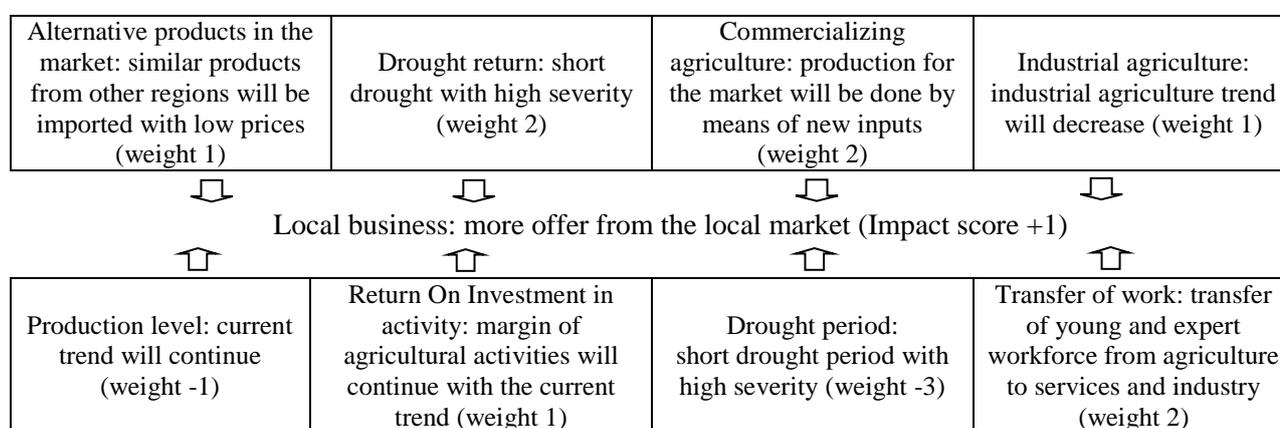**Table 7. Support and Compatible Scenarios**
Source: Research findings, 2017

Backup scenarios	Compatible scenario
Production level: the current trend will continue (weight 1)	Agricultural commercialization: Production is done for the market using new inputs(Weight- 2)
Increasing people's income: The current trend will continue (Weight 2)	
Local business: Deliver more products from the local market (Weight 3)	
Alternative products in the market: Similar products from other areas will come at a low price(Weight 2)	
Transfer work: the young and expert forces from agriculture to service and industry (Weight 3)	
Industrial agriculture: The trend of industrial agriculture will be reduced(Weight 2)	
Return of drought: Return of drought and its severity (Weight 3)	
Period of drought: Short drought period and high intensity (weight 3)	

The default effect score is +17. This means that the alternative hypothesis is more acceptable in comparison with the scenario assumption. So, scenario of "The profit margin of agricultural activity continues with the current trend is contradictory.

4.7. Fifth scenario the possible scenario
This scenario is called local business and hypothesis of "Supply more products than local demand" has been chosen. This hypothesis is supported by the following elements of the scenario (Figure 6). In short, this assumption shows the impact score of +1. Backup scenarios express the change in type and also in intensity of use in the study area, and scenarios that are consistent with this scenario also verify the change in type of use. So it is possible that in the future type of agriculture use change in favor of non-agricultural use.

Alternative products in the market: similar products from other regions will be imported with low prices (weight 1)	Drought return: short drought with high severity (weight 2)	Commercializing agriculture: production for the market will be done by means of new inputs (weight 2)	Industrial agriculture: industrial agriculture trend will decrease (weight 1)

⇩   ⇩   ⇩   ⇩

Local business: more offer from the local market (Impact score +1)

⇧   ⇧   ⇧   ⇧

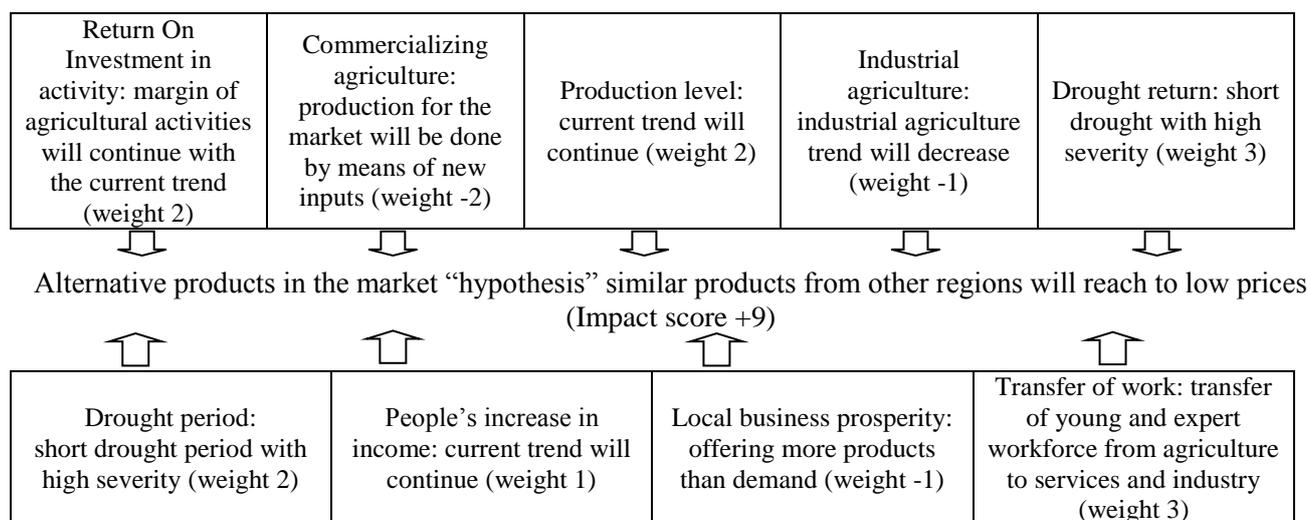| Production level: current trend will continue (weight -1)	Return On Investment in activity: margin of agricultural activities will continue with the current trend (weight 1)	Drought period: short drought period with high severity (weight -3)	Transfer of work: transfer of young and expert workforce from agriculture to services and industry (weight 2)

Figure 6. Impact on the scenario element "Local Business Growth: Delivering More Products from Local Market".
Source: Research findings, 2017

The alternative hypothesis for this scenario which is "higher demand than supply products" will be more convincing because this scenario supports assumptions that weigh more. Based on these hypotheses changes in the type of use is more probable to occur than the severity of use and consistent hypotheses show change in use (figure 7).

Return On Investment in activity: margin of agricultural activities will continue with the current trend (weight 2)	Commercializing agriculture: production for the market will be done by means of new inputs (weight -2)	Production level: current trend will continue (weight 2)	Industrial agriculture: industrial agriculture trend will decrease (weight -1)	Drought return: short drought with high severity (weight 3)

Alternative products in the market "hypothesis" similar products from other regions will reach to low prices
(Impact score +9)

Drought period: short drought period with high severity (weight 2)	People's increase in income: current trend will continue (weight 1)	Local business prosperity: offering more products than demand (weight -1)	Transfer of work: transfer of young and expert workforce from agriculture to services and industry (weight 3)

Figure 7. Influential elements on the scenario of "alternative products in the market: Similar products from other areas will reach at low prices".
Source: Research findings, 2017

Table 8. Backup and support assumptions with the scenario of "the demand will be higher than the supply of products"
Source: Research findings, 2017

Backup scenarios	Compatible scenario
Production level: the current trend will continue(Weight 2)	Agricultural commercialization: production for the market using new entries will be done (Weight – 1)
Return on investment in activity: The profit margin of agricultural activity with the current trend (Weight 2)	
Alternative products in the market: Similar products from other areas at low prices will be entered (Weight 1)	Industrial agriculture: Industrial agriculture trend will be reduced (Weight -2)
Transfer work: the young and expert force from agriculture to service and industry. (Weight 3)	
Return of drought: the short period of its return is extremely high(Weight 3)	
Period of drought: Short period of drought and its severity (weight 3)	

The default score is 11. This means that the second assumption is more reliable than the scenario assumption of "supplying products more than local demand ". So the assume of this scenario is inconsistent.

4.8. The Sixth Scenario; the Believable Scenario

Due to the advancement of alternative products in the market, the assuming of "similar products from other areas will deliver at a low price" has been selected. "This hypothesis is supported by the following scenario elements. On basis of backup scenarios (positive weighting scenarios) and consistent scenarios the likelihood of change in land use in very high level is possible. So the scenario seems more likely to be happen. In short,

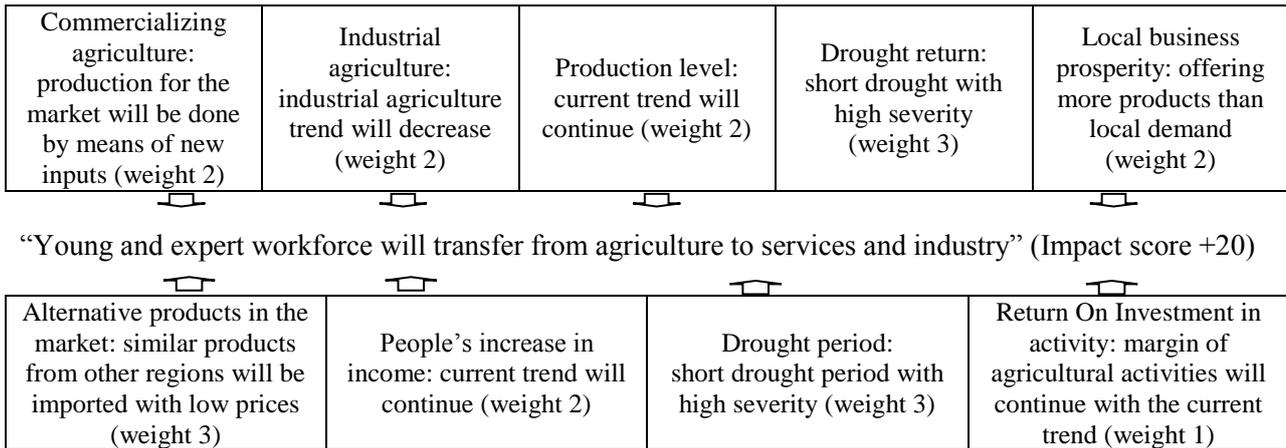the score is + 9. So the argument is in favor of this premise (table 8).

Conclusion: Based on the results, the balance of supporters and opponents of this assumption reaches 3. This result is no better than the balance of the selected hypothesis, "similar products will be imported from other regions at low prices. In summary, none of the alternatives is more acceptable than the selected assumption. Therefore, the selected hypothesis can be adapted as the same.

4.9. The Seventh Scenario; the Believable Scenario

In relation to the workforce transmission, the assumption of "the young force and the expert from agriculture will be transferred to services and industry" has been selected. This hypothesis is

supported by the following scenario elements. The support assumptions in this scenario indicate that change in land use will be much higher than the change in the severity of the lands. Accordingly, the probability of occurrence a change in land use in the future is not expected with current trend and higher than it.

It needs to be explained that no other element of the scenario is compatible with this assumption. In short, this assumption indicates the impact score of +20. Therefore, the arguments that are in favor of this assumption will overcome the other assumptions(figure 8).
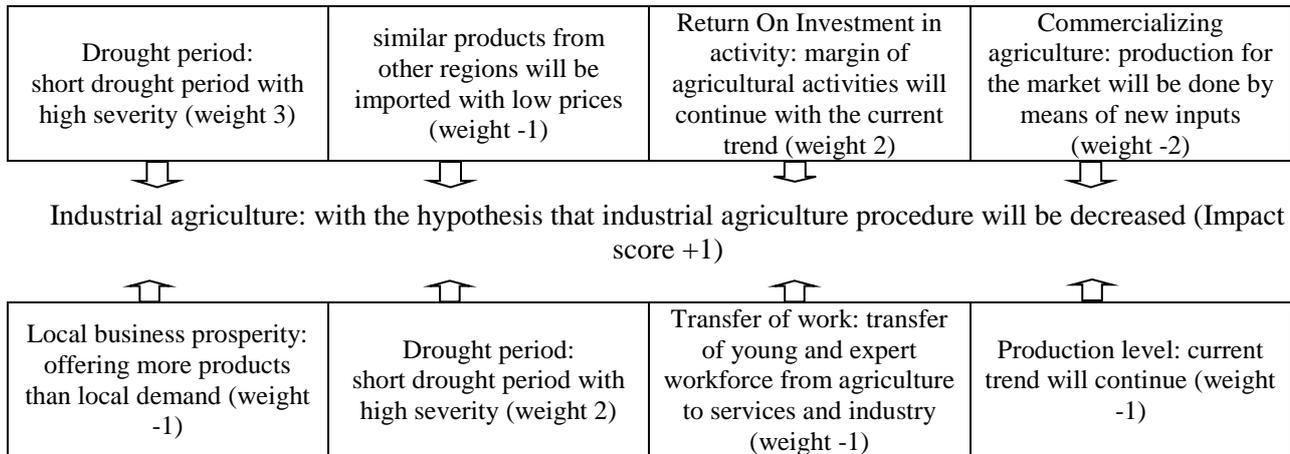
Commercializing agriculture: production for the market will be done by means of new inputs (weight 2)	Industrial agriculture: industrial agriculture trend will decrease (weight 2)	Production level: current trend will continue (weight 2)	Drought return: short drought with high severity (weight 3)	Local business prosperity: offering more products than local demand (weight 2)

"Young and expert workforce will transfer from agriculture to services and industry" (Impact score +20)

Alternative products in the market: similar products from other regions will be imported with low prices (weight 3)	People's increase in income: current trend will continue (weight 2)	Drought period: short drought period with high severity (weight 3)	Return On Investment in activity: margin of agricultural activities will continue with the current trend (weight 1)

Figure8. An influential element on the scenario of '' transition of work: the young force and the expert from agriculture to services and industry."

Source: Research findings, 2017

Conclusion: the results of making scenario device shows that the alternative hypothesis of this scenario, including "the specialized young force in the service and agricultural industry will be balanced" with an equivalent of score -11. And also the hypothesis "the young force and the expert will be stayed at agriculture sector" has a score of -20. This results show that there is no alternative scenario suitable for this scenario. In short, none of the alternative hypotheses is more acceptable than the selected assumption "the young force and the expert from agriculture will be transferred to services and industry". Therefore, the selected hypothesis can be adapted as the same.

4.10. The Eighth scenario, the possible scenario

In this scenario, industrial agriculture is selected by this assumption: "the industrial process of agriculture will slow down". This assumption is supported by the scenario elements with positive weights in the form. Based on the nature of the backup scenarios and this scenario "the industrial agriculture process will be slow", the probability of change in land use will be more likely than change at severity of user. But compatible scenarios with this scenario show changes in intensity and user type. In short, the impact score of this assumption is +1 that represents fewer contradictions in the scenario (figure 9).

Drought period: short drought period with high severity (weight 3)	similar products from other regions will be imported with low prices (weight -1)	Return On Investment in activity: margin of agricultural activities will continue with the current trend (weight 2)	Commercializing agriculture: production for the market will be done by means of new inputs (weight -2)

Industrial agriculture: with the hypothesis that industrial agriculture procedure will be decreased (Impact score +1)

Local business prosperity: offering more products than local demand (weight -1)	Drought period: short drought period with high severity (weight 2)	Transfer of work: transfer of young and expert workforce from agriculture to services and industry (weight -1)	Production level: current trend will continue (weight -1)

Figure 9. Influential elements on the scenario "industrial agriculture: The trend of industrial agriculture is reduced".
Source: Research findings, 2017

Considering the existence of contradiction, the alternative hypothesis that "the agricultural industrial process becomes quicker" is more persuasive. This scenario is supported by the following scenarios in network analysis. Based on the nature of the backup scenarios and their weight, land use change is not expected either in both types and intensity. In general, the default impact scores reach +6. This means that alternative hypotheses are more acceptable than the scenario hypothesis of the "industrial agriculture process is reduced". So the assumption of this scenario is contradictory (table 9).

Table 9. Backup and Compatible scenarios
Source: Research findings, 2017

Backup scenarios	Compatible scenario
Production level: the current trend will continue (Weight 1)	Increasing people's income: the current trend will continue (Weight -1)
Communization of agriculture: Production is done using new inputs for the market (Weight 2).	Return on investment in activity: The profit margin of agricultural activity with the current trend (Weight 1-)
Local trade: offering productions more than local market (Weigh 3)	
Workforce Transition: the young force and the expert from agriculture will be transferred to services and industry (Weigh 3)	Return of drought: the drought period is short and its severity is extremely high(Weight 3-)
Period of drought: drought period is short and its severity is high (weight 2)	

4.11. Rusting Scenarios

Generally, the assumptions of a scenario are supported by unequal strength. The degree of strength can be expressed in terms of 'cohesion value'. Rusting Scenario expresses and measures the difference between the assumption's impact score and impact score of the best alternative. In the following list, the Driving was ranked as descending robust. Based on the results of related scenario, the workforce transition is most probable, and the scenario related to production level was selected as unlikely scenario (table 10).

Table 10. Rusting Scenarios
Source: Research findings, 2017

Driving	Scenario Assumption	Stability Value
Workforce Transition	The young and expert force will be transferred from agriculture to services and industry.	31
Alternative products in the market	Similar products will be imported from other areas at low prices.	3
Industrial agriculture	The trend of industrial agriculture is reduced.	-5
Increase income	People's income continues with the current trend.	-9
Local Business	The supply of products to the market place will be more than mind.	-10
Commercialization of agriculture	Production is done using new inputs for the market.	-16
Return of capital and profit	The profit margin of agricultural activity continues with the current trend.	-24
Production Level	The level of production will continue with the current trend.	-26

5. Discussion and Conclusion

The results showed that the influence of transitions have a high uncertainty in land use. Many selected uncertainties are considered mainly as the market elements of land use planning and according to the state economy system in Iran, the prediction of their situation and their behavior in the region is more complex. Therefore, most scenarios have more inconsistencies and less stable rate. So, the quality of market and government involvement in this process is critical. Thus, this complexity and unpredictability of government and market behavior due to the weakness of the economic and tangible laws and the lack of executive behavior on land use, the planning of land use will face a number of problems. Therefore, it is suggested that specific programs need to be developed and observed to avoid them for each scenario.

References

1. Alexander, P., Rounsevell, M. D., Dislich, C., Dodson, J. R., Engström, K., & Moran, D. (2015). Drivers for global agricultural land use change: the nexus of diet, population, yield and bioenergy. *Global Environmental Change, 35*, 138-147.
2. Boroumand. A. Abbasi A.A. & Bahrami. M. (1394/2015). Probabilistic Tree scenario-writing, Third National Conference on Future Studies. Yadeghar Derakhshan Aria, Tehran, [in Persian].
3. Bozorgi, M. (1388/2009). Research Methods in Future Thesis. *Social Sciences Month Book*, 14. [In Persian]
4. Bradfield, R., Derbyshire, J., & Wright, G. (2016). The critical role of history in scenario thinking: Augmenting causal analysis within the intuitive logics scenario development methodology. *Futures*, *77*, 56-66.
5. MacNulty, C. A. R. (1977). Scenario development for corporate planning. *Futures*, *9*(2), 128-138.
6. Van Dijk, T. (2003). Scenarios of Central European land fragmentation. *Land use policy*, *20*(2), 149-158.
7. Ding, D., Bennett, D., & Secchi, S. (2015). Investigating impacts of alternative crop market scenarios on land use change with an agent-based model. *Land*, *4*(4), 1110-1137.
8. Dong, C., Schoups, G., & van de Giesen, N. (2013). Scenario development for water resource planning and management: a review. *Technological forecasting and Social change*, *80*(4), 749-761.
9. Rodríguez Eraso, N., Armenteras-Pascual, D., & Alumbreros, J. R. (2013). Land use and land cover change in the Colombian Andes: dynamics and future scenarios. *Journal of Land Use Science*, *8*(2), 154-174.

10. Fox, T. A., Rhemtulla, J. M., Ramankutty, N., Lesk, C., Coyle, T., & Kunhamu, T. K. (2017). Agricultural land-use change in Kerala, India: Perspectives from above and below the canopy. *Agriculture, Ecosystems & Environment*, *245*, 1-10.

11. Freeman, O., & Pattinson, H. M. (2010). Exploring client scenarios associated with scenario planning. *Futures*, *42*(4), 304-312.

12. Gollnow, F., Göpel, J., Schaldach, R., & Lakes, T. (2018). Scenarios of land-use change in a deforestation corridor in the Brazilian Amazon: combining two scales of analysis. *Regional Environmental Change*, *18*(1), 143-159.

13. Shao, J. A., Wei, C. F., & Xie, D. T. (2006). An insight on drivers of land use change at regional scale. *Chinese Geographical Science*, *16*(2), 176-182.

14. Johnson, M. L., Bell, K. P., & Teisl, M. F. (2016). Does reading scenarios of future land use changes affect willingness to participate in land use planning? *Land Use Policy*, *57*, 44-52.

15. Kristensen, S. B. P. (2016). Agriculture and landscape interaction—landowners' decision-making and drivers of land use change in rural Europe. *Land use policy*, *57*, 759-763.

16. Levers, C., Butsic, V., Verburg, P. H., Müller, D., & Kuemmerle, T. (2016). Drivers of changes in agricultural intensity in Europe. *Land Use Policy*, *58*, 380-393.

17. Lin, Y. P., Hong, N. M., Wu, P. J., & Lin, C. J. (2007). Modeling and assessing land-use and hydrological processes to future land-use and climate change scenarios in watershed land-use planning. *Environmental Geology*, *53*(3), 623-634.

18. Lu, Q., Liang, F., Bi, X., Duffy, R., & Zhao, Z. (2011). Effects of urbanization and industrialization on agricultural land use in Shandong Peninsula of China. *Ecological Indicators*, *11*(6), 1710-1714.

19. Maimaitijiang, M., Ghulam, A., Sandoval, J. O., & Maimaitiyiming, M. (2015). Drivers of land cover and land use changes in St. Louis metropolitan area over the past 40 years characterized by remote sensing and census population data. *International Journal of Applied Earth Observation and Geoinformation*, *35*, 161-174.

20. Mancosu, E., Gago-Silva, A., Barbosa, A., De Bono, A., Ivanov, E., Lehmann, A., & Fons, J. (2015). Future land-use change scenarios for the Black Sea catchment. *Environmental Science & Policy*, *46*, 26-36.

21. Mottet, A., Sylvie, L., Nathalie, C., & Annick, G. (2006). Agricultural land-use change and its drivers in mountain landscapes: A case study in the Pyrenees. *Agriculture, Ecosystems and Environment* 114, 296–310.

22. Newman, M. E., McLaren, K. P., & Wilson, B. S. (2014). Long-term socio-economic and spatial pattern drivers of land cover change in a Caribbean tropical moist forest, the Cockpit Country, Jamaica. *Agriculture, Ecosystems & Environment*, *186*, 185-200.

23. Nguyen, H. H., Dargusch, P., Moss, P., & Aziz, A. A. (2017). Land-use change and socio-ecological drivers of wetland conversion in Ha Tien Plain, Mekong Delta, Vietnam. *Land Use Policy*, *64*, 101-113.

24. Pratt, A. C. (2009). Social and economic drivers of land use change in the British space economy. *Land Use Policy*, *26*, S109-S114.

25. Provo, J., Ruona, W. E., Lynham, S. A., & Miller, R. F. (1998). Scenario building: An integral methodology for learning, decision-making, and human resource development. *Human Resource Development International*, *1*(3), 327-340.

26. Da Silva, R. F., Batistella, M., & Moran, E. F. (2016). Drivers of land change: Human-environment interactions and the Atlantic forest transition in the Paraíba Valley, Brazil. *Land Use Policy*, *58*, 133-144.

27. Snoek, M. (2003). The use and methodology of scenario making. *European Journal of Teacher Education*, *26*(1), 9-19.

28. Swart, R. J., Raskin, P., & Robinson, J. (2004). The problem of the future: sustainability science and scenario analysis. *Global environmental change*, *14*(2), 137-146.

29. Taghilou, A.A. (1394/2015). Future Scenarios of Rural Settlements in Iran, Rural Journalism Research and Program. *Third Year,* (5), 96-83. [In Persian]

30. Taghilou, A.A. (1396/2017). Drivers of Development of Iranian Villages. *Journals of Spatial Planning,* 20(4), 281. [In Persian]

31. Ustaoglu, E., Williams, B., & Murphy, E. (2016). Integrating CBA and land-use development scenarios: Evaluation of planned rail investments in the Greater Dublin Area, Ireland. *Case Studies on Transport Policy*, *4*(2), 104-121.

32. Van Vliet, J., de Groot, H. L., Rietveld, P., & Verburg, P. H. (2015). Manifestations and underlying drivers of agricultural land use change in Europe. *Landscape and Urban Planning*, *133*, 24-36.

33. Wang, Q., Ren, Q., & Liu, J. (2016). Identification and apportionment of the drivers of land use change on a regional scale: Unbiased recursive partitioning-based stochastic model application. *Agriculture, Ecosystems & Environment*, *217*, 99-110.

34. Weimer-Jehle W. (2016). *Constructing consistent scenarios using cross-impact balance analysis*. Stuttgart Research Center for Interdisciplinary Risk and Innovation Studies University of Stuttgart Seidenstr. 36 70174 Stuttgart Germany.

35. Xystrakis, F., Psarras, T., & Koutsias, N. (2017). A process-based land use/land cover change assessment on a mountainous area of Greece during 1945–2009: signs of socio-economic drivers. *Science of the Total Environment*, *587*, 360-370.

36. Zhang, Y., Wang, C., Xie, H., Zhang, J., & Wu, J. (2017). Analyzing spatial variations in land use/cover distributions: A case study of Nanchang area, China. *Ecological Indicators*, *76*, 52-63.

سناریوهای تغییر کاربری اراضی نواحی روستایی
(مطالعۀ موردی دهستان باش قلعه- ارومیه)

علی‌اکبر تقیلو*۱

۱-دانشیار جغرافیا و برنامه‌ریزی روستایی، دانشگاه ارومیه، ارومیه، ایران.

چکیده مبسوط

۱. مقدمه

روستاهای واقع در محور ارتباطی ارومیه- سلماس در دهستان باش قلعه در معرض تغییر و تحولات زیادی قرار گرفته است. در این محور ارتباطی به جهت گسترش و پراکندگی شهری، تراکم جمعیت، توسعه فعالیتهای خدماتی و تراکم بالای روستایی اراضی در معرض تغییرات شدت کارکردی و تغییر کارکردی قرار دارد. بنابراین برنامه‌ریزی برای آینده با این روندها و تاکید بر امنیت غذایی و محرومیت‌زدایی، افزایش درآمد روستایی، حفاظت از اراضی کشاورزی در برنامه های مختلف دولت در سطح فرا منطقه ای، رشد جمعیت، رشد صنعت و شهر نشینی، فساد و رانت بازی، تقسم زمین و کاهش اندازه آنها و تخصیص به کاربریهای تفریحی خصوصی، تغییرات دموگرافیک، کاهش کیفیت آب و بحران آب، توسعه و گسترش اتصالات فضایی (راههای روستایی و بین شهری) در سطح منطقه بسیار مشکل است. این روندها تنها بخشی از روندهای جاری در این منطقه را تشکیل که بسیاری از آنها متضاد و متناقض از هم می‌باشند. این روندهای متناقض برنامه‌ریزی کاربری اراضی برای آینده را با مشکلاتی روبرو ساخته است. لذا ضرورت دارد برای استفاده مناسب و مطلوب از اراضی و حفاظت تمام ذی‌نفعان مستقیم و غیر مستقیم منابع زمین، برنامه‌ریزی را برای حالات مختلف آینده انجام داد. در تحقیق حاضر محقق به دنبال این است که ابتدا پیشران‌های تغییر کاربری اراضی را براساس اسناد تعیین نماید و سپس سناریوهای کاربری اراضی را شناسایی کند.

۲. روش تحقیق

نحوه جمع‌آوری اطلاعات بصورت پیمایشی و اسنادی است. داده‌های پیمایشی جهت سنجش و تعیین میزان اهمیت، اثر و انتخاب پیشران‌های بحرانی با استفاده از نظر کارشناسان و روستائیان بوده است.

در جهت تدوین سناریوها گامهای زیر به ترتیب طی گردید:

گام اول: تعیین اهداف، گام دوم: تعیین فاکتورهای کلیدی، گام سوم: تعیین پیشران‌ها، گام چهارم: تعیین تاثیر پیشران‌ها و اهمیت آنها در فاکتورهای کلیدی، گام پنجم: تحلیل تاثیر متقابل پیشران‌ها بر همدیگر و گام ششم: تعیین پیشران‌های با تاثیر گذاری مستقیم و تاثیرپذیری غیر مستقیم از پیشران‌های دیگر.

برای تعیین سناریوها ابتدا هدف و فاکتورهای کلیدی (تغییر در کارکرد اراضی و تغییر در شدت کارکرد اراضی) تعیین شد. پس از آن، فهرستی از پیشران‌ها با مطالعه ۳۴ تحقیق داخلی و خارجی در حوزه کاربری اراضی تهیه گردید. بعد از تهیه لیست پیشران‌ها، پرسشنامه ای جهت سنجش اهمیت و اثر آنها بر فاکتورهای کلیدی از نظر روستائیان و کشاورزان تدوین گردید. پرسشنامه مورد نظر بصورت ماتریس پیشران‌ها و فاکتورهای کلیدی در قالب طیف لیکرت (تاثیر خیلی زیاد، .... تا تاثیر خیلی کم) توسط محقق طراحی شد. بعد از تهیه پرسشنامه به کشاورزان (۳۱۸ نفر بعنوان نمونه با استفاده از فرمول کوکران بدست آمد) مراجعه گردید و پرسشنامه ها تکمیل شد.

با توجه به ماهیت و هدف تحقیق (تدوین سناریوهای کاربری اراضی) و جلوگیری از افزایش حجم مقاله، تنها نتایج پیشران‌های تاثیرگذار و تاثیرپذیر غیرمستقیم و تاثیر متقابل پیشران‌ها در این تحقیق ذکر شده است و سایر نتایج ارائه نگردیده است. ولی نتایج نظر کشاورزان در گسترش سناریوها استفاده شده است. برای جمع‌آوری اطلاعات و

Email: a.taghilo@gmail.com

* نویسندۀ مسئول:

بینی وضعیت و رفتار آنها در منطقه از پیچیدگی بسیاری برخوردار است. به همین جهت اکثر سناریوها دارای تناقضات بیشتر و میزان پابرجایی کمتری برخوردارند. بنابراین کیفیت نقش دخالت بازار و دولت در این فرایند از اهمیت زیادی برخوردار است. سرمایه‌داری صنعتی و بورژوازی شهری امکان اجازه توسعه کشاورزی و تغییر شدت کاربری اراضی را نسبت به تغییر نوع کاربری اراضی نمی دهد. این امر علاوه بر اینکه ناشی از عملکرد بازار همانند واردات محصولات به مناطق مختلف که منجر به کاهش حاشیه سود کشاورزی می شود از طریق دولت نیز در قالب برنامه های مختلف مانند نگه داشتن قیمت محصولات برای افزایش قدرت خرید مردم، تشدید خواهد شد. به نظر می رسد نتایج بدست آمده از سناریوهای تغییر کاربری با نتایج بدست آمده از مطالعات یانگ (۲۰۱۶) در چین و دایجک (۲۰۰۳) در هلند سازگاری زیادی دارد. در نتیجه این پیچیدگی و غیر قابل پیش بینی بودن رفتار دولت و بازار با توجه به ضعف قوانین اقتصادی، سلیقه ای و رانتی بودن رفتار اجرایی در مورد کاربری اراضی، برنامه ریزی استفاده از زمین را با مشکلات عده ای روبرو خواهد ساخت.

کلید واژه‌ها: کاربری اراضی، سناریو، آینده پژوهی، دهستان باش قلعه، ارومیه.

تشکر و قدردانی

تحلیل تاثیر متقابل پیشران‌ها بر همدیگر پرسشنامه‌ی دیگری بصورت ماتریس پیشران‌ها تدوین شد. این پرسشنامه جهت تعیین پیشران‌های تاثیرگذار و تاثیرپذیر غیرمستقیم از پیشران‌های دیگر برای ساختن سناریو طراحی شد. برای سنجش تاثیر متقابل پیشران‌ها بر همدیگر از ۲۲ نفر کارشناس استفاده گردید. در نهایت داده‌ها و اطلاعات بدست آمده از کارشناسان از طریق تکنیک تحلیل ساختاری در نرم افزار میک‌مک تجزیه و تحلیل گردید و پیشران‌های تاثیر گذار مستقیم و تاثیر پذیری غیر مستقیم تعیین شدند.

پس از تعیین پیشران‌های تاثیرگذار مستقیم و تاثیرپذیری غیرمستقیم، حالت‌های هر یک از آنها از طریق مصاحبه با کارشناسان پنج نفره (۲ نفر برنامه‌ریز روستایی، ۲نفر برنامه‌ریز منطقه‌ای، یک نفر کارشناس منابع طبیعی) برای هر پیشران تعیین گردید. پس از تعیین حالت‌های سناریوها، پرسشنامه‌ای در قالب ماتریس حالت‌ها تدوین شد و در اختیار گروه فوق جهت تعیین میزان تاثیر حالت‌های هر پیشران بر حالات دیگر پیشران‌ها قرار گرفت.

برای انتخاب پیشران‌ها با تاثیرگذاری مستقیم و تاثیرپذیری غیرمستقیم از تکنیک تحلیل ساختاری در محیط نرم‌افزاری میک‌مک استفاده گردید و برای توسعه سناریو از نرم افزار سناریو ویزارد استفاده شد.

۳. یافته‌های تحقیق

بر اساس نتایج، ۷ سناریو بدست آمد. در این سناریوها، بسیاری از عدم قطعیت‌های انتخاب شده عمدتا از عناصر بازاری برنامه ریزی کاربری اراضی به شمار می روند. با توجه به نظام اقتصاد دولتی در ایران پیش

ارجاع: تقیلو، ع. (۱۳۹۷). سناریوهای تغییرکاربری اراضی نواحی روستایی (مطالعهٔ موردی دهستان باش قلعه- ارومیـه). مجلـه پـژوهش و برنامه‌ریزی روستایی، ۷(۳)، ۴۴-۲۹.

http://dx.doi.org/10.22067/jrrp.v5i4.67080