

## **Communicative Action as a Basis for Realization of Citizen Participation in Urban Development Process (Case Study: City of Gorgan)**

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### **Extended abstract**

#### **Introduction**

Today, change in approach to development has caused that human concepts such as citizen participation are considered as the main factor for development of cities. These transformations in literature of urban planning in developing countries (including Iran) have changed the ideas of most experts in these countries. Thus, they have emphasized on importance of participation to the realization of urban development. But despite this emphasis and even restructuring of urban management in Iran (establishment of city councils), still the lack of participation is proposed as one of the major obstacles to achievement of development. However, with these changes even the concept of participation in Iran cities is still unrealized well and lack of popular participation is a key issue in these cities. Therefore, in the process of planning, decision making and implementation of a plan, people are not involved or play just a minor role. The present study also seeks to explain this issue that why despite the emphasis of most experts and restructuring of urban management in Iran, there is not still a suitable participation between the main components of the city (Citizens, City Council as an expression of civil society and municipality as the governing body of the city). In this study participation on quality of communication the three pillars of the city with each other based on Jurgen Habermas's theory of communicative action under review. City of Gorgan has been investigated as the study area in this research.

#### **Methodology**

The study will be performed in three stages of Description, explanations, analysis and suggestions. In the first stage the current status of the study area is identified and described. In the second stage, this current status in the study area (city of Gorgan) is explained based on theory of communicative action. Suggestions are also proposed with the critical and

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emancipator approach. With this interpretation, it can be said that in this study research method is combination in the form of multiple quantitative and qualitative methodologies.

### Results and Discussion

Results of the study in stage of description indicate that in existing space of Gorgan, citizens have potentially high willingness to participate, but this mentality is not actualized in field of action and institutional participation rates are low. They (Citizens) are also unfamiliar with the concept and philosophy of creation of the City Council as an expression of civil society. The results of the study in the stage explanation, according to Jürgen Habermas's theory of communicative action, indicate that not equipped space with the principles of the theory of communicative action in Gorgan has caused the distance amongst the main pillars of the city (Citizens, City Council as an expression of civil society and municipality as the governing body of the city) . This space is characterized by lack of trust. It is also a major obstacle to the realization of formal and institutional participation. The results of the study in the analysis stage indicate that primacy of modernism and modernization on modernity has caused manifestations of modernism and modernization (city councils) in this city. The suggestions also emphasize that formation of space in city of Gorgan with the principles of theory of communicative action can be fertile field for the main pillars of the city to each other, increase trust and also provide the necessary basis for transmission meaning of the City Council as an expression of civil society. (Fig. 1)

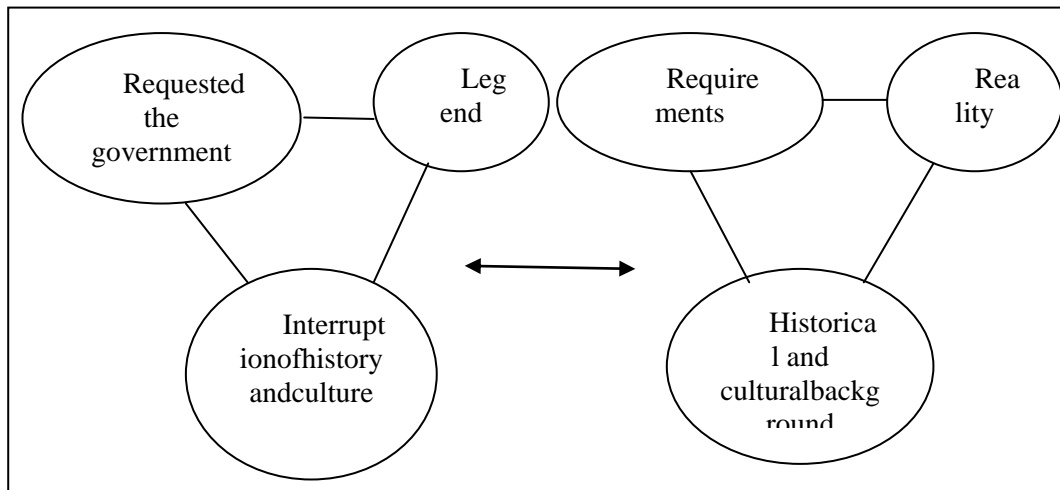


Fig. 1. Modern trends in the territories north and south

### Conclusion

Generally, it can be said that for realization of participation in social and cultural contexts it is required to provide modernity in developed countries in these contexts. In developing countries (including Iran) because of cultural discontinuity and modernism, these concepts derived from modernity thoughts such as participation will be faced with the duality. Under the influence of this duality despite the emphasis of most experts and restructuring of urban management (establishment of city councils) in Iran still the lack of participation is proposed as one of the major obstacles to achievement of urban development.

**Keywords:** city of Gorgan, communicative action, development, modernity, participation.

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## **Analysis of Spatial Distribution of Population and Utilities on the Basis of Spatial Justice (Case Study: Ardabil)**

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### **Extended Abstract**

#### **Introduction**

Spatial inequalities in establishment of municipal activities and different levels of residents wealth in various areas of a city, is not a new phenomenon in the cities all over the world. In developing countries, because of egregious social and economic differences, and due to inequality and imbalance in municipal services distribution, spatial differences of cities have been exacerbated (Abdi, Daneshpour, 1998). Spatial structure of a city is composed of components and elements which have reactions on each other. Therefore, instability of each of these components will have an effect on the whole structure (Savj & Vard, 2001, 90). To this reason, an organized spatial balance in cities is considered as a kind of municipal stability and will be realized when a logical compatibility is created between population scattering and service distribution in cities. As a result, appropriate and optimal distribution of social, economic, cultural, and sanitary facilities between regions and areas is one of the most important factors to prevent inequalities, development gap, and inappropriate spatial distribution of population on the areas of land. In planning for growth and development of different urban areas, it is essential to know the position and place of regions as one of the most important factors in achievement of a balanced municipal development. In some urban regions, service distribution is better than other regions, flow of people will head towards these regions, and subsequently social and environmental problems and issues will come up (Sarvestani, 2008, 6). In line with the policy of spatial justice, as a pivotal goal of country development plans, it is necessary to investigate the status of different regions with respect to services distribution and level of various infrastructural and socio-economic indexes, as well as to focus on deficiencies and insufficiencies for the future development plans.

In the recent years, conversion of Ardebil City into a provincial capital has caused a rapid physical expansion of this city. This, in turn, has caused serious problems. One of the most important of the problems is socio-spatial imbalance. Selection of this city as the provincial capital in 1996 has broken balanced and homogeneous spatial organization of the city. Inharmonious skeletal and physical development of the city has caused ecologic segregation. As

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a result, some of the areas and districts of the city have better accessibility to services, while some other districts, usually with higher population, have inappropriate access to the services.

The most important questions of this research are including: Is municipal services distribution well balanced in all areas of Ardebil City? Is there a meaningful relation between spatial population distribution and services distribution in all areas of Ardebil? Is there a meaningful relation between population density and services distribution in areas of Ardebil?

In order to explain the aforementioned questions the following assumptions are presented: Services in Ardebil city have not been distributed in a balanced manner. There is a direct meaningful relation between population scattering and municipal services distribution in the areas of Ardebil city. There is a direct meaningful relation between population density and municipal services distribution in the areas of Ardebil City.

### **Methodology**

The present research is an analytic-descriptive research with information collected in a field and attributive method, via a quantitative research. The statistical society of the research is 44 areas of Ardebil, using 17 indexes, and the collected information is analyzed via VIKOR model. We have used questionnaire by experts to determine the weight of research indexes (20 experts and specialists of municipal service department). We also used AHP model and relative Entropy method to analyze population.

### **Results and Discussion**

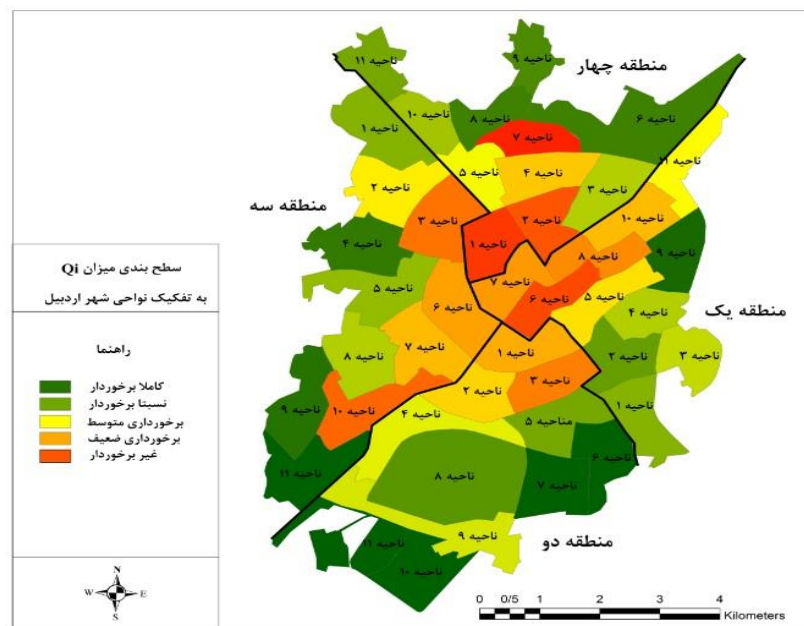
In order to analyze the properties of population spatial distribution in 44 regions of Ardebil, relative Entropy coefficient has been used. The Entropy coefficient in 2014 equals to 0.99. This value is merely less than unity and shows there is almost a full balance in spatial distribution of population.

Investigation on the pearson correlation coefficient between population of the areas in SPSS reveals the value of -0.169 with significance equal to 0.272, which means there is no meaningful relation between the two variables. In fact, population acceptance of different areas of Ardebil is not in accordance with the areas and other factors like land and house price, personal income and etc. have affected the population distribution.

### **VIKOR method**

VIKOR method is one of the newest methods of multi-variable decision making problem solving methods, which was first introduced by Oprikovich & Tzeng in 1998. This method evaluates the problems containing inappropriate and incompatible criteria.

The stages of VIKOR method are presented: First stage: gathering necessary data and forming decision matrix. Second stage: descaling decision matrix. Third stage: determining weight vector of criteria. Fourth stage: determining the best and the worst value among the values of each criterion. Fifth stage: calculating S and R values. Sixth stage: calculating Q. Seventh stage: ranking the options based on the descending order of the obtained values for S, R, and Q.



Checking Pearson's correlation relation between population density and the scores obtained from VIKOR method shows that correlation coefficient is 0.161 and has a meaningfulness level of 0.295. This means there is no meaningful relation between population density and services distribution, i.e. regarding equality, the more the areas obtained the higher ranks in municipal services distribution. This is the same for area of the regions. Correlation coefficient between area of the regions and services distribution equals -0.142. This means that areas extent has no effect on how optimal are the municipal services distribution.

### Conclusion

In this research, spatial distribution of population and services in 44 regions of Ardebil City has been investigated. Density level of Ardebil city in 2014 is 83.6 people per hectare. The highest densities among the areas of Ardebil city belongs to district 7 of region 4 and district 1 of region 3 with 201.1 and 182.2 people per hectare, respectively. The lowest densities belong to district 11 of region 2 and district 8 of region 2 with 0.2 and 1.6 people per hectare, respectively.

The results of this research show that districts 6 and 7 of region 2 with the highest score (very wealthy) and district 7 of region 4 with the lowest score (very deprived), are ranked in the first and the last place, respectively. The results also show that services distribution in some indexes like cultural, kindergarten, fire station and etc. are not distributed equally in regions of Ardebil city. Thus, regarding the first question and assumption, services distribution among the regions are not balanced, which verifies the first assumption. Regarding the second question and considering the results, the Pearson's coefficient between the areas' population rank and rank of VIKOR's score equals 0.151 with meaningfulness level of 0.386. This shows level of population has not affected how the municipal services are distributed. Therefore, there is a mere relation between population scattering and services distribution in the areas of Ardebil city, which rejects the second assumption. According to findings of this research and with the aim of answering the third question, the Pearson's coefficient between areas' population scattering and rank of VIKOR's score equals to 0.161 with a meaningfulness level of 0.295. This means that there is no meaningful relation between population scattering and services distribution. This means that services distribution is not in accordance with population needs, but socio-economic properties of areas' residents have an effect on scattering and distribution of services, so the third assumption is also rejected.

**Keywords:** Ardabil City, services distribution, spatial population distribution, vikor model.



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## Tourism Development in Coastal Cities and Social Security (Case Study: Tonekabon City)

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### Extended Abstract

#### Introduction

Security and tourism are two very important issues addressed by policy makers and planners. Regarding its outcomes in society, tourism development is considered by many institutions and scholars and it seems necessary to discuss about that. In addition to its positive social and cultural implications, tourism has also some negative implications which have fundamental importance in terms of sociological views. One of these consequences is the introduction of anti-social behaviors due to a flood of tourists in the region. Another consequence, to name, is the acquaintance of villagers with new ideas of tourists contrasting their own cultural values and causing antithetical identities. Social security could not be ignored in this regard since there is some sort of correlation between social order, security and tourism. While there is not social security in a region, tourism and its development could not make an effective role for its community. If tourism development undermines security infrastructures of society, it would make it nonsense. Therefore, all social systems in the world have tried to balance between tourism development and social security. By the way, tourism development has some negative consequences for society, of which we address to its effects on social security of destinations. Tonekabon city enjoys beautiful coastal line and fine weather cpnditions and other natural attractions. It is considered as a tourist destination in Iran. This city has been traditionally considered as a destination for tourists because of Caspian Sea in the north and the fertile plain in the middle and the rainforest in high mountains in south part of the sea and also because of having fine climate and beautiful nature. On the other hand, Tonekabon with an easy-access coastal line and residential and recreational facilities and proximity to tourism exit (Tehran) is nowadays welcoming many tourists. High volume of tourists in the coastal line has negative consequences in addition to its positive effects. Therefore, this paper aims at studying social security dimensions of the host community caused by tourism development. We try to answer two questions, A) how much is the level of satisfaction of host community from tourism development in the coastal city of Tonekabon? B) What effects has had tourism development on social security of local residents of coastal city of Tonekabon?

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### Methodology

This is a descriptive-analytical study and has been conducted with field survey. We first collected our data with library studies and then defined accordingly the notion of security and tourism development as our main study variables. We also collected other required data with field method (questionnaire tool) and characterized the level of tourism development as our independent variable using such variables as number of incoming tourists, the economic dependence on tourism, job dependence on tourism and investments by private sector for establishment of infrastructures and amenities of tourism. Our statistical population includes 68163 citizens of Tonekabon. With high volume of our statistical population, we used simple stochastic sampling method and used Cochran formula to determine the sample volume. Thus, we calculated it up to 360 people. We also processed our collected data using SPSS software and used compare-means test, T-test, correlation test and regression analysis in terms of levels of measurement of variables.

### Results and Discussion

Our findings suggest that from local community point of view, tourism growth is high because the results show the computed mean is bigger than theoretical median. Field observations of authors, sensible high traffic, sensible population growth in vacations, cars with non-local plate numbers and development of second homes all verify this claim that this region is a special destination for home tourism. Our findings, in this regard, show that the level of support of sample population from the future of tourism development has a suitable situation. Findings also suggest that there is a significant inverse relationship between tourism and social security so that the more tourism development we have, the less social security issues are appeared.

### Conclusion

Coastal cities are the regions with fine weather that makes them destinations for many tourists. Tourism development in the destinations has various consequences including those affecting social security in local community. Thus, in this study, we studied the effects of tourism on social security of the host community. Our results show that tourism had its most effects upon corruption in the city of Tonekabon. In such a way that we could say an increase in tourism development in Tonekabon city has led to an increase in corruption (burglary, street molestation, promiscuity and moral perversion). The second affected area could be police control, i.e. with tourism development; police officials charge themselves to protect security and order of the city more than ever. The index of distrust is the third area of influence, and with tourism development it could be said that people in society become strangers to each other and the trust between them decrease. Therefore, it could be concluded that tourism development in the region has had a negative effect on security of the society and led to reduction of social security of the region. We noticed that progress in this process could increase the intensity of this reverse relationship and tackle tourism development. In this regard, it entails that planners and decision makers taking suitable managerial strategies, put plans in place that are in line with reduction of insecurity in this city.

**Keywords:** coastal tourism, social security, Tonekabon City.

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## **Analysis of Lighting Situation and Safety of Urban Spaces Using CPTED Strategies and Safety Audit Assessment Model (Case Study: Mellat Park of Zanjan)**

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### **Expanded Abstract**

#### **Introduction**

Paying attention to the concept of security for citizens and its promotion has become one of the main priorities of the urban theorists, managers, and planners. Apart from its social and cultural effects on the patterns of citizenship behavior and improvement of the environmental quality of habitation areas, it is important to explain the features and its associated effects on the physical role of cities in reduction of urban crime and offenses and lowering crime occurrences. This is described in new urbanism theories. Moreover, numerous studies have proved that by changing environmental conditions and proper space designing, the rate of special crime will reduce and on the other hand, it will increase safety level of the society. Nowadays, crime and violence are regarded as a part of public life which can lead to increased rates of crime and social problems and create significant problems for the cities. Due to these problems which mostly occur in man-made and physical environments of urban areas, implementation of proper urban planning and designing approach related to security and safety seems quite necessary. The concept of crime prevention through environmental design (CPTED) for such urban environment plays a crucial role in lessening the crime and violence. Taking advantage of CPTED environmental design, crime preventive strategies have become a branch of mechanical approaches used in prevention of crime. This emphasizes on the idea affecting the situational factors is much easier than changing it and fighting against human weaknesses and reforming criminals' personalities. Hence, the perfect solution for crime prevention is limiting criminal opportunities.

Urban use with public performance has the highest rate of users in parks and recreational centers. In other words, existence of parks among all classes of society is felt. It also has a privileged social position and its presence is valuable for all social classes, especially the low-income strata of society. Due to its high levels of users, the Mellat Park has become one of the most important recreational sites in the city. It has a better position relative to other parks of the city. Therefore, analysis and assessment of the safety level of the park is noteworthy. The main objective of this study is to identify the sites with low urban safety levels, especially those located in vulnerable places (children and women). The evaluation and implementation of CPTED strategies, discussed within the study, are along with safety assessment methodology as a new approach in evaluation and analysis of the rates of urban safety uses.

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## Methodology

This applied study has a descriptive- analytical method. Data collection was carried out by using two ways: documentary and field survey. In order to gather data and according to CPTED strategy and safety audit model, a questionnaire was prepared and the field survey of the research scope was prepared. In addition, to assess the lighting situation and safety level of the study area, the graphic statistical analysis software (Arc GIS, Excel) were used.

## Results and Discussion

According to field observations, most lightings installed in the park are 400-watt sodium vapor lamps with a 47,000 lumen luminous flux and the brightness on its side streets (the connecting park roads are considered as side streets) is 10 lux (equivalent to 8 m). Due to the height of power poles in the park, this size is not fixed. According to the brightness calculations of lighting for lampposts hung, a range of about 8 and 15 meters is considered as bright and semi-bright, respectively. For round lampposts also the rates of 5 and 12 m are considered. Finally, for 4 projectors available in the park, 20 m on the bright and semi-bright cases is taken into account. However, these rates are in accordance with the standard lighting calculations. Based on these rates of available light poles and light exposure within the park assessed by Arc GIS software, it is indicated that the absolute darkness of the park area at night is more than 70%. According to the results of safety assessment and inspection of the site, it was realized that most lightning equipment of the park is from type B located on the sides of the connecting roads. The lights of type B are located just in two part of the park including within a large swimming pool and the entertainment park area. Thus, more than 80% of the park equipment is designed so inappropriately that they were contrary to the principles and strategies of crime prevention.

## Conclusion

According to the studies conducted in the field of crime prevention, both foreign and domestic researches clearly represent the importance and usefulness of this approach in the field of prevention of crime and crime occurrence in all urban areas. The results of this analysis on this park indicate that it is very weak in terms of security. The results of the evaluation model of the Mellat Park in Zanjan show the inappropriate lighting and lighting equipment status in the site. Moreover, all lighting equipment is installed along the connecting paths so that the central areas of the park are left in darkness. This is due to the poor lightning design and lack of proper lampposts and lamps in the park. Therefore, it seems necessary to have re-examination of its lighting and the resulting security problems of the park.

**Keywords:** CPTED, lighting, Mellat Park, safety audit, Zanjan.

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## Simulation of Future Land Use Changes Based on an Ecological Optimal Pattern in Mashhad Metropolitan Area

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### Extended Abstract

#### Introduction

In the years before industrial revolution in Europe, cities had mono-centric characteristic. After industrial revolution, cities changed and transformed from mono-centric configuration into poly-centric structure. At this moment theoretical concerns about cities had emerged. During 1920s and 1950s various theories came into the scene, describing cities as static entities. In 1960s and 1970s some cities in northern America gradually experienced a different growth and new dynamic states. After that in 1980s and 1990s, by appearing the new form of physical growth of cities, new problems and challenges had come into existence. Urban sprawl is one of the most important problems nowadays in metropolitan areas. It seems that the core of urban planning is land-use. There are lots of strategies and solutions for this problem. One of the solutions is ecological land-use strategy. There are also lots of descriptive and prescriptive models in this field, intelligent models such as CA, ANN etc.

Mashhad Metropolitan area with more than 3000000 populations is in terms of extent the second metropolitan area in Iran. This area because of its significant border situation plays an important role in national development of the whole country. This significant role is why it should be considered as the pole of national-regional development. The area has solely more than 75 percent of the population of Mashhad as well as about 90 percent of the added value of that region. The explanatory indices used in this area indicate an intensified imbalance and centralization of capital and power in the area. The logical consequence of this imbalance have led to urban sprawl and increasing accumulation of capital and power. This sprawl have had several consequences such as demolition of green and agriculture lands, land speculation, increasing environmental pollutions, ecological damages and mismatch of the developed land with the natural potentials of those lands. Thus, it is necessary to have an ecological criterion for judgment of the urban and rural settlements in the area.

#### Methodology

This study is carried out in two parts. In the first part, an optimal land use pattern based on ecological principals will be formulated. In the second part, the output of the formulated results of the first part will be used as spatial criteria in order to simulate future land use changes based

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on the ecological output. To do so, a CA model will be associated with ANN algorithm. For this purpose, we'll draw three different growth scenarios for 2026:

1. The objective of this part is initially by virtue of theoretical studies and fieldwork to identify appropriate ecological indices for urban and rural development; secondly an optimal land-use pattern will be produced by using AHP model based on each of aforementioned indices. Finally, by overlying all those patterns the final optimal land-use pattern will be generated.

2. In the second part, by using aerial photos of the years 1996 and 2011, we will identify the land use changes. In the next stage, the ecological layers produced in the first part will enter into the model and will be used as spatial variable. By using cellular automata and artificial neural network algorithm three growth scenarios will be simulated.

Brief explanation of the function of the model is as follow: (1) production of land use/ cover layers for the years 1996 and 2011; (2) use of ecological pattern as spatial variable and a direction for simulation for the two first scenarios in the one hand, and use of Euclidean distance from important settlements and major roads for the third scenario on the other hand; (3) creation of land use change matrix; (4) modeling of future changes potential; and (5) simulation of land use change for the year 2026 for each scenarios, i.e., radical ecological growth scenario, mild ecological growth and uncontrolled growth.

### Results and Discussion

The results of the ecological pattern show that there are ten deciles. As we move from early deciles to tenth deciles we find more appropriate sites for development. The tenth decile is the existing settlements in the area. One of the results of this study is that the best and the ideal way of developing are infill development and maximum use of the existing developed lands. However, the first till fourth deciles are extremely bad sites for development. The fifth and sixth ones are not well enough but more appropriate compared with the former ones. The seventh and eighth are fairly appropriate.

In the second part, based on the ecological pattern and Euclidean distances of roads and settlements three scenarios will be simulated for 2026. In the first scenario, the amount of built areas is at the lowest, and is equal to 659 km<sup>2</sup>. In the second scenario, 735 km<sup>2</sup> will be developed and according to this scenario parts of agriculture lands will be degraded. In the third scenario, 775 km<sup>2</sup> will be developed which is in opposition to optimal ecological pattern.

### Conclusion

The study draws three growth scenarios for 2026. The first one was a radical ecological growth based on the ninth and tenth deciles of the ecological pattern. The second one was a mild ecological growth based on the seventh till tenth deciles of the ecological pattern. Finally, the third scenario was an uncontrolled growth. The results show that the first scenario will retain the most portions of the green lands and is an endogenous growth. The second scenario is a mild one. Although it permits certain parts of green lands to be degraded, it is an acceptable model. In this scenario, some major nodes and some secondary ones will be presented. The third scenario (business as usual) is uncontrolled growth that will ruin lots of green lands. This can be concluded that continuation of the existing growth will lead to irreparable consequences in the area. Environmental crises such as water crisis, air pollution and pressure on infrastructure will lead to human crises like riots, crimes and vandalism. Thus, it is necessary that planning system consider reasonable growth.

**Keywords:** artificial neural network, cellular automata, optimal pattern, sustainable development.

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## Land-use suitability analysis of Tabriz City Growth with AHP-OWA model

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### Extended Abstract

#### Introduction

Changes in land use will also cause changes in environmental conditions. In 2007, for the first time in human history, the world's urban population exceeded from rural population. Now world's urban population is growing faster than the world's population and more than half the world's population (54% in 2014) lives in urban areas. Most of this growth occurred in developing countries and in these countries the growth of urban settlements is five times of the developed countries. Intense migration of rural population to the cities and the rapid growth of urban population caused uncontrolled physical expansion of urban around the world. Therefore, to mitigate the effects of urban growth, it is essential to manage the population to the optimum areas. To determine appropriate areas for urban growth is among the useful solutions in this field. For this purpose, land-use suitability analysis is applied. Land-use suitability analysis is a very important work to city planners and managers to determine the most appropriate spatial pattern for future land use. Tabriz city in the recent decades has high population growth and uncontrolled migration. Also, by increase in use of cars and high consumer culture, a lot of land around the city has been under urban growth. The area of city in 1982 was 7220 hectares while in 2009 this value increased to 22,346 hectare. Indeed, during the past 27 years the city has experienced growth more than 3 times. The city population in 1984 was about 957 thousand and it reached to 1,336 thousand in 2011. Indeed, during the past 27 years the city's population increased only 1.3 times. Therefore, the urban growth conduction and land-use suitability is essential for decrease of social, economic and environmental adverse effects. One of the effective methods for land-use suitability analysis is multi-criteria evaluation (MCE). Ordered Weighted Averaging (OWA) as a MCE method has capability of risk taking/ risk averse and trade off relations.

#### Methodology

In this research, we used ENVI4.7 software for the processing of UTM+ landsat image of Tabriz city. The image classification was the maximum likelihood supervised and the rate of overall accuracy and Kappa coefficient is 97.61 and 0.96, respectively. Then, the data entered into IDRISI Selva software and constraint and factor maps were created. Constraint maps were urban and industrial lands and water levels with 50 meter buffer. Factor maps were land-use

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capabilities for urban development map, distance from urban, roads, industries, water, agricultural, barren and fault lands, elevation, slope and aspect. Factor maps were used in processing stage and standardized with FUZZY operators. Finally, factor maps with AHP method are weighted. Then, for assessing compensation rates of factor maps and control of risk taking/averse we used OWA. Suitable regions for future development of Tabriz city is created by the analysis.

### Results and Discussion

To make AHP-OWA model operational in assigning suitable areas for urban growth, all criteria are combined and weighted. Constraint or Boolean maps as a mask or cover have two values of 0 and 1. Indeed, the regions as constraint with zero value are not calculated in processing and only those pixels with one value are included in the analysis. All factor maps were reclassified with values ranged 0- 255, that pixels are zero or close to zero. They have very low potential for urban development and those pixels with 255 or close to that have very high potential to urban development. The criteria are from different types and reclassified after the standardization. For example, in the factor map of distance from urban lands with contiguity to urban lands the potential of lands for urban development are very high, while in the factor map of distance from fault this relation is unlike. After standardization, the factor maps were weighted with AHP model. Preferences and priorities of the factor maps by pairwise comparison matrix are based on prior theoretical researches in the land-use suitability analysis. In this research, the great importance of factor maps is given to distance from urban lands, distance from fault and distance from roads. Also, factor maps of elevation, slope and land-use capabilities are in the next place with lower importance relative to the factor maps of distance from urban lands, distance from fault and distance from roads. The consistency ratio is 0.03 that was in the acceptable range. This shows that the weighing of factor maps is accurate. After weighting the factor maps by AHP model, the third set of weighting is given by OWA model. This weighting gives us possibility of control level of trade off relations and also risk level between factors. Weighting are established in triangular spatial decision making. OWA method operates in this decision making space and allow us to survey different strategies or decision scenarios and even inconsistent. Weighting in OWA model applied on a pixel by pixel basis to factor scores as determined by their rank ordering across factors at each location (pixel). In order to perform a weighting by AHP, we have 11 order weights. Order weight 1 is assigned to the lowest ranked factor for that pixel (i.e., the factor with the lowest score), order weight 2 to the next higher ranked factor for that pixel, and so forth. Thus, it is possible that a single order weight could be applied to the pixels from any of the various factors depending upon their relative rank order. Finally, land-use suitability for urban development is produced and output map is displayed in 0 – 255 range.

### Conclusion

Rapid increase in population growth in recent decades in Iran caused the urban sprawl. The Iranian cities settled in proximity of rivers and favorable regions surrounded by agricultural lands. Then, urban growth by the recent decades converted these agricultural lands to urban areas. Tabriz city in the recent decades has rapid growth. This growth often occurred in high slope areas, proximity to Tabriz fault and in agricultural lands. Therefore, it is essential to use efficient ways to find the suitable lands for urban growth. The AHP-OWA model can be efficient method for this type of analysis.

**Keywords:** AHP-OWA model, multi-criteria evaluation, Tabriz City, Urban land Suitability Analysis.



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## **Analysis of the Feedback of Natural Environment in the Development of Galehdar City**

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### **Expanded Abstract**

#### **Introduction**

Location of any human settlement is influenced by environmental factors, especially morphology and topography of the ground on which the settlement is formed. This makes it necessary to consider the morphology in site selection of urban land application. Identifying the status quo and problems of the city and prediction of its future changes involves recognition of these factors, forces and their mechanism of action. Different centers of the city during various periods and dynamics of physical expansion of Galhedar and the spatial arrangement of the neighborhoods (sprawled expansion) and fabric expansion of the city indicate that temporary urban rivers have a direct effect on the configuration, development and spatial structure of Galhedar. Reciprocal function of the two subsystems including physical basin and human subsystem of the urban area in the past have gone parallel with balance in subsystems and dynamism of hydro geomorphology of the city and its control. However, currently with rapid expansion of urban space with physical geomorphology and hydrology (climate), the system moves toward imbalance.

#### **Methodology**

The aim of this present research is to investigate the physical environment of temporary urban rivers (hydro geomorphology) and its processes and their impact on fabric-physical development of Galhedar city. In order to improve the spatial and fabric structure of the city and use of a descriptive-analytical method based on documents-library resources and several field observations, this research investigates the effects on the sustainable development of the city to eliminate obstacles on the way of its development.

#### **Results and Discussion**

Morphology of Galhedar represents the fabric of the city and the reasons of its configuration, fabric development, continuity and changes in the development trend and planning for the future of the city. In a systemic intra-city investigation, since the city centers are formed in various periods, a different picture of the city is painted in its development, structure and fabric.

The historic monument of "Tomb Padu" represents the history and the initial development of Galhedar city (settlement). The early and historic center (the offset point of the settlement/village) is located within the present area of Galhedar city (during Achaemenid to

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Sasanian periods). Given the present depth and direct linear path of Horu River, it seems that overflow of the river or an earthquake might have caused desolation, displacement and transformation of the early center and formation of the second center (old texture) symmetrically on the west part of Horu River (rebuilding of the city in the Jews neighborhood).

Formation of human settlement in Galheddar had slow growth in the stage of connection to the Jews center (second center/old texture) and the third center during Molla Fereydun Khan (middle texture). The new center (Safavid era) was completed after the second center.

Several centers have been formed separately and symmetrically from east to west in different eras and the old center is left desolate. Temporary rivers have been effective in site-selection of various centers of the city as well as in physical-spatial distribution and status of centers and their fabric formation. Thus, the location and spatial structure of the city reflects its environmental conditions. Therefore, topographic (location) and geographic conditions (status) as well as fabric changes of the city (the present and future conditions of the city) and physical fabric changes in the city during Islamic Republic era have caused a semi-sprawled and grid-plan pattern in the structure of Galheddar City.

Following the environmental conditions (geomorphology), the texture of Galheddar City and its houses are compact in the old section (second and third centers); on the other hand, the new texture is formed based on particular order and geometrical texture of the dominant environmental conditions. In addition to compact and irregular morphology contrast in the old section and disintegrated regular morphology in the newly-built sections of the city, this trend can be seen in the spatial dispersion of the structure and appearance. The most important factor affecting the morphology is its location infrastructure and site. In fact, natural elements have been effective in the structure, texture and formation (development trend) of the city.

In terms of urban spatial growth, the morphology (plan) of Galheddar city has followed continuity and sequence. Accordingly, the spatial structure of the city has been based on environmentalism and the historical background of the city has affected the spatial system, disparity of urban areas and the inner system of the city. Therefore, the structure of Galheddar is affected by its physical location and its disintegrated fabric and texture is formed by temporary rivers.

## Conclusion

The particular location of Galheddar city and its morphology (site and urban texture) shows that its location next to a river and in a plain has caused the spatial structure of the city to be based on a "purposeful order in the structure and fabric of the city in connection to the natural environment" and in contrast a "complex irregularity in the fabric and structure of the city texture".

Analysis of the variables of physical environment, artificial environment and their effects on the structure, type, morphology, and the shape of the city (unity of the natural environment and the city) indicated that morphology of the city is based on the natural environment of 3 linear rivers and the form of communicative network inside the city. This is in its old and early sections consistent with the structure of natural environment of the city and its surrounding i.e., similar to the ancillary network and its connection with the main river in watershed.

The results have also explained the reciprocal relationship between human-made environment (physical environment and the structure of the city) and the natural environment (rivers of the city) as well as the correlation between the two in terms of time and space in the location of the city.

Overflow periods of Ghale and Horu rivers and their discharge have a relationship with settlement expansion in Galheddar city (the hydrologic effects between construction and urban development). The hydrology of the region is effective on the formation of center sites, their deterioration and spatial dispersion. In fact, city centers and consequent urban development of the city indicate the role of hydrology in historical civilizations of the region.

**Keywords:** Galheddar City, hydro geomorphology, physical development, rivers of city, sustainable urban development.

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