

***Investigating the Capacity of Upgrading the urban density by analyzing the spatial distribution using multivariate decision-making techniques (A case study of Urumia city)***

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*Received:03/03/2019 Accepted:21/10/2019*

**Abstract**

Density as one of the dimensions of city construction is an important factor in understanding how the city works and changes. in the case of the study.the city of urmia has been developing a large horizontal expansion in the recent decades. The purpose of this research is to evaluate the process of change in the types of densities in Urmia city and level of implementation of detailed plan in the field of building density. in this regard, at first, the status of different urban densities in different periods and the degree of fulfillment of a detailed plan was analyzed and Then, with the introduction of effective indicators on determination of real building density, city land capacity was determined and modeled with the Multi-Criteria Evaluation and in GIS. the density indicators in the city are distributed as unbalanced in the urban regions and 78% of the building densities predicted by the detailed plan were not realized. the result of modeling the capacity of building density Suggests unused to 68 % of the city's land capacity and The distance is far to favorable conditions, especially in regions 2,3 and 5of the city. Comparison of the results of the research model with the existing condition of building density in Urmia Suggests The movement of the density profile from higher than the density in the central and middle regions of the city towards the medium and lower density in the city's margins and creates a pyramid mode in the city.

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**Introduction**

one of the components of city construction is density, determination of urban density is unplanned and often has been summarized in personal desires needs and or financial ability of the applicants and manufacturers but the emergence of new problems such as land limitation and population growth has become a new topic in urbanism, the requirement of building density is to have the capacity to accept infrastructure and other economic ,social and cultural potential .of the urmia city has a history of carrying out three Master plans (in 1976,1989, 2009) and two detailed plan(in years1978 , 1994).this study evaluates the density of the city and identify the factors affecting the determination of real building density , potential and density loading capacity of urmia city by using Multi-Criteria Evaluation and gis are modeled

**Materials and Methods**

this research is based on the purpose of the kind of applied research and according to the method of work ,it is of descriptive - analytical nature .the statistical population of this research is urmia city and Extractad with gathering information through library studies, The results of official census data ,Urban development plans and maps of the existing situation and .Their process of change was analysed and after determining the indices of the determination of building density and Compilation of required data And complete the questionnaire,weighting and standardization of indicators based on multi - criteria Evaluation models and used by gis , Expert Choice 11 software in order to determine the loading capacity of the Building Density of the urmia city and its zoning.the final stage of this zoning is compared with the existing situation zones of the city and the difference of loads is specified

**Results and Discussion**

the study of the status of urban indices has been studied from ۱۹۷۶ to ۲۰۱۶ and in terms of the needs of the research .In these years ,the city's population has always been with a positive growth rate .So that over the course of ۴۰ years of the city population has grown ۴.۰times and It has a total area of ۷۷۰۰۰,۷and the population density has increased from ۱۱۳ to ۶۰ per in hectare. This rate indicates that the growth of the city area is far more than population growth .It shows that the city has grown almost twice as many as the population increase.the population density of the urmia city has fallen from ۱۱۴ to ۶۰ in ha to ۶۰ per hectare. that indicates horizontal expansion. The sheer population density has also risen from ۳۶۴ to ۲۶۰ people. It represents a decline in population per unit area of residential infrastructure .The level of the structure is falling down until,۱۹۹۶ But since then ,the trend is increasing.The motion represents the compression towards the compression.Residential housing density ,from % ۶۳ in ,۱۹۸۶ reached 95.5

in 2016 and the average number of classes comes from 1.5 to 1.6, But the average area of a residential block with a decrease of the area from 23 to 20 square meters. in the present situation, the average number of classes in urmia city is About 1/6 floor and the average level coefficient is 58033 % and the average Building density is .% 96 / 25.

By examining the feasibility of the 1994 detailed plan, all the different densities of building, in 2014, There are only % 0 of the very low Density ranges % 44, of the average density range % 10, of medium density and less than % 1 of the density range and about % 2 of the apartment density limit, and in general, only % 22 of the density prediction has been achieved in order to achieve optimal urban density indexes 13, indices are considered in three categories of service - social, physical, environmental, and with analysis of 2 distributed questionnaires, the mean correlation coefficient of indicators is 0.8 and the standard deviation of indicators is less than 0.1, which indicates that their extracted weight is correct.

The results of the research show that 2% the city's area on the capacity of a very low building density capacity, 21% of city on average capacity, 31% on average capacity, 30% of city area on high capacity and 16 % of city area in the capacity of building density is very high. Whereas, in the existing case, 37% of Uploads in very low building density, % 04 on low density, % 4, in average density, % 1 in high density % 1, density is too high. the great distance to the desired state. In zones 3, 2 and 0 are more evident

### **Conclusions**

Study of physical indices associated with urban density indicates the horizontal expansion of urmia city and the short growth of its building density, and only 22 % of the proposals detailed plan have been made. comparing the existing conditions and the research model indicates that 68 % of the city's land capacity is idle. the results of the research model led to the movement of the density and gradient profile of the city to moderate and lower density of the city to moderate and lower density in the city margins, and the density of these areas in the city and the lower density of structures in the southern and western margins of the city is relative to the local land and maintenance of the city's pyramid state the results of the research model led to the movement of the density and gradient profile of the city from increasing density in central and middle regions of the city to the middle and lower density on the outskirts of the city and the Slope of city density in a mild and sensible way and expresses the proportion of these areas across the city, and the rational state of the altitude, Less density of structures on the southern and western margins of the city relative to domestic landpreserving the city's pyramid state

**Keywords:** buildings density, Multi-Criteria Evaluation Model, Geographic Information System, Urmia City

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