Analysis of Multi Polarization Process of Spatial Structure and Urban Functions (Case Study; Sanandaj City)

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Extended abstract

Introduction
In the urban system of developing countries, due to differences in the political, social and economic structure of these countries, there are unbalanced and unequal spatial distribution of population and urban activities and services. In Iran, the phenomenon of inequality in the distribution of urban resources and facilities has been shaped by the escalation of false urbanization along with the socio-political and economic developments. Today, in urban planning system, it was attempted to avoid interferences in land uses and also availability of these services in each region to mitigate centralization and aggregation pattern in certain regions.

In Sanandaj, relatively high aggregation of administrative, political, and economic, and service organizations resulted in high population and consequently incidence of spatial effects such as inappropriate physical growth of the city and increased illegal settlement in some parts of the city. This also made spatial distribution of urban land uses in the city unbalanced. In these cases, urban development plans are organized for the land use system to determine the activities and segregate land uses and functional zoning based on traditional, physical, and deterministic approach.

Main purpose of this paper is to evaluate and study the polarization process of urban land uses in order to specialize functions and systematic spatial development of urban activities in accordance with different socio-spatial structures between different regions and urban areas based on the suggestions of urban development plans.

Methodology
This research has a descriptive-analytic methodology. The method is used to carry out an applied research in order to explore relations between variables and phenomena and also to

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solve existing problems in spatial and physical development of Sanandaj. We assessed land uses aggregation in Sanandaj by using formal data and statistics and also apply statistical methods and LQ. At this stage, we use statistical methods and spatial coefficient model to analyze data as well as we used ArcView and ArcGIS software to draw up the required maps.

Results and discussion

We have used Shannon entropy model to analyze the spatial distribution pattern of land use in Sanandaj city. Based on the calculations, Shannon's entropy coefficient has been changed from -1.511 to -1.569, for commercial uses. This indicates a relative increase in Shannon and shows spiral and diffused development of this activity. Significant changes have occurred in academic services and an increase in coefficient Shannon from -0.843 to -1.208 indicates that it does not tend to be aggregate and centralized. The Shannon entropy for medical uses decreased from -1.420 to -1.165, that indicates an intense and centralization in this function at some regions of Sanandaj.

Regarding workshop industries, results show that the Shannon entropy coefficient for these activities has increased from -1.180 to zero, indicating a high centralization and aggregation of these functions. The LQ index or spatial portion is one of the models that illustrate the spatial distribution of urban utilities and their degree of specialization and polarization. According to the results, the workshops and medical uses have the highest aggregation in region 1 of Sanandaj, and in the region 2, military and tourism uses are high aggregated, as well as facilities and equipment and academic and profession services; have the highest level of aggregation and centralization in region 3.

According to the results of LQ range, industrial and workshops uses academic services, urban facilities, equipment and healthcare in 2004, with LQ values were 0.09-2.80, 0.10-2.61, 1.77-2.61 and 0-2.45 as the highest amount of specialization or centralization among other activities. The general education, governmental, police and residential uses have the lowest values, respectively, with 0.83-1.06, 0.50-1.23 and 0.61-1.37. According to the Sanandaj General Master Plan, which prepared by Tadbir Shahr consulting Co. in 2005, industrial and workshop uses, transportation and depots, healthcare, exhibition and shopping centers have LQ values of 0-7.55, 0-6.15, 1.46-4.35, and 0-3.10, respectively, as the highest centralization in 2015. In case of realization uses, the public education, residential, governmental, and police uses will have the lowest centralization values, respectively, by 0.88-1.23, 0.58- 1.32 and 0.44-1.34.

Conclusion

In general, comparing the proposed land use pattern in the development plan (comprehensive) of Sanandaj with the current pattern of urban land use shows the tendency to polarization of urban functions. Transfer of military, industrial, transportation and depots uses from different parts of the city to the suburbs and even outside the city can be observed with ecological separation of lower classes of society on the northern and eastern suburbs versus the residence of middle and high class people in modern buildings mainly in the southern parts of the city. The tendency to move governmental, police center, municipal facilities, shopping centers, and exhibitions from downtown to the streets around the city can provide similarities between urban ecological and morphological structures. Formation of new cores such as university centers, Kurdistan universities, medical sciences and Teacher Training, service centers such as terminals, and military centers into the urban area, all indicate the similarity of Sanandaj spatial structure with the multi-core model of Haris and Ulman.

Keywords: Spatial development, polarization, Shannon entropy, LQ coefficient, Sanandaj city.