Analysis of Spatial Structure of Population in the Central City-Region of Mazandaran in 1986-2011

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Extended Abstract

Introduction

Spatial structure of city regions has a dynamic nature. These regions over time are faced with many developments and transformations at different spatial levels. They are also affected by the exclusive condition of social, economic, and natural processes and mechanisms. In recent decades, most urban regions around the world are undergoing various processes of population such as urbanization, suburbanization, counter urbanization and re-urbanization. In the different cases, population changes are always influenced by centripetal and centrifugal forces. These forces make changes in the spatial structure of urban regions characterized by the pattern of mono-centric with a strong center. According to a polycentric structure, the peripheral centers are emerged. The analysis of population spatial structure has been carried in the numerous studies such as Modelling Urban Population Densities in Beijing 1982-90: Suburbanization and its Causes; The Spatial Restructuring of Population in Metropolitan Beijing; Suburbanization and Subcentering of Population in Beijing: Metropolitan Area: A Nonparametric Analysis ; and Population suburbanization in Barcelona, 1991–2005: Is its spatial structure changing?. Hence, the identification of population changes in the metropolitan regions is necessary to understand the spatial structure of changes during different time periods.

The aim of this article is to determine whether population distribution is occurring in Central Region of Mazandaran from 1986 and 2011 and how it is organized spatially. This issue is examined through an analysis of the spatial structure of the population of this region and its evolution in the period. In other words, the ultimate aim is to determine population changes associated with the spatial structure changes. Which spatial structure is more consistent with these developments? Recently, Mazandaran province is faced with population changes. According to the 1986 census, it had a population of 2274862 million and it increased to 3073943 million in 2011. The interesting point is that 70 percent of the population are concentrated in its central region. The significant polarization shows that regional spatial structure is emerging Polycentricity phenomenon, with population centers distribution of relatively similar and same-size. Therefore, this paper has analyzed population changes in Mazandaran central region and its impact on the development of spatial structure, during 1986 to 2011.

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Methodology

This research has an analogical paradigm. Central city-region of Mazandaran is selected as case study. This study investigates the spatial structure of population in the region. The census data produced by statistical center of Iran in 1985, 1996, 2006 and 2011 have been analysed by descriptive-analytical method. These data have been collected at the district level, rural and urban centers. District is the most suitable geographic unit for spatial analysis (especially population distribution in metropolitan areas) to consider rural settlements and urban-village.

In the first part of the data analysis, evaluation of population concentration and its evolution have been analyzed in Excel software for the calculation of Hoover, Herfindahl index and Concentration Ratio. Then, to assess population spatial structure in terms of morphological polycentricity, we have used GIS statistical analysis tools (Mean nearest neighborhood and Hot spots analysis) and rank-size model.

Results and discussions

To identify overall trends of population dispersion or concentration, we have used Herfindahl and Hoover and Concentration Ratio for concentration indicators. The findings of Hoover and Herfindahl indices show the concentration population trend 1986 and 2011. According to the spatial patterns of concentration ratio, we can say that the population distribution in 1986 is compared with 1996, a relative balance. Some population centers in the southern part of the region had a relatively high concentration. Since 1996, the concentration in the southern part of the region is greatly reduced, while it is increased in the plain and its central area. The previous trend is continued in 2006 and 2011. The results of the spatial pattern analysis of concentration suggest that the large urban centers are considered as gravity centers of population. According to the existence of four cities with relatively similar and same-size, this pattern is significant in population distribution.

This part of the research investigates the spatial structure analysis resulted from the population distribution and the existence of the polycentricity, by morphological indicators such as size and distribution of settlements. To evaluate the settlement distribution, we have employed the analysis of mean nearest neighborhood. This is calculated equal to 0.714. This indicates that population centers (both rural and urban) are organized as the cluster spatial pattern in regional level. Next, in order to display the cluster spatial pattern, we have used hot spots analysis and Getis Ord-G index. The rank-size model has been used to measure the size of settlements (for the cities more than 5,000).

The findings of morphological indicators showed that Sari, Amol, Babol and Ghaemshahr cities has retained its position as a major regional center with a relative balance between these centers. In other words, dominance of four cities with settlements of relatively same size around them demonstrates formation of Polycentricity structure.

Conclusion

The results of the research suggested that spatial developments trend of population in the region has tended to concentrate on four major cities. In other words, spatial pattern of population in Mazandaran central region has formed relatively strong polycentricity by dominant cities like Sari, Amol, Babol and Ghaemshahr. Finally, the results are consistent with a polycentric structure. However, this spatial structure is strengthening because the population is concentrating more on the central cities. Thus, to achieve balanced spatial development in the region, regional planning and policy making are necessary to achieve distribution of population in the city-region of Mazandaran.

For further study, population spatial structure can be analyzed in this region and the metropolitan areas of the country using the data of migration flows by newer and more complex methods.

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