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## A study of the obstacles to the perform of a smart city in the metropolis of Ahvaz from the perspective of chaos theory

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Research Article

### Extended Abstract

**Objective:** In the against of many problems caused by uncontrolled urbanization; And the need to change low-productivity trends in the past; Smart city has been introduced as the axis of millennium development and means the opening of new concepts in urban planning, using the capabilities of information and communication technology that combines the capabilities of real and virtual world to solve urban problems. At the same time, the explanation of the city and its problems from the perspective of the theory of complexity and chaos, as a new paradigm, is emerging in world research. In Iran, as well as in the city under study of this research, the smart city has recently been proposed as a healing prescription for the therapy of cities facing many problems caused by unbridled urbanization and unprofitable trends of the past. In this regard, the metropolis of Ahvaz, the administrative-political center of the border, oil-rich and industrial province of Khuzestan and the largest city in the southwest of the country, also in a country with a centralized military, oil-based and center-based peripheral, in a bed of The complex oil-based political economy has expanded; In such an arena, there is no room for doubt; Which is basically a complex metropolis of Ahvaz; In particular, this metropolis, from a social point of view and from the point of view of the social geography of the city, has the special characteristics of the various ethnic groups that exist in this regard; is; This fact should be paid special attention in the process of smartening this metropolis. In other words, considering the special features and complexities of this metropolis - which was mentioned as the most important - it is necessary to make the intelligence of this metropolis from the perspective of the new idea of complexity and in this context, the theory of chaos. But the problem is that the activities that have been done so far in order to make the metropolis of Ahvaz smarter; It is often done in technical terms and with a simplistic and reductionist view; Therefore, these activities - often - in practice, have not led to success. Evidence that the environmental conditions of Ahvaz metropolis are not suitable for achieving sustainable development and this metropolis is facing problems such as dust, water, sewage, governance, unemployment, etc .; Problems that have been interpreted as super-challenges. In such a situation, the present study due to the importance of the subject, following the idea of complexity; In order to answer the following questions and analyze the obstacles to the realization of a smart city in the metropolis of Ahvaz from the perspective of the criteria of chaos theory; And in fact a better understanding of the current complex conditions of this metropolis with the prospect of becoming a smart city, in the framework of the new theory of chaos; As a result, he provided research solutions: 1) According to the current situation of Ahvaz metropolis; And with the prospect of turning Ahvaz into a smart city, does the theory of chaos

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prevail in this metropolis? And 2) Is the rule of chaos theory an obstacle to the realization of a smart city in the metropolis of Ahvaz? In general, so far, the practical use of chaos theory in order to achieve smart cities and the planning of such cities has been done only in an institutional framework and governance, in a limited way, and in fact there have been references to it. In Iran and in the study area, no research with the above characteristics has been conducted so far. Therefore, the innovation of this research is to pay attention to the complexity in the realization of smart cities and the relationship between the criteria of chaos theory and dynamism in the complex context of Ahvaz metropolis in order to achieve the smart city.

**Methods:** This research is applied in terms of purpose and descriptive-analytical in terms of method. In order to collect descriptive data, library and documentary studies were used and to collect analytical data, survey method and questionnaire tools were used. The data collection tool in the survey section is a researcher-made electronic questionnaire that was set based on a five-point Likert scale from a very low option with a score of 1 to a very high option with a score of 5, which was provided to the respondents via the Internet. The final content validity of the questionnaire was finally confirmed by the professors after modifications and Cronbach's alpha coefficient of 0.80 for the whole questionnaire showed the desirability and acceptability of the reliability of the questionnaire. The statistical population of the research, consists of employee who work in management, planning and implementation institutions in relation to the city of Ahvaz in this metropolis. The sampling method was a combination of cluster and networked snowball sampling methods; Finally, 380 questionnaires were received; Therefore, the sample number of this research is 380 cases of Executive staff of offices, institutions, organizations and companies involved in the process of smartening the city; Includes Khuzestan Governor's Office, Ahvaz Municipality, Ahvaz Road and Urban Development Department, Ahvaz Telecommunication Company, Engineering System Organization, Architecture and Urban Planning and Information and Communication Technology Consulting Companies in Ahvaz Metropolis; In order to analyze the data, mean statistical tests, one-sample t-test and Friedman ranking were used using SPSS software. Ahvaz metropolis with an area of approximately 220 square kilometers (the fourth largest city in the country and the largest city in southwestern Iran) and 18 meters above sea level, in a geographical position of 31 degrees and 13 minutes to 31 degrees and 23 minutes north latitude and 48 degrees and 32 minutes Located up to 48 degrees and 47 minutes east longitude. The population of this city, according to the population and housing census of 1395 is equal to 1184788 people, which is considered as the seventh most populous city in Iran. This city has 8 urban areas, 34 districts and 124 neighborhoods based on the latest divisions is.

**Results:** Based on the research findings, the average of all three components; Of the four components of chaos theory, including the butterfly effect with an average of 4.05 with the highest value; And then the components of unknown fascinators (3.24) and nonlinearity (2.83) are higher than the average Likert scale, respectively. In contrast, the adaptability component with an average of 2.23 is in a lower position than this average. This means that due to the nonlinear components, the butterfly effect and the unknown attractants; Moving from order to chaos, or in other words, moving from stability to instability as an obstacle to the realization of a smart city in the metropolis of Ahvaz has a high power; On the contrary, the balancing element of self-organization - in order to achieve a smart city in the metropolis of Ahvaz - in comparison with this powerful movement; It has lower power. Based on other findings of the research, the result of performing a single sample t-test according to the current conditions of Ahvaz metropolis; And with the prospect of turning Ahvaz into a smart city, the theory of chaos should prevail in this metropolis. The same is true of the aggravating components of chaos. However, based on other findings of the study, in relation to the adaptability modulator component, the result of a one-sample t-test of the status of the adaptability component in the current conditions of Ahvaz metropolis in terms of turning Ahvaz into a smart city is not

appropriate. According to Friedman ranking test, among the four components of the rule of chaos theory in the metropolis of Ahvaz, respectively, the butterfly effect with an average of 43.91 first rank, anonymous fascinators with an average of 41.20 second rank, nonlinear with an average of 45.27. Third place and finally with a long distance, adaptability with an average of 21.21 is in the fourth place.

**Conclusion:** Considering the current situation of Ahvaz metropolis and with the prospect of turning Ahvaz into a smart city, the theory of chaos prevails and is considered an obstacle to the realization of a smart city in this metropolis. In other words, non-linear motion, especially the butterfly effect and unknown fascinators in the metropolis of Ahvaz has a lot of power. This high force causes; That the metropolis of Ahvaz faces instability and turmoil in order to achieve a smart city. But in contrast to the extreme weakness of adaptability, the power of self-organization in this metropolis is low.

**Keywords:** Smart city, theory of complexity, theory of chaos, self-organization, Ahvaz city.

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