فصلنامه مدیریت شهری
(ویژه نامه لاتین)
Urban managment
No.**40** Automn **2015**
119 - 132

Received *23 Sep 2014*; **Accepted** *11 Mar 2015*

Analysis of Spatial Fragmentation in Tehran Metropolis Using ANP (Analytic Network Process)

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Abstract
Nowadays, Spatial and social inequalities are universal and expanding phenomenon. Identification and spatial analysis of social, economic and ecological inequalities in metropolises is one of the essential and basic proceeding for planning and achieving urban sustainable development. The present research method is descriptive-analytical and using 13 sub criteria based on three main criteria of social, economic and environmental analyzes the status of spatial fragmentation among the metropolis Tehran's districts. For this purpose, the criteria and sub- criteria's internal and external dependencies was determined using the Delphi and ANP method in Super Decisions Software and assessed and scored relative to each other. The results of assessing the indicators shows that Tehran metropolis lacks of the physical unity and spatial heterogeneity between the north and south of the city remains as main feature of its spatial structure. It is necessary that the authorities of Tehran urban management to take actions for better understanding of this phenomenon and consequently offer new and efficient solutions for reducing the effects of various impacts of spatial inequality and duality. For this reason, it is essential to rethink the concept of city in terms of social, economic, political, and ecological and sustainability dimensions.

Key words: *spatial fragmentation, urban sustainable development, Analytic network process (ANP) and Tehran metropolis*

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Introduction

The tendency to urbanity and increasing metropolises has become the dominant process in the world especially in developing countries. The speed and rate of urban growth and urbanity in developing countries had been more than other countries . The combination of tendency to inherent centralization of the capitalism system (external factors) and the pre-industrial infrastructural inability in these countries has led to capitalism's intense centralization and has created the exogenous urbanity. (Piran, 1989: 48). Exogenous urbanity in Iran has created with taking into account the oil revenue in pre-industrial society that urbanity causes the rapid and inequalities urbanity (Sarrafi, 2000: 47 and Azimi, 2003: 44). Tehran metropolis has developed very fast under the influence of new world order in recent century which this rapid growth has led to the important development and changes in the spatial formation.

The economic, political, cultural, military, administrative and services centralization in Tehran has provided a wide range of employment opportunities. Simultaneously, activities relative stagnation in other cities of the country and enjoying the better services has accelerated the development. So, the population of Tehran metropolis has increased from 155.000 people in 1907 to 8.154.051 people in 2011. Moreover, the urban area has increased from 24 square kilometers in 1921 to 180 square kilometers in 1966 and 630 square kilometers in 2011 (Amirahmadi, 1990:25, Tehran municipality, 2012: 3). During this period of rapid urbanity growth surpassed on development (Quantity over quality); environmental problems, economic dualism and spatial heterogeneity have been intensified; so, the various problems resulting from the social and spatial fragmentation has threatened the urban sustainability. Therefore, future of this city which has national, regional and global importance is at risk (Marsusi, 2005: 23 and Sarrafi, 2000: 47). Identification and spatial analysis of social, economic and ecological inequalities in metropolises is one of the essential and basic actions for planning and achieving urban sustainable development. In this research, spatial inequality in 22 districts of Tehran metropolis has been analyzed using the various indexes of social, economic, environmental and enjoying the Analytic Network Process model (ANP).

Theoretical Basis

The concept of space and its related meanings have been used and discussed mainly from the second half of the 1960's at first among the geographers and some of the economists (related to the concept of the space) then among other scientific fields. The concept of space in geography has been utilized in two meaning; absolute Space and relative space. Absolute space has objective, specific and natural qualities but the relative space continuously changes at effect of the social and economic demands and technological conditions. Therefore relative space is constrained by the time and location (Shakouei, 1999: 286 and Pourahmad, 2006: 194). Relative understanding of space in absolute space is just a relation between events and their characteristics. Therefore, it depends to time and process or something that an individual or community feels it. In this approach of the space, relative or created space is a conceptual space and community proceeds (madanipour, 1999: 23). From David Harvey point of view, there are relative spaces according to human performances and social processes (Shakouei, 1999: 286).

In urban management and rural areas' encyclopedia, space has been defined as objectivity of role taking and effectiveness of individuals and group of people in location. In other words, the outcome of the interaction among the two socio-economic and natural-ecological forms the space. Then, space could be defined as a kind of social proceeds. As space is formed from related components, then could be accounted as a system (Saeedi, 2008: 614).

From a systemic approach, city is a socio-physical complex system which is composed

of multiple sub-systems. The efficiency and the dynamics of this complex system are dependent on the coordination and equivalence in the inner and outer systemic relationships. On one hand, Variety, multiplicity and diversity of the different elements and dimensions of the city and urban living, on the other hand, decision and policy making factors effective on making the city and directing its development leads a problem in the lack of coordination mechanisms between sectorial and institutional for achieving the unity and integrity Which refers to the scattering and inequality (barkpour and asadi, 2009: 108). Reviewing the various texts about fragmentation reveals that there are two types of large scattering on urban issues (Henton 1991, Edwards 1999, Edwards 1991, Barlow 1997, Lang and Danielson 2001 and bark pour and asadi, 2009):

- Fragmentation in various city aspects and urban living
- Fragmentation in planning and management system

In this research, the first type of fragmentation (spatial and social fragmentation) has been studied. Social fragmentation means existing plurality in social classes which is a historical and expanding issue in cities. The distinction between rich and poor sectors has been the historical reflects of industrial development and wealthy power for purchasing desirable areas with good perspective, better transport, schools and air quality in order to have better life (Edwards, 1991: 349). The chasm process (gap) among the rich and poor in cities after the 1950's, Suburbia intensification and urban sprawl that is another type of spatial fragmentation is shown more in suburban rich areas and urban poor areas. (European Environment Agency, 2006. Ewing et al, 2002). The newest kind of distribution and social differentiation could be seen in formation of wealthy gated communities, this time not only in terms of space but also in terms of physical fence has also been isolated from other urban parts (Lang and Danielson, 1997: 867).

Spatial inequality refers to conditions in which various spatial or geographic units on some variables have different levels (Kanbur and Venables, 2005:2). Spatial heterogeneity reflected in shortage and poverty in lifestyle, health care, good schools, job opportunities, food, transportation, education, adequate housing, security, data and having indicators of piped water services, gas, electricity, etc (Hall & Ulrich, 2000:14).

Spatial inequalities intensified with increasing social inequalities in big cities and spatial inequality reinforces the social inequalities (Skop. 2006:394). In this context, "Tounis mentions to the urban space as the class classifications extent and hostility, Contrasts between capital and labor, arithmetic and self-interest are its characteristics; like George Zimmel that knows the city as center of the social inequalities intensification and class classification". Also, detachable is due to socio-economic inequalities could be affected by government policies and governments could intensify the spatial segregation conditions (Kaplan & Kathleen, 2004: 581). David Harvey also emphasizes on interdependence among the social inequalities and spatial structures (Shakuei, 1999: 141).

The concept of social justice from the late 1960's is used by geographers in urban studies in order to reduce severe inequities, poverty and …. Then, above all, the Radical and Liberal doctrine were affected (Shakuei, 1999:141). Depending on social, geographical and historical conditions meaning of justice is different (Harvey, 2002: 389 and Hataminejad, 2001: 284). In the other hand, Justice is bound to time, place and type of military relations and social structures (Piyeran, 2005:14). It means that everybody achievement is equal to his/her merit or competency. Justice is a proper and equitable action or feature (Hoggart, 1995:174). From Edward Suja point of view, justice has a geographical concept and equitable distribution of resources, services and access them is human basic rights (soja 2010). The liberalism doctrine followers consider the

social justice for more as means of protection the status quo, moral virtue and humanity task. Thus, pay attention to the equitable distribution more than equitable production method is shown in their work limited. While, The radicalism doctrine followers Including Henry Laufer, Manuel Castells, David Harvey and Edward Soja also emphasize to the production and the goods consumption. According to David Harvey, social justice theory is based on interaction of the spatial and social realities. In other words, Socio-economic inequalities of community affect the spatial structure and any changes on it has a direct effect on socio-economic relations and the community income distribution (Harvey 2000: xiv). Therefore, as time and space are inseparable, social and spatial inequalities are interdependent. He believes the private sector logic is in order to maximize the profit and this is the same natural propensity to development of rich neighborhoods more than poor one which intensifies the inequalities of the income distribution (Harvey 1997: 85). Hence, the urban distinct forms due to social, economic and political various processes could be indicative of social justice scale in the city (Hataminejad, 2001: 287). Spatial and social justice are from basic concepts of urban sustainable development. In other words, poverty and inequality reduction and relying on social justice and geographical equality are basic actions on urban sustainable development. The concept of sustainable development in the world literature for the first time in 1987 brought with publication of the Environment World Commission and United Nations Development called Our Common Future. It is a famous report in the name of Brandt Land has defined the sustainable development as follows: "Development which meets the present needs without reducing the ability of future generations to meet their needs" (WCED, 2008:43). Sustainable development has multidimensional concept of economic, social and environmental (Boggia & Cortina, 2010: 2301). Sustainable development Principles are as follows:

- Sustainable development objectives is multifaceted and ecological balance, social justice and economic survival are together and inseparable (Sarafi, 2013: 63).
- In ecological aspect, while development is sustainable that natural resources usage be proportional to their reproduction rate and pollution and waste production be in their absorption capacity and refinement of the ecosystem (etal).
- Also, in social and cultural aspects, development is sustainable that be included the intergenerational justice and basic needs' provision and the vitality culture be promoted with depositary and environment-friendly criteria.

Sustainable social system must be achieved to the equal distribution of resources and facilities equality and social services including health, education, gender equality, political accountability and participation (Mersousi, 2004:20).

- In economic aspects, the development is sustainable in which consumption, distribution and production pattern changed towards localization (Sarrafi, 2013:64). Economic system pays to the maintaining and expanding of the employment opportunities and sufficient income at local level and deal with globalization challenges and Prevents from forming imparity between the different economic sectors.

Research Method

This research is a kind of case study and its method is descriptive-analytic. in order to identify the spatial fragmentation in Tehran metropolis using census statistical data of population and housing in 2011, 3 main criteria and 13 sub-criteria of economic, social and environmental aspects have been introduced. Then, through using ANP model and Delphi method (Based on a survey of 10 experts including college professors and executive officials) for analyzing the sub-criteria have been used from Super Decisions software. After determining the final value of sub-criteria, option evaluation Matrix was formed and

ranking of districts obtained in the status of having indicators. Finally, using the hierarchical clustering method were shown the clustering development degree of the 22 districts of Tehran metropolis in Arc Gis software.

Analysis of research findings

a) Assessing the criteria importance coefficient

Analytic network process is a comprehensive and dynamic method for accurate decision-making which has been introduced by Thomas L. Saaty in 1996. Since, all of the planning issues and problems necessarily have not Analytic hierarchical process (AHP), the major limitation led to provide the Analytic Network Process (ANP) by Tomas, Where the complex relationships (interdependence and feedback) between and among the decision elements be considered through replacing the hierarchical structure with network structure and since, Analytic Network Process is a general and perfect form of the Analytic Hierarchical Process, all the positive features include ; Simplicity, flexibility, using qualitative and quantitative criteria simultaneously, and the ability to evaluate the adaptability and judgment. Also, the complex relationships between and among the decision elements be considered through replacing the network structure with the hierarchical structure (Zebardast, 2010:88). The distinction of this method with hierarchical is in effectiveness and impact of criteria on each other (Saaty, 2004:3). Main and sub criteria have been considered in this research, have interdependence and internal dependent, also, in matters that such an internal interaction between the indicators exists, using the hierarchical analysis in that relation has not been considered and the result is wrong. In this case, network analysis is used. Use of the analytic network process even if doesn't exist inter-relation between the criteria, output of the model does

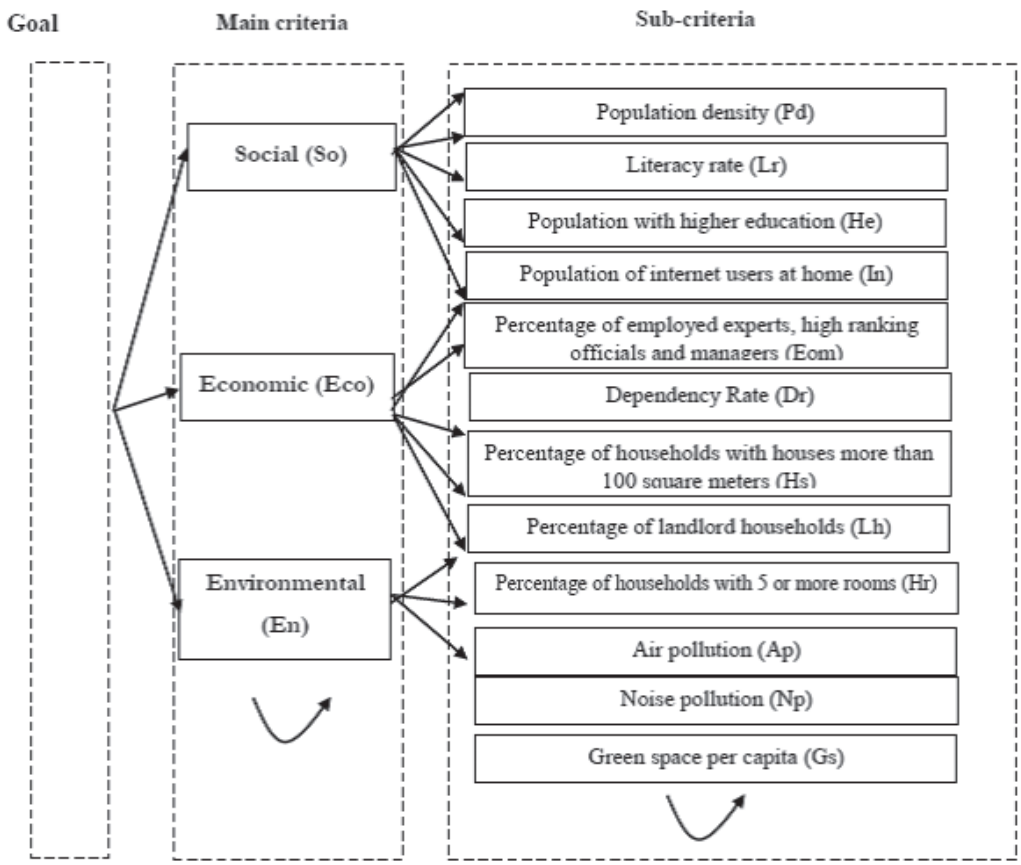


Chart 1. Network Model for Identifying Spatial fragmentation in Tehran Metropolis

main criteria	Social (So)	Economic (Eco)	Environmental (En)
Social (So)		□□	□□
Economic (Eco)	□□		□□
Environmental (En)	□□	□□	

Table1. Internal Dependencies of Main Criteria Together

$$W = \begin{array}{l} \text{Goal} \\ \text{Main criteria} \\ \text{Sub-criteria} \end{array} \begin{bmatrix} \text{Goal} & \text{Main criteria} & \text{Sub-criteria} \\ 0 & 0 & 0 \\ W_{21} & W_{22} & 0 \\ 0 & W_{32} & W_{33} \end{bmatrix}$$

not get trouble. Therefore, according to the interaction between indicators, in this research network analysis model has been used. For this reason, in recent years use of ANP instead of AHP has increased in most cases (Jharkharia and Shankar, 2007: 275). The Process of ANP model is as follows:

1.Modeling the network analysis structure

For implementation of network analysis process, we need to form an appropriate network model covering the research objective and the main and sub criteria (indicators). Chart 1, shows the network model that formed for illustrating the spatial fragmentation of Tehran 22 districts that options in this model will be evaluated separately. This is also obvious that the main and sub criteria have internal dependent that should be examined.

shows the internal dependency of main criteria and table 7 shows the internal dependency of sub-criteria.

It is necessary at this stage, according to the model's Network structure (chart 1), general structure of unweighted super matrix or primary super matrix be specified. Structure of the primary super matrix will be as table 2.

Table2- Structure of the primary super matrix

2) Formation of comparative matrix and their compatibility controlling

At this step, comparative matrixes formed from main criteria, dependence of the main criteria to each other, sub criteria and dependence of the sub criteria to each other and also their compatibility is controlled. Binary comparison of three main criteria has been performed base on Saati's 9 quantitative and in the same way of use the Analytical Hierarchy Process (AHP). The result of the binary comparison of main criteria and also its harmonious vector, namely W_{21} is provided in table 3. The results of the binary comparison matrix and also matrix of determining the interdependence has been base on experts' viewpoints.

Binary comparison of the main criteria's interdependencies (matrix W22)

To obtain the W_{22} matrix elements for under-

main criteria	Social (So)	Economic (Eco)	Environmental (En)	Eigenvalue
Social (So)	1	2	3	0.528
Economic (Eco)	0.5	1	3	0.332
Environmental (En)	0.33	0.33	1	0.139

$$W_{21} = \begin{bmatrix} 0.528 \\ 0.332 \\ 0.139 \end{bmatrix} \begin{array}{l} \text{So} \\ \text{Eco} \\ \text{En} \end{array}$$

Table 3- Binary comparison and eigenvalues of the triplet main criteria

main criteria	Economic (Eco)	Environmental (En)	Eigenvalue
Economic (Eco)	1	3	0.75
Environmental (En)	0.33	1	0.25

Table 4. Binary comparison of main criteria with respect to their interdependence and controlling the social criteria

W_{22} =

	So	Eco	En
So	0	0.8	0.667
Eco	0.75	0	0.333
En	0.25	0.2	0

Table 5. Matrix W22

W_{32} =

	So	Eco	En
PD	0.291	0	0
LR	0.179	0	0
HS	0.087	0	0
HE	0.316	0	0
IN	0.126	0	0
EOM	0	0.402	0
DR	0	0.157	0
HS	0	0.169	0
LH	0	0.128	0
HR	0	0.144	0
AP	0	0	0.54
NP	0	0	0.297
GS	0	0	0.163

Table 6. matrix W32

standing the main criteria interdependencies, Binary comparison of the main criteria is performed on Saati's 9 quantitative. For calculating the Coefficient of each main criteria (according to the interdependence among them), binary Comparison of two major criteria (By controlling the main criteria namely social criteria) is provided in table 4. The method of asking question about importance Coefficient in this case is: how much is the relative importance of the main criteria together when the "social criteria" be controlled?

Similarly, main criteria interdependence with controlling two other main criteria examined and three binary comparison of main criteria formed and compatibility factor of each one has been controlled. So that, the matrix related to the interdependencies main criteria (W_{22}) can be calculated. After formation of three matrixes and performing the necessary calculations, results is provided in W_{22} matrix.

Binary comparison of each sub- criteria related to the main criteria (matrix W32)

At this stage, the importance coefficient of each sub-criteria in triple main criteria obtained via their binary comparison (based on Saati's 9 quantitative) and this importance coefficient form the matrix column elements W32.

sub-criteria	Pd	Lr	Hs	He	In	Eom	Dr	Hs	Lh	Hr	Ap	Np	Gs
Population density (Pd)		✓	✓	✓		✓		✓		✓	✓	✓	✓
Literacy rate (Lr)	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		
Household size (Hs)	✓	✓		✓		✓	✓				✓		✓
Population with higher education (He)	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		
Population of internet users at home (In)		✓		✓		✓							
Percentage of employed experts, high ranking officials and managers (Eom)	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		
Dependency Rate (Dr)		✓	✓	✓		✓							
Percentage of households with houses more than 100 square meters (Hs)	✓	✓		✓		✓				✓			✓
Percentage of landlord households (Lh)		✓		✓		✓							
Percentage of households with 5 or more rooms (Hr)	✓	✓		✓		✓		✓					
Air pollution (Ap)	✓	✓	✓	✓		✓						✓	✓
Noise pollution (Np)	✓										✓		✓
Green space per capita (Gs)	✓		✓					✓			✓	✓	

Table 7. Internal dependence of sub-criteria

	Pd	Lr	Hs	He	In	Eom	Dr	Hs	Lh	Hr	Ap	Np	G
Pd	0	0.129	0.109	0.094	0	0.128	0	0.108	0	0.121	0.242	0.54	0.
Lr	0.141	0	0.162	0.154	0.163	0.152	0.14	0.136	0.163	0.186	0.076	0	0
Hs	0.121	0.096	0	0.087	0	0.088	0.395	0	0	0	0.198	0	0.
He	0.175	0.192	0.241	0	0.54	0.203	0.232	0.172	0.297	0.246	0.079	0	0
In	0	0.089	0	0.128	0	0.101	0	0	0	0	0	0	0
Eom	0.175	0.172	0.197	0.19	0.297	0	0.232	0.217	0.54	0.326	0.108	0	0
Dr	0	0.096	0.133	0.086	0	0.085	0	0	0	0	0	0	0
Hs	0.096	0.059	0	0.064	0	0.075	0	0	0	0.121	0	0	0.
Lh	0	0.054	0	0.077	0	0.06	0	0	0	0	0	0	0
Hr	0.082	0.066	0	0.075	0	0.064	0	0.288	0	0	0	0	0
Ap	0.065	0.048	0.079	0.046	0	0.044	0	0	0	0	0	0.297	0.
Np	0.056	0	0	0	0	0	0	0	0	0	0.154	0	0.
Gs	0.09	0	0.079	0	0	0	0	0.079	0	0	0.143	0.163	0

Table 8. Binary comparison of the sub-criteria internal dependency

Binary comparison of the sub-criteria internal dependency (matrix W33)

As is evident from chart 1, 13 sub-criteria present the triple main criteria's features are selected for purposes of this study. W33 is obtained from binary comparison of sub criteria with interdependent together.

3.Formation of Super matrix and Its Conversion into Limit Super matrix

Given that all existing comparison matrixes has been calculated on unweighted super matrix structure (W21, W22, W32 and W33) and their compatibility has been controlled, unweighted super matrix obtained via replacing this matrix on Primary super matrix as table 9. Then, unweighted super matrix should convert to weighted super matrix namely matrix that calculation of its column's components is one (Whatever Saati calls it random matrix)

For converting unweighted super matrix to weighted super matrix, it should be multiply unweighted super matrix at Cluster Matrix. Cluster matrix reflects the influence of each cluster to achieve the objectives of the study. Cluster matrix obtains from binary comparison of clusters within Primary super matrix

Table 9. unweighted super matrix

		Goal	main criteria			sub-criteria											
			So	Eco	En	Pd	Lr	Hs	He	In	Eom	Dr	Hs	Lh	Hr	Ap	Np	Gs
Goal		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
main criteria	So	0.528	0	0.8	0.667	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eco	0.333	0.75	0	0.333	0	0	0	0	0	0	0	0	0	0	0	0	0
	En	0.14	0.25	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sub-criteria	Pd	0	0.291	0	0	0	0.129	0.109	0.094	0	0.128	0	0.108	0	0.121	0.242	0.54	0.323
	Lr	0	0.179	0	0	0.141	0	0.162	0.154	0.163	0.152	0.14	0.136	0.163	0.186	0.076	0	0
	Hs	0	0.087	0	0	0.121	0.096	0	0.087	0	0.088	0.395	0	0	0	0.198	0	0.245
	He	0	0.316	0	0	0.175	0.192	0.241	0	0.54	0.203	0.232	0.172	0.297	0.246	0.079	0	0
	In	0	0.126	0	0	0	0.089	0	0.128	0	0.101	0	0	0	0	0	0	0
	Eom	0	0	0.402	0	0.175	0.172	0.197	0.19	0.297	0	0.232	0.217	0.54	0.326	0.108	0	0
	Dr	0	0	0.157	0	0	0.096	0.133	0.086	0	0.085	0	0	0	0	0	0	0
	Hs	0	0	0.169	0	0.096	0.059	0	0.064	0	0.075	0	0	0	0.121	0	0	0.185
	Lh	0	0	0.128	0	0	0.054	0	0.077	0	0.06	0	0	0	0	0	0	0
	Hr	0	0	0.144	0	0.082	0.066	0	0.075	0	0.064	0	0.288	0	0	0	0	0
	Ap	0	0	0	0.54	0.065	0.048	0.079	0.046	0	0.044	0	0	0	0	0	0.297	0.141
	Np	0	0	0	0.297	0.056	0	0	0	0	0	0	0	0	0	0.154	0	0.107
	Gs	0	0	0	0.163	0.09	0	0.079	0	0	0	0	0.079	0	0	0.143	0.163	0

Table 9. unweighted super matrix

clusters	main criteria	sub-criteria	Eigenvalue
main criteria	1	2	0.667
sub-criteria	0.5	1	0.333

Table10. Binary Comparison of Clusters

	Goal	main criteria	sub-criteria
Goal	0	0	0
main criteria	1	0.667	0
sub-criteria	0	0.333	1

Table 11. Primary Cluster matrix

structure (Table 10 and 11).

It's necessary to exponentiation of the weighted super matrix for achieving the Limit super matrix till all elements of super matrix be identical (be equal together). In such a case the Limit super matrix obtained and relative weight or value of each sub criteria is earned (due to table 13).

The Vector (WANP) indicates the final value of each sub-criteria and base on it, the final value of four criteria in order of importance are the percentage of literates with higher education (0.174), expert employees, senior officials and managers (0.170), lettered rate (0.124) and population aggregation (0.106). As a result, will have Maximum effectiveness in identifying the spatial fragmentation and development sustainability of Tehran metropolis.

4- Formation of options evaluation matrix

The options evaluation matrix have been formed after specification of weight or final value of each sub criteria. The option evaluation matrix has been formed after specification of weight or final value of each sub criteria. Option evaluation matrix shows the status of every district on having each one of sub criteria. For formation of options evaluation matrix, at first, status of each sub criteria in every district has been specified. Then all the numbers have been normalized with indexing

	Goal		main criteria			sub-criteria											
			So	Eco	En	Pd	Lr	Hs	He	In	Eom	Dr	Hs	Lh	Hr	Ap	Np	Gs
Goal		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
main criteria	So	0.528	0	0.533	0.444	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eco	0.333	0.5	0	0.222	0	0	0	0	0	0	0	0	0	0	0	0	0
	En	0.14	0.167	0.133	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sub-criteria	Pd	0	0.097	0	0	0	0.129	0.109	0.094	0	0.128	0	0.108	0	0.121	0.242	0.54	0.323
	Lr	0	0.06	0	0	0.141	0	0.162	0.154	0.163	0.152	0.14	0.136	0.163	0.186	0.076	0	0
	Hs	0	0.029	0	0	0.121	0.096	0	0.087	0	0.088	0.395	0	0	0	0.198	0	0.245
	He	0	0.105	0	0	0.175	0.192	0.241	0	0.54	0.203	0.232	0.172	0.297	0.246	0.079	0	0
	In	0	0.042	0	0	0	0.089	0	0.128	0	0.101	0	0	0	0	0	0	0
	Eom	0	0	0.134	0	0.175	0.172	0.197	0.19	0.297	0	0.232	0.217	0.54	0.326	0.108	0	0
	Dr	0	0	0.052	0	0	0.096	0.133	0.086	0	0.085	0	0	0	0	0	0	0
	Hs	0	0	0.056	0	0.096	0.059	0	0.064	0	0.075	0	0	0	0.121	0	0	0.185
	Lh	0	0	0.043	0	0	0.054	0	0.077	0	0.06	0	0	0	0	0	0	0
	Hr	0	0	0.048	0	0.082	0.066	0	0.075	0	0.064	0	0.288	0	0	0	0	0
	Ap	0	0	0	0.18	0.065	0.048	0.079	0.046	0	0.044	0	0	0	0	0	0.297	0.141
	Np	0	0	0	0.099	0.056	0	0	0	0	0	0	0	0	0	0.154	0	0.107
	Gs	0	0	0	0.054	0.09	0	0.079	0	0	0	0	0.079	0	0	0.143	0.163	0

Table 7. Internal dependence of sub-criteria

	Goal		main criteria			sub-criteria											
			So	Eco	En	Pd	Lr	Hs	He	In	Eom	Dr	Hs	Lh	Hr	Ap	Np	Gs
Goal		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
main criteria	So	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Eco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	En	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sub-criteria	Pd	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106	0.106
	Lr	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124	0.124
	Hs	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092	0.092
	He	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174	0.174
	In	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051	0.051
	Eom	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
	Dr	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053	0.053
	Hs	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054
	Lh	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
	Hr	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056	0.056
	Ap	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045
	Np	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016
	Gs	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03

Table 13. Limit Super Matrix

method and simultaneously, sub criteria that has reverse ratio with development, has been normalized reversely. Finally, final weight of each sub criteria in matrix has applied till option evaluation matrix formed. Table 14 shows the option evaluation matrix.

Finally, digits in each row are collected till every district ranking be specified. Table 15, shows the district's rank, grade and development level.

Conclusion

Nowadays, Spatial and social inequalities are universal and expanding phenomenon. Identification and spatial analysis of social, economic and ecological inequalities in metropolises is one of the essential and basic actions for planning and achieving urban sustainable development. In this research, in order to determine the spatial and social fragmentation in Tehran metropolis within the spatial sustainable development of 3 main criteria (social, economic and environmental) and 13 sub criteria or indicator is considered with internal dependent and interdependent together. Since, in matters that such an internal and interdependence among the indicators exists, using the hierarchical analysis in that relation has not been considered and the result is wrong. Therefore,

Indicators and sub criteria													
district	PD	LR	HD	HE	IN	EOM	DR	HA	OH	NR	AP	NP	GS
1	0.092	0.124	0.082	0.16	0.049	0.151	0.046	0.053	0.029	0.056	0.035	0.016	0.008
2	0.081	0.122	0.081	0.16	0.046	0.155	0.041	0.043	0.03	0.033	0.02	0.01	0.007
3	0.089	0.123	0.078	0.171	0.051	0.17	0.042	0.054	0.03	0.047	0.025	0.011	0.01
4	0.078	0.12	0.084	0.1	0.027	0.077	0.048	0.022	0.026	0.013	0.028	0.012	0.005
5	0.076	0.123	0.082	0.138	0.04	0.13	0.049	0.028	0.027	0.022	0.023	0.011	0.007
6	0.088	0.123	0.083	0.174	0.049	0.166	0.046	0.046	0.03	0.048	0.022	0.01	0.008
7	0.06	0.12	0.075	0.114	0.032	0.107	0.051	0.02	0.027	0.02	0.027	0.013	0.002
8	0.034	0.12	0.08	0.101	0.029	0.087	0.05	0.015	0.027	0.013	0.032	0.01	0.002
9	0.096	0.118	0.083	0.079	0.021	0.054	0.051	0.009	0.024	0.015	0.015	0.001	0.003
10	0.008	0.118	0.076	0.081	0.021	0.069	0.051	0.005	0.026	0.012	0.012	0.011	0.002
11	0.048	0.119	0.078	0.087	0.024	0.08	0.053	0.012	0.025	0.015	0.011	0.013	0.004
12	0.075	0.115	0.083	0.067	0.021	0.055	0.048	0.018	0.025	0.019	0.016	0.014	0.006
13	0.072	0.12	0.081	0.091	0.026	0.075	0.048	0.016	0.029	0.01	0.045	0.015	0.005
14	0.06	0.119	0.083	0.073	0.02	0.049	0.05	0.013	0.025	0.013	0.038	0.012	0.004
15	0.059	0.114	0.088	0.045	0.012	0.028	0.047	0.006	0.024	0.006	0.036	0.012	0.015
16	0.068	0.113	0.085	0.046	0.013	0.035	0.044	0.008	0.025	0.009	0.024	0.009	0.015
17	0.029	0.112	0.087	0.044	0.012	0.029	0.042	0.007	0.025	0.009	0.017	0.009	0.004
18	0.09	0.114	0.09	0.044	0.012	0.028	0.045	0.006	0.025	0.004	0.017	0.013	0.011
19	0.087	0.113	0.092	0.041	0.011	0.026	0.043	0.008	0.024	0.003	0.018	0.012	0.029
20	0.075	0.114	0.086	0.056	0.016	0.045	0.042	0.011	0.026	0.006	0.018	0.012	0.011
21	0.103	0.121	0.085	0.096	0.025	0.071	0.041	0.021	0.028	0.012	0.022	0.009	0.01
22	0.106	0.123	0.09	0.111	0.031	0.083	0.047	0.036	0.024	0.012	0.026	0.015	0.03

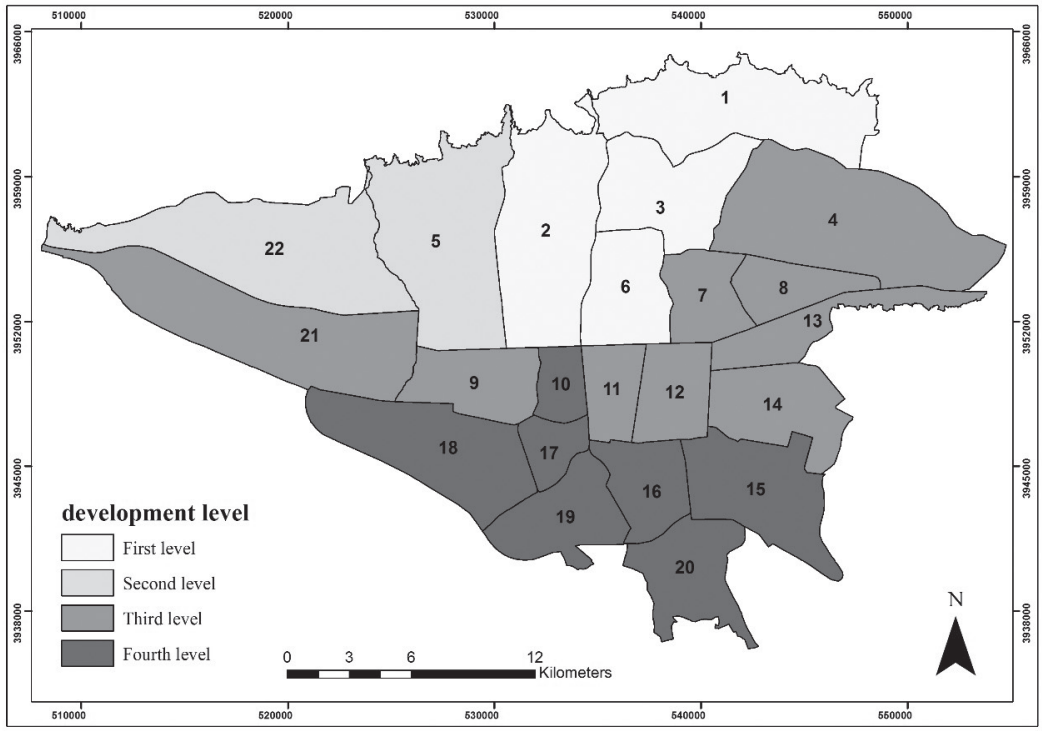
Table 14. option's evaluation matrix

Resources: General census statistical data of population and housing 2011 and the justice evaluation in Tehran, 2008

First level			Second level			Third level			Fourth level		
Rank	Value	District	Rank	Value	District	Rank	Value	District	Rank	Value	District
1	0.902	District 1	5	0.754	District 5	7	0.668	District 7	16	0.518	District 20
2	0.899	District 3	6	0.733	District 22	8	0.645	District 21	17	0.506	District 19
3	0.893	District 6				9	0.641	District 4	18	0.498	District 18
4	0.829	District 2				10	0.634	District 13	19	0.495	District 16
						11	0.600	District 8	20	0.491	District 10
						12	0.570	District 11	21	0.491	District 15
						13	0.570	District 9	22	0.426	District 17
						14	0.563	District 12			
						15	0.560	District 14			

Table 15. Rank, grade and development level of districts of Tehran metropolis

according to the interaction between indicators, network analysis model has been used. The research findings have been obtained using of experts and officials, Higher education (0.174), ratio of employed experts, senior officials and managers to all employees (0.170), in order of maximum importance, have allocated the most effectiveness in formation of the spatial fragmentation and social detachable of Tehran metropolis. Reviewing the theoretical texts illustrates that indicators of the social status and economic bases of families like professional and technical workforce, managers, education level and value of houses are considered as the most important factor in ecological detachable. In other words, households with professional career and higher education, higher income prefer to live in the expensive houses and urban healthy neighborhoods. Crafts and Body work workers with lower



▲ Plan 1. development level of Tehran districts

education and lower income Hobson (from hopelessness) refuge to the affordable houses in poor neighborhoods (Shokuei, 1993: 89-90). After determining the final value of sub-criteria, option evaluation matrix was formed and ranking of districts obtained in the status of having indicators. The study result proves the socio- spatial heterogeneity of 22 districts in Tehran metropolis. Districts 1, 3, 6 and 2 respectively with highest scores are located in the northern Tehran. Districts 17, 15, 10, 16, 18, 19, 20, 19 respectively with lowest score are located in southern half of city and have lower development level. There is an obvious chasm (gaps) on urban structure of Tehran between the north and south half of the city. The natural space of Tehran location has an important impact on the city spatial qualitative. So that, North regions from natural and social landscape have particular Superiority. From year 1921, city was bipolar with increasing the land speculators and city development and this status also continued with entering the country into the arena of the world capitalism and the evolution of social structure. Bipolarity Process take more acceleration in the second stage of the city evolution (1931-1941) with social stratification. In both steps, government had a basic role by supporting the new social and economic relations in the new market. The spatial heterogeneity grew with a series of activities and became a new market. So that, pricing system of the land and real estate institutionalized the urban districts differences. It means that, the spatial heterogeneity had had close relation with social distribution genesis from the beginning (Takmil Homayoun, 2000:19). Spatial and social heterogeneity between the north and south of Tehran also has been continued as main feature of the spatial structure after the Islamic revolution and the war. So that, socio - Spatial heterogeneity clearly is visible among the city. North of city has bigger houses, less aggregation , smaller households, higher literacy and education rate ,expert / technical employees, senior managers and further Welfare amenities. Also, from environmental hazards such as flooding,

underground sewage contamination, air and noise is safer and healthier than south of city. The continuance of current process not only is a major challenge for achieving the urban sustainable development of Tehran but also is at the national level. Therefore, it is necessary that the authorities of Tehran urban management to take actions for better understanding of this phenomenon and consequently offer new and efficient solutions for reducing the effects of various aspects of spatial inequality and duality. We should rethink about the concept of twenty-first century city where exist the social justice, ecological sustainability, political cooperation and economic vitality.

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