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Knowledge-based Activities of Site Selection by Fuzzy ELECTRE Method, Case Study: Tehran Metropolitan Area

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ABSTRACT: This research aims to identify the economic logic in the process of locating and the spatial transmitting of the knowledge-based institutions in Iran while on the macro and micro levels, it seeks to find an optimal location for the knowledge-based activities in Tehran. The research method is mixed and statistical population of this research includes a number of 879 knowledge-based companies which are officially registered in the vice-president of the information technology ministry. In order to identify the impactful criteria on site selection of the corporations in Iran, Delphi method is used. The sample size for the Delphi method includes 50 samples; interviews with managers in the knowledge-based companies. In order to set the extracted priority of the criteria, the Shannon entropy method and MCDM software was employed, then selection of different regions with higher priority was done by overlaying and using the Fuzzy ELECTRE method. On the second step, the mentioned bank of data was setup in GIS using the data from 2010 census and field research, finally a number of locations was specified for the optimal settlement of knowledge-based institutions by using Fuzzy ELECTRE method. Results show that the advantages of using the localization economies are playing a bolder role in site selecting rather than the advantages from the urbanization economies. Results of the local analysis show that the district 5, 2 & 4 have the most attraction for the settlement of active institutions in the field of knowledge.

Keywords: Knowledge Economy, Knowledge-based Activities, Fuzzy ELECTRE Method, Localization Economies, Tehran Metropolitan Area.

INTRODUCTION

Knowledge and innovation have always played a crucial role in production and society in general (Parcero & Ryan, 2016, p. 1147), therefore, "Iran's 20-year vision plan" has a focus on knowledge-based economy and metropolitan areas are considered as its development engines (Hall & Pain, 2006), therefore, development and eloquence of the knowledge-based economy is inevitably knitted with the spatial planning policies of urban regions. This connection includes macro planning sections (on the vision level) as well as the micro level (local plans), so the urban planning plays a key role in supplying infrastructural demands and in increasing the competitive advantage of the knowledge-based economy in a region.

Statement of the Problem

Though, on the macro level, requirements for developing knowledge economy are similar, in the micro level, criteria and priorities are very different. According to this fact, the current paper aims to identify site selection priorities for knowledge-based firms in Tehran to pave the way for strengthening the competitiveness and the growth of knowledge-based industries through locating an optimal place for the settlement of mentioned institutions. The main question is: which Tehran's districts are optimal for being locations of knowledge-based activities. This research first extracts the key criteria of knowledge-based site location and selection from the theoretical literature, and then scrutinizes and

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prioritizes of them altogether with the opinions of head managers; finally, tries to find an optimal location for knowledge-based activities in Tehran. The result of these researches would be reflected in the form of a number of recommendations that aim to increase the efficiency of urban planning for the development of knowledge-based economy at the city level in Tehran metropolitan area.

THEORETICAL FRAMEWORK

Knowledge-based Economy

The knowledge-based economy has played a key role in the world-economy during the past few decades. World bank (2007) mentioned that knowledge economy is the type in which knowledge assets are deliberately accorded more important than capital assets, and where the quantity and sophistication of the knowledge pervade economic and social activities that reach considerably high levels. The economic committee of Asian and Pacific Economical Conventions acknowledges that the knowledge-based economy is a type of economy in which production, distribution and the application of knowledge are the main factors and stimulants for the economic growth, generating wealth and employment in all industries. Based on this definition, the knowledge-based economy does not rely on other high-tech industries but relies on such an economy that all sciences use the knowledge befitting their demands. That is, in the knowledge-based economy, production and application of knowledge as the stimulant factor that contributes to economic growth and production of wealth and employment in all industries. Also, according to this committee, the fundamental knowledge of the knowledge-based economy is a way far from the technical knowledge, since it includes cultural, social and directorial knowledge. Regarding the great role of knowledge and its scientific applications for example in 'technology' - the whole process of development emphasizes a feedback relationship between the knowledge and its application. We can briefly refer to the specification of knowledge-based economy as:

1. Knowledge-based economy is a type of economy with ample resources and unlike other resources that get worn and amortized, data and knowledge can be used repeatedly and they may even grow through the extended use (Mirzaee, Personal Communication, November 3, 2016).

2. In the knowledge-based economy, knowledge will turn into a product that can be sold. The knowledge has a very inhomogeneous market, each product has its own specific price and quality. Owners of the knowledge are actually active in an exclusively/ semi-exclusively way (Nazeman & Eslamifar, 2011, p. 8).

3. Knowledge-based economy is a weightless economy, a valuable quality in this economy which is a conceptual and intangible phenomenon (Nazeman & Eslamifar, 2011, p. 9).

4. Value of the products and services depends on the condition of the people. Specific knowledge would have different values for different people on different places and times.

5. In knowledge-based economy, a big quota of national production per capita is produced by the knowledge-based activities and by the ones that generate knowledge including industries with highly paramount technologies, advanced services and finance services especially those with the expert instruction/ research activities (Foray, 2004).

6. Knowledge and data infiltrate and affect on the places with higher demands and less obstacles.

7. In this type of economy, there is no shortage in resources for savings, in return, the potential to extract from the knowledge is limited and the savings essentially exist as concepts in the mind of the people. So, a big part of competition in such economy is based on the absorption of social assets and creative people, the knowledge level of the workforce is the competitive advantages in this economy.

8. The demand is for the skilled and experienced workforce, for workers that can work with the classified knowledge (Mehrara & Rezaei, 2015, p. 2348).

Knowledge-based Industries

Collectively those knowledge-based institutions that produce knowledge-based products or services are considered knowledge-based industries, whether in competition or cooperation with others. The knowledge-based industries include those industries products and processes which directly depend on the production and exploitation of knowledge. Such industries are categorized into two classes: those which use the processes and thematic complex scientific topics to manufacture a product or to offer services, e.g. industries that include advanced sciences or technologies (Nanotechnology, Biotechnology, Nuclear technology, Information technology, Aeronautics, Chemistry, Petrochemistry, Electricity and Physics); The second class includes the industries that manufacture smart products or employ smart processes in the course of manufacturing their products. According to Davis and Botkin, the six characteristics of knowledge-based industries are:

1. Knowledge-based industries customize their products, such products/ services are not manufactured/ offered in a massive amount, but they are manufactured/ offered according to the desirable characteristics of

the customers. 2. Knowledge-based products have a relatively short life-cycle, this is due to their low ability in protecting the intellectual properties and the rapid innovation in products and services. 3. Knowledge-based products are smart and they will get smarter if they are used more. 4. The users will get smarter and would learn more as they use the products (Davis & Botkin, 1999).

According to the enactment "Specifying knowledge-based companies and institutions in Iran" by law, knowledge-based institutions are the private companies, institutions or corporations that have been formed in order to achieve synergy in knowledge and wealth, to develop the knowledge-based economy, to achieve scientific and economic purposes (including the deployment and applications for inventions and innovations), to commercialize the results of researches and developments (including the design and production of merchandise and services) in the domain of super-technologies with a high rate of added values specially in the development of related soft wares (The by-law of specifying knowledge-based companies, 2011, p. 1). The studied samples and different chain-patterns of value production, demanding workforce and products of knowledge-areas indicate that the logic behind choosing a location and the priorities of knowledge-based sites is different from mass-production industries.

The Accumulation Theory and an Optimal Location for Economic Activities

Locating theories are inevitably knitted with the logic of economy, the models for choosing an optimal settlement location are usually based on economic advantages. Finding the advantages of the action clusters and discovering the reason of crystallization of accumulation of activities is common among economists and urban/regional planners. Two distinct definitions can be extracted from the term "Cluster": 1. a phenomenon which results from the concentration of populations or activities in an industrial city or region which usually takes advantage of urbanized economy, 2. a phenomenon in which similar or identical factories cluster together in a specific location, this mechanism is called localization economies. The spatial analysis of the clusters shows that factors like local adjacency or different concepts of geographical economy create an accumulation of similar activities in one region. There are three different theories regarding the accumulation: 1. proportion of expenses to supply shared resources like the expenses for creating infrastructures or infrastructural systems, on-the-job training systems, and etc. Briefly, it is reduction of expenses of manufacturing, maintenance and creation of infrastructures and supplying their raw material. 2. Accumulation creates a market for the expert-workforce, as Marshal says, "spillover of technology is the factor that contributes to the creation of a market for the experienced workforce". 3. Accumulation will also lead to an increase in expenses of the inter-factory transactions and the transport costs due to the small distance between the factories; customers can communicate with different competitive companies in short distances to take advantages of cutting the expenses, this type of saving is called the localization economies. The recent theory about the causes of cluster's formation is known as "spillover of knowledge" and it believes that localization of similar factories facilitates knowledge spillover, accelerates inter-factory learning, and it leads to innovation and adaption (Porter, 1998; Maskell et al., 1998; Malmberg et al., 1996). Local culture transfers implicit knowledge from one player to another by using its specific norms, values, official or unofficial institutes (Malmberg & Maskell, 2002, p. 433), and this approach is called the advantages of urbanization.

Jacobs focuses on the importance of diversity in the professional expertise which is in opposition with another type of expertise in a local region as the contributing factor to invent new activities (Jacobs, 1969, p. 181). The difference between these two points of view lies in a key concept: Spatial economy; the economy is the scale and it appears through this scale and the urbanization economy results from the size of the market that the factory is active in (Capello, 1995, p. 5; Von zedtwitz, 2004). The advantages of urbanization economies will be formed in three contexts: 1. The advantages resulting from the manufacturing and the use of public services and products, 2. The advantages resulting from the scale of the city market, quality of the workforce, the scale of the market for the manufactured products, access to the high-professionals and high-level urban services as well as the access to information and broad connections. Like spatial advantages, the urbanized advantages play an important role to reduce the transactional expenses of the market (Cappellin, 1988; Shin, 2001; Neo, 2008). The spillover of the knowledge increases the advantages that are taken from the size of the market for the factory: 1. Lack of competitiveness, 2. The impossibility of choosing a viewpoint to access the knowledge.

Romer states this spillover as a factor that contributes to the growth. To enjoy the advantages of the spillover, he recounts the distance as a key element. This is why he specifies distance as the main reason for the formation of activity (He & Gebhardt, 2014; Rome, 1986). Researches like Feldman and Audretsch, Varga and Acs indicate that the geography of initiations and discoveries are highly influenced

by the universities and research & development institutions (Audretsch & Vivarelli, 1996; Feldman & Audretsch, 1999; Acs, 1989; Varga,1998 Anselin, Acs & Varga, 1997, Ramirez & Xibao, 2008, Malmberg & Mmaskell, 2002).

Varga notes that research and development institutions pave the way for collaboration between the industry and the academy as the channels for transferring knowledge. Academic seminars, research journals, the advisory society of university professors, collaborative plans of industries, industrial parks, technologic confirmations and local workforce market include researchers, engineers and the societies of professionals, all of whom are some of the ways to transfer the knowledge (Varega, 1998). Acs' studies show that most of the universities are based on small factories - for example on electronic factories (Acs, 1989). Mirzaee analyzed contributing factors to the development of the knowledge-based economy, and refers to both groups of urbanized and local induced advantages; he finds two major infrastructures indicators which are essential in the course of development of knowledge-based economy: 1. Human infrastructure (expert workforce), 2. Technological infrastructure (like proper bandwidth, laboratory and research facilities). He also focuses on the importance of the knowledge spillover and face to face relations for the knowledge-based institutions and analyzes their locations according to their situations in the network; in fact the connectivity to the network is an important point, so any location that can make this connection is considered as the suitable place for knowledge-based industries. Because of limited access to the land, expenses for settling in metropolises are really high and knowledge-based industries are distinguished in form of clusters on the urban periphery to improve this three major criteria: 1. Access to the experienced workforce, 2. Access to data, power, innovation and customers' networks, 3. Expenses for their settlement (personal communication, 2016). Athari talks about a sort of savings that are due to the consolidation against the expenses of scale, and he believes that the advantages of consolidation were more influential on the formation of knowledge-based institution clusters (personal communication, 2015). Ebadi believes that the transformation of the essence of industries from workers to the knowledge affects the local priorities; the location priorities are related to the existing technology, but the external advantages and expenses affect the policies of institutions (personal communication, 2015). By surveying the opinions of researchers and theorists, the influential criteria for locating, the whereabouts and the formation of activity clusters can be summarized based on different saving logics in table 1.

Table 1. Criteria and Indicator's for any Type of Advantages

Urbanization Economies Advantages	Localization Economies Advantages
- Easy access to a large and divergent market for the final product (Jacobs, 1969; Cappellin, 1988; Shin, 2001; Neo, 2008). - Easy access to a large and divergent market for supplying the raw material (Fujita & Venables, 2001; Feser, 2002). - Access to the transportation infrastructure - Cooperation with other sectors and local factories (suppliers and customers) according to the rules of the market (official contracts). - Access to a divergent workforce pool with a high quality/ mobility in a region (Rosenthal & Strange, 2004; Jacobs, 1969).	- Access to the expert workforce (Vonzedtwitz, 2004) - Proximity with similar sector factories (Fafchamps & Hamine, 2017; Desmet and Fafchamps, 2005) - Access to a specific supplier - Cooperation with other local factories (suppliers and customers) without the urge to have official contracts (Fujita, 2002, p. 264; Henderson, 1997) - Access to the circulating workforce (Vonzedtwitz, 2004, Boschma et al., 2009, Power and Lundmark, 2004) - Access to spillover of knowledge mechanisms (Porter, 1998; Maskel et al., 1998; Malmberg et al., 1996; Acs et al., 2002; Varga, 1998; Malmberg & maskell, 2002; He & gebhardt, 2014)

METHODOLOGY

The present paper is a mixed-method research because it uses both the qualitative and quantitative methods. The data gathering method is documentary, the required data on location -activities criteria, as well as the indicators related to each criterion, were provided by referring to the theoretical and applied researches, professional journals and papers. In the case study part, information was obtained from the questionnaire, statistical data from the National census of population and housing 1990, and statistical centers' reports. The statistical population of the research includes 879 official knowledge-based firms that are registered in the vice chancellor IT office of the president. For Delphi method, Rocco (2007) have used 15 interviews, Park (2001) analyzed 30 samples

for identifying the location criteria of welfare centers. Powell (2003) studied 30 samples and Creswell (1998) had 20-30 samples as the minimum demanding count to ensure reliable results in Delphi method. According to the researches on Delphi method, 30 samples satisfy the model. For more confidence, 50 interviews (50 samples) with the managers of knowledge-based firms (as experts) were arranged. Data gathering performed in two parts, at first, experts chose more important criteria and suggested some new criteria. After four steps, 80% convergence obtained, and Delphi process was stopped. In the second part, criteria weighted by the questionnaire which includes comparison questions. First, 30 interviews were performed to determine validity and reliability, after being ensured about them, the rest of the interviews were done. Criteria priorities were extracted separately from each questionnaire and put into MCDM software, then the final weight of the criteria was specified by using the Shannon entropy model. The entropy method is one of the MCDM methods that is a touchstone for checking the extent of unreliability in a discrete probability distribution system. In this way when the distribution is broad, unreliability increases more than when the frequency distribution is sharp (Momeni, 2008). In this method, the broader the distribution of the criterion values, that criterion gains more value. Entropy is a criterion for the uncertainty of specific Probability distribution (E_j), what Shannon explained it as formula 1.

$$E_j = -k\sum_{i=1}^{n}[P_i * lnp_i]$$

The entropy method has three procedures: 1. Calculation of the entropy of each phenomenon (E_j) 2. Calculation the extent of diversity or deviation from the full entropy for each of the phenomenon (d_j), as formula. 2.

$$D_j = 1 - E_j$$

3. Calculation of the weight of each indicator by dividing the calculated value into the second step following the extent of diversity of the studied phenomena (W_j), as formula 3.

$$W_j = \frac{dj}{\sum dj}$$

In the next step, based on the theoretical studies of the research, statistical data which were applicable to the previously chosen indicators were specified and entered Tehran's GIS across its 22 municipality-district detachments. According to the selected indicators and by using Fuzzy ELECTRE model, the optimal location for the establishment of knowledge-based activities was marked on the scale of each municipality district. Fuzzy ELECTRE method is one of the decision-making methods that ranks the choices with a bilateral collation of data. Unlike the previous methods that considered a binary method for comparison of two choices, it uses the threshold of advantage and indifference in terms of compatibility and incompatibility, this approach utilizes fuzzy functions, so the Electre method has a more accurate outcome than the hierarchical methods (Kazazi et al., 2011). An excerpt of general processes in the research are reflected in Fig. 1.

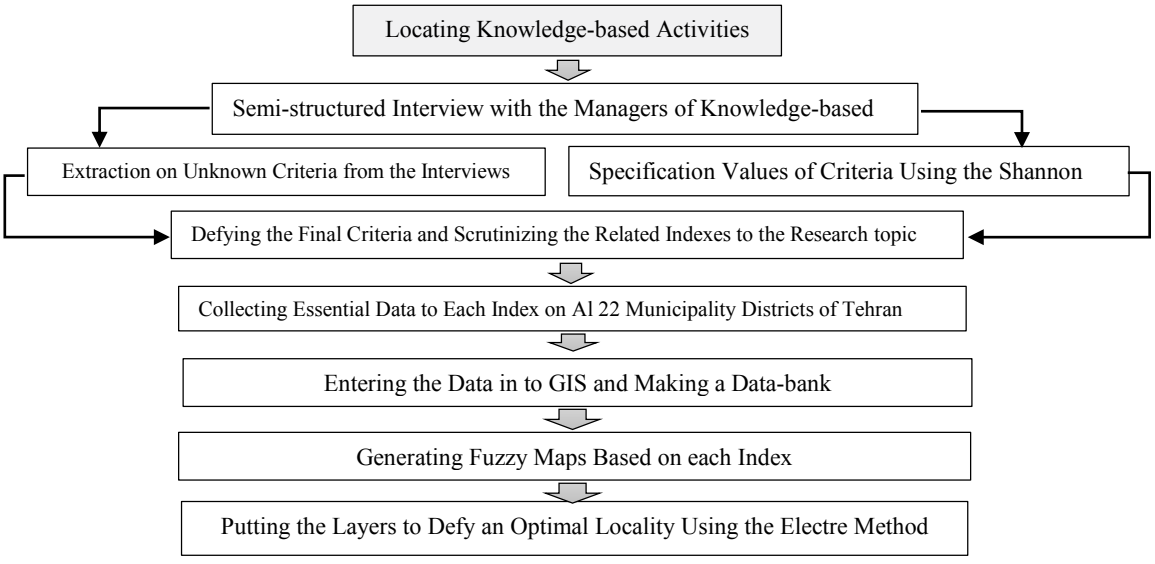

Fig. 1. Research Procedure

CASE STUDY

The studied area in this research includes all of the 22 municipality districts of Tehran metropolis. According to the 2010 population census, the population of the whole province was measured as 12 Million and the capital city was estimated around 5.8 million (www.amar.org.ir). The expanse of Tehran was specified around 61264 hectares in 2009 (Boosazgan, 2006). The economic role of Tehran was based on agriculture until the reign of Nasser o-din Shah but later this role was played by the industries during the last decades of Qajar era and early Pahlavi period. Following the political and ministerial changes in the country, Tehran was considered as a locality with a higher political, ministerial rank and a place for centralization of national elite, a junction for trading and industrial products of the region, continuation of the mentioned processes led to the formation of institutions and service providing institutions like banks, insurance companies and service companies then Tehran's economic change accelerated and moved towards industry and services (Ehlers, 2001, pp. 224-248). During the past decades, the economy of Tehran is fully linked with the environs – i.e., it is fully linked to the circumferential urban region. As the capital city of Iran, Tehran became the important center for national economy, in many economical domains it is a junction between national exchanges and international commerce. According to the Tehran's strategic-structural plan, during the recent years, Tehran is facing a fall in the GNP while the mentioned program defines the role of Tehran as the most important international city of Iran and the main pathway for international connections of Iran. To play this role, a number of centers with international commercial activities around a locality in Ghale-Morghi were suggested (BoomSazan, 2005, p. 17). Due to its situation as the center of political decisions and various infrastructural advantages (both in human and spatial dimensions), Tehran used to be known as the concentration place for the skilled workforce, R&D programs, and knowledge-based economy. Statistical counting of workshops that are involved in research and development activities show that an estimate of 25% of all workshops with the development and research plus an estimate of 25% of all research centers of the country are situated in Tehran metropolitan area, also around 45% of the whole researchers of the country are working in Tehran (Iran's statistics center, 2009). According to the statistical reports of the vice president of information and Technology organization of Tehran, Tehran is in the first grade in the number of knowledge-based institutions (879 institutions), Isfahan is in the second rank - with only 230 institutions (www.daneshbonyan.isti.ir); a total number of 437 companies from the whole institutions that are situated in Tehran are listed as the young companies (still have not reached manufacturing). As a result: 1. Tehran is the main center of knowledge-based and science-oriented activities in Iran, 2. Due to the high share of young knowledge-based institutes in Tehran, a major portion of site-condition problems for the competitiveness of the knowledge-industries are still not tangible; thus there exists an intervention opportunity for the urban planners to spatially reorganize and locate the knowledge-based activities in Tehran metropolitan area with the aim to improve the functional efficiency.

DISCUSSION AND RESULTS

The analysis of the interview content with the managers of knowledge-based industries shows among all factors contributing to the "Advantages of urbanization economies", in a scientific environment with access to the advanced supplementary services (like insurances) locational priorities on choosing the settlement place of knowledge-based industries are the most important ones and other impactful factors are mostly related to the "Location induced advantages". The statistical analysis of the interviews and questionnaires show that more than 70 percent of the knowledge-based institutions tend to be situated in adjacency of other companies in other knowledge fields; they believe that this adjacency is more advantageous than being close to the companies of the same domain. Using the Shannon method, the discussed criteria were defined based on the results of the priorities extracted from the questionnaire and, they are presented in table 2. The results illustrate that access to the public transit, environmental conditions, cost of settlement and possession of the building are relatively important factors in choosing the settlement location.

Table 2. Site Selection Indexes' Final Weight

Index	Environmental Iondition	Land or Rent Price	Access to Public Pransit	Access to Skilled Workforce	Proximity with Customers	Proximity with Suppliers	Proximity to Similar Sector Firms	Access to Insurance and Bank Service	Access to Communication Infrastructure
Weight	0.1624	0.1555	0.1856	0.1441	0.0359	0.1222	0.0684	0.0293	0.966

Next, based on the mentioned criteria and the level of each criterion's importance for Tehran metropolitan area an optimal establishment spot is to be assigned. In table 2, the environmental conditions of the settlement are not included, because of their dependence on the special conditions of the location by the way these are applicative to researches with minor scales (inter-regional level). The adjacency with the suppliers and accessibility for the customers were also eliminated from the process of finding an optimal place since the results are dependent on the activity of each institute. To defy an optimal place and to have the possibility for doing analogies based on the selected criteria, it seems mandatory for the selected criteria to compose it with quantitative indexes. The indexes presented in Fig. 2 are related to the research topic which is extracted from the interviews; the method for calculating each index will be described in brief afterward:

The following table shows the codes derived from data.

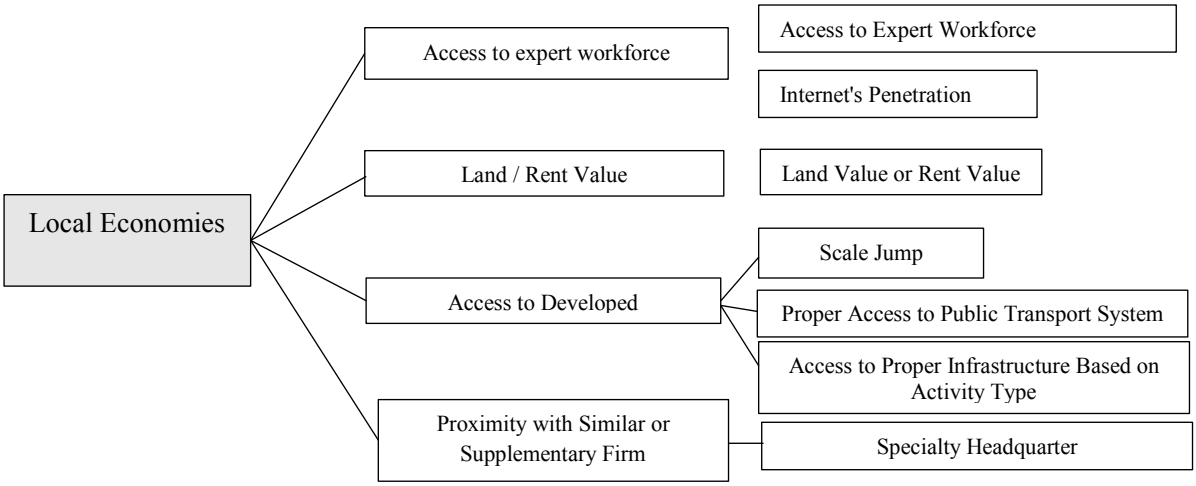

Fig. 2. Research Selected Criteria

- Workforce with Higher Education: The number of Ph.D. students and master's degree has been entered the GIS, the data was taken from the 2010-census results. The results of the interviews show that the graduate students of the computer and mathematics majors, production and manufacturing engineering are considered as two main groups of the workforce in knowledge-based institutions. The total number of the graduate students of these two educational groups were sorted based on their municipality regions (Fig. 3).

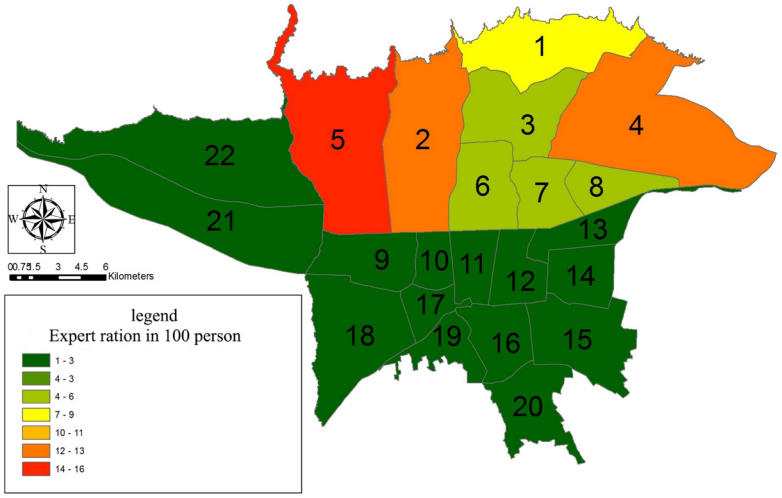

Fig. 3. Access Level to the Skilled Workforce

-Internet's Penetration Rate: This index reflects the amount of general skill in using new ways of communication and is one of the indexes in evaluating the technical skill level, using the 2010 census data the relation of this index was calculated through Formula. 4, and is now on the GIS by Formula. 4.

$$\text{Internet Penetration Rate} = \frac{\text{number of 10years old people who have used the internet during the past 12 months}}{\text{Whole population of 10 years old and up in the region}}$$

Formula. 4. Internet Penetration Rate

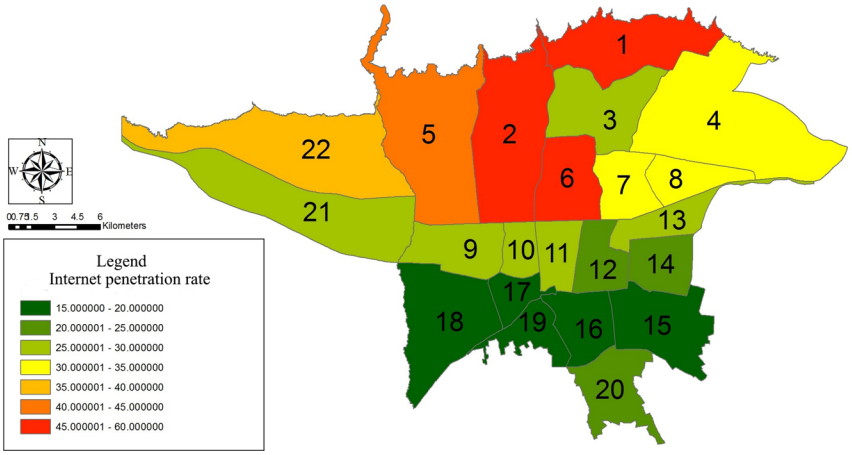

Fig. 4. Internet Penetration Rate

- **Access to Public Transport Infrastructure:** "Desirable access to the subway is 800 m and for the high-speed trains is 500m" (Tehran's master transportation-planning studies company, 2006). Fundamental data on the trip mode shifts was defined based on specifying subway stations equipped with bus and taxi stations through the data bank at www.metrogroup.tehran.ir website; the qualified stations were determined and then the data was transferred to the GIS. (Figs. 5 & 6).

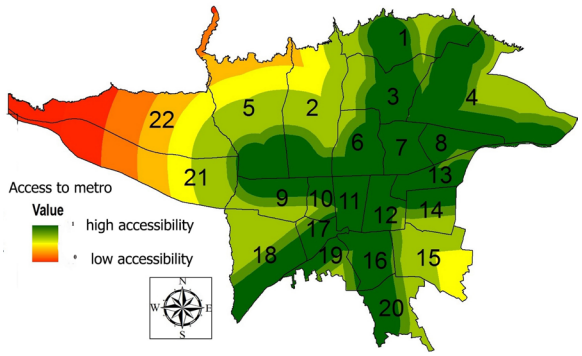

Fig. 5. Access to the Subway Stations in the Region

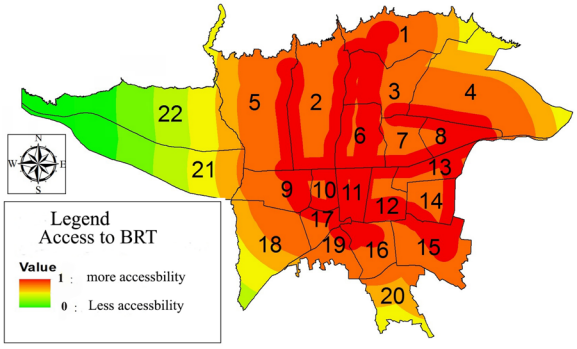

Fig. 6. Access to BRT Lines in the Region

- Land Price Value: the average price value of the land was determined on the basis of the "Land and Rental costs of the years 2015-2016 report" provided by the organization of statistics (Fig. 7).

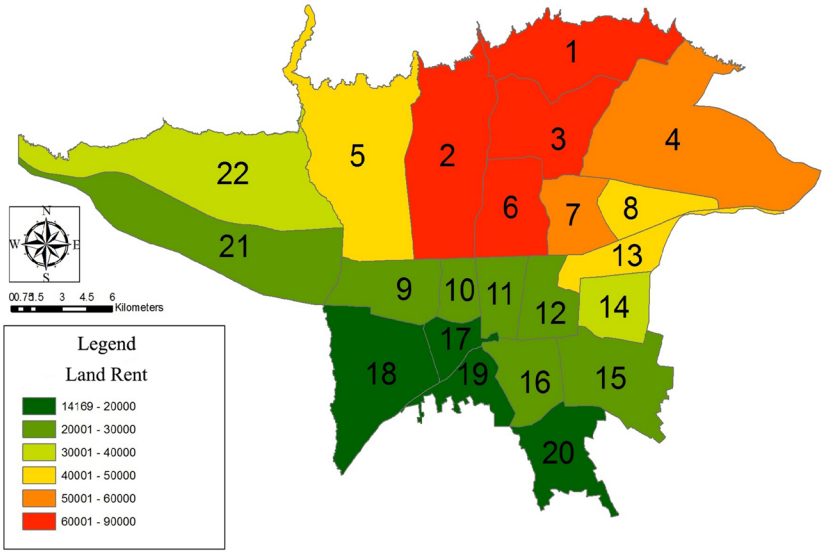

Fig. 7. Land Value

- **Proximity to Similar Sector Firms:** Special shop arrangements are typically indicated based on the number of similar activities to the total existing activities in one spectrum or one axis. Due to a lack in data access for the whole number of activities for each axis and context detachment, we gathered the local information of all knowledge-based companies by analyzing the addresses of registered companies and then we put them into the GIS, the analysis for adjacency with similar companies index was done according to the contribution of each district from the total number of companies; in this way, the district with the higher number of companies would be considered as more preferable.

According to the results, in comparison with other municipality districts, district 2, 5 and 4 are respectively having the most desirability for settlement of knowledge-based firms (Fig. 8).

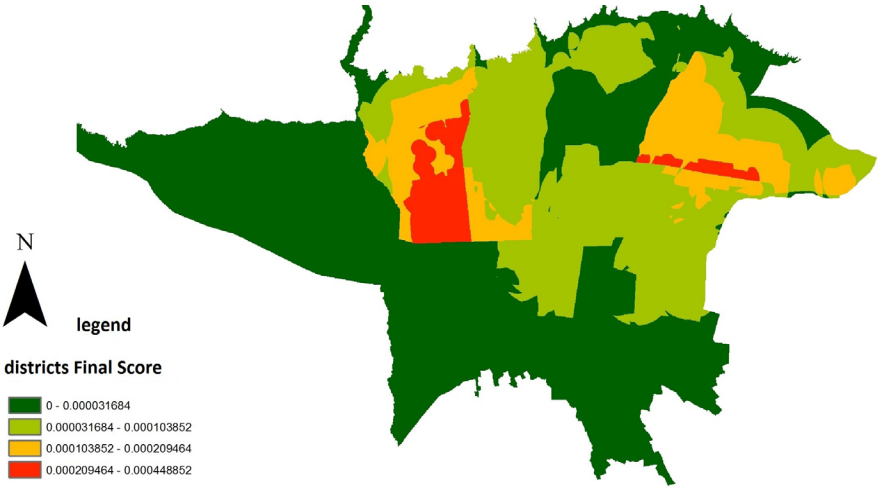

Fig. 8. The Fuzzy Map for the Locative Desirability for the Knowledge-based Activities

Results of weighting the managers' selected indexes show that when it comes to finding a settlement place the focus of the traditional locating theories is on the importance of land value or land rent, this index however, has the third position among all the priorities for knowledge-based companies in Tehran. In spite of the exuberant emphasis of theoretical researches and the experiences of other countries, access to the specialized workforce on choosing a place for knowledge-oriented activities is an index ranked as the fourth priority for knowledge-based companies in the city of Tehran. It seems that this index is not a priority at the inter-city scales for the knowledge-based institutions. Interviewees supposed that the environmental conditions of the settlement place affect the specification of interior spaces, surrounding environments, and access to the open green-spaces during the work hours as well as the calm workplace, more than 70% of the managers recount these factors as the most important ones in the generation of new ideas and efficiency of their expert workforce.

Results of the analysis show that in locating the knowledge-based institutions in the city of Tehran the impactful priorities and criteria are not only different from the priorities in mass-production industries but also they are different in the theoretical aspects of the research. Thus, the framework criteria, extracted from this study plays an important role in spatial-functional enhancement of spatial system of Tehran for the knowledge-based industries and this due to its proportionality with the specific demands of knowledge-based activities. The following research can include the customers/ suppliers proximity criteria in locating process through categorizing them into special groups and to specify the desirable region for each of the special group of the knowledge-based activities on the city level of Tehran metropolitan area.

CONCLUSION

Results of the research show that knowledge-based firms locate their establishment place according to the localization economies. Our findings support Vonzedtwitz (2004) and porter (1998) researches and stand in contrast with Cappellin (1988) and Shin (2001) who emphasis on urbanization economies effect on knowledge Geography. Perhaps knowledge-based firm's current step in life cycling effect on priorities for site selecting.

Results show that an access to public transit, environmental and physical condition and land or rent price are the most important criteria for locating. based on the suggested method, optimal places are 2, 5, 4 & part of 6 Tehran's districts. Using fuzzy method instead of hierarchical methods, caused the southern half of the district 6 to be the most desirable locality for among the southern districts for the establishment of science industries, thus it seems that using the fuzzy method on the process of locating can produce more accurate results for the urban planners. In this research, determining the optimal locations as the center of knowledge-based activities shows that anticipation of Tehran strategic-structural plan for settling an international business center in the locality of "Qale Morghi" in Tehran -which is listed as the less desirable districts with a less than average desirability in this research- would not befit with the demands of active institutions in the domain of knowledge. Thus, in the process of revising Tehran's development plans, the place of settlement for the activities of the knowledge-based and international economy can be specified using the suggested methodology and the results of this research with a more accurate touch and symmetric with the true demands of the mentioned institutions.

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