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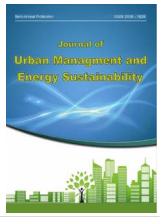

ORIGINAL RESEARCH PAPER

Presentation of urban creativity and innovation conceptual framework in approach to knowledge-based urban development, case study: Tehran

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ABSTRACT

Today, the world has taken a fundamental step from traditional development to knowledge-based development. Knowledge-based urban development is a controversial topic among international organizations, competent authorities in cities, as well as researchers. The necessity of research has been showing that the future of urban areas, especially in developing countries, increasingly depends on the capacity to produce, absorb, retain and strengthen the knowledge. The purpose of this study is to present a conceptual framework of urban creativity and innovation with a knowledge-based urban development approach in Tehran. Therefore, firstly, by descriptive-analytical method, the criteria and indicators of urban creativity, urban innovation and urban knowledge-based development were extracted from theoretical foundations, patterns and experiences. Then by Delphi method, they were screened and stabilized in three rounds. Quantitative data from Tehran were extracted and compared with Melbourne which is one of the first knowledge-based cities in the world.

The results of this study show that to achieve knowledge-based urban development, knowledge is necessary but not enough in other words, it can be said that creativity is at the heart of knowledge and knowledge is practical when it leads to innovation. These three variables are necessary and are intertwined in such a way that the achievement of a knowledge-based city is not possible by eliminating any of these cases. Moreover, the comparison of knowledge-based urban development indicators in Tehran and Melbourne as a model shows a huge difference in the 44 indicators introduced and proves the need for a codified model to turn Tehran into a knowledge-based city. Finally, this model was presented according to the drivers that affect the future of Tehran. It should be noted that this model can be presented to other cities and different cities can be measured in terms of knowledge-based urban development.

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1. Introduction

Over the past two decades, knowledge-based urban development (KBUD) has been a contentious issue among international organizations, city authorities and researchers. Institutions such as the World Bank (1998) and the European Commission (2000), the United Nations and the Organization for Economic Co-operation and Development (OECD, 2001) have sought to create a knowledge development framework for strategic decisions on global development and have suggested knowledge-based urban development to improve the economic conditions of developing countries. This new approach is seen as an opportunity for these countries to participate in global competition. Knowledge-based urban development has been the focus of policy-making in many cities around the world that seek to achieve long-term competitiveness (Yigitcanlar & Bulu, 2015). Universally, the adoption of KBUD is considered as a solution to all the social, economic, environmental and spatial challenges that contemporary development is facing (Yigitcanlar & Sarmin, 2015). On the other hand, many cities around the world have gone through a process of transition from traditional economic-industrial activities to knowledge-based economic activities in order to achieve sustainable economic growth (Esmaelpourarabi, 2018). Therefore, the need to apply knowledge in the development of the 21st century has become necessary and proven. Innovation is also defined as practical knowledge (Jafari & Tabibian, 2020). Among these, we can say that creativity is the boundary between knowledge and innovation. Creativity is the product of knowledge, and creativity is achieved in the city when knowledge is transformed from thought into action. This issue, along with creative knowledge, deals with knowledge-based development. Iran has significant potential in this field. Iran ranks 30th in the world in terms of gross domestic product (GDP) in 2017 and in terms of science production is among the top 15 countries in the world in 2018 (Web of Science, 2018). 50 basic knowledge companies were registered in Iran in 2013, this number has reached 3000 companies in 2016. On the one hand, detailed and master plans that have one-dimensional look; do not meet the needs of urban development, but unfortunately they are still the main management and practical programs in Iran. On the other hand, in some steps of the decision-making process in urban areas, a technocratic approach is needed, because people do not have the necessary knowledge and awareness on many issues and the need for people with knowledge (a community of urban planning elites, knowledge managers and knowledge citizens) is felt. These factors have finally led to a large gap in an era when the world is based on knowledge, planning and management, has taken away the ability to compete from many cities in Iran. The world today looks at the issue of building and maintaining cities in a different way. In order not to suffer from urban decline and achieve sustainability, we must keep pace with the world, and this will not be possible except with the development of basic knowledge. In order for the city to pull itself out of this vortex, it must be able to solve the existing gap with knowledge and it is better to form a background to prevent the occurrence and development of this gap.

The city of Tehran, according to the studied potentials, can be among the knowledge-based cities of the world. The general purpose of this study is to provide a conceptual framework of urban creativity and innovation with a knowledge-based urban development approach in Tehran. The main question of the research is: What are the most effective criteria and indicators on creativity, innovation and knowledge-based urban development?

2. Theoretical Framework

2.1. Knowledge-based urban development

Knight first defined the term of urban knowledge-based development for cities in 1995 as "the transformation of the source of knowledge into local development in providing a basis for sustainable urban development and the social learning process in which citizens are aware of the nature of the change taking place in their cities (Night, 1995)." The knowledge-based development initially focused on economic development, but in its evolution, it has aimed at balancing the social, economic, cultural and environmental dimensions of development in a sustainable way. The goal of knowledge-based

urban development as a development approach is to bring economic prosperity, environmental sustainability, socio-spatial order and good governance to cities. In addition, this model of development encourages the production and dissemination of knowledge in a protected environment which is environmentally safe, economically secure, socially just and well-governed – knowledge of the city (Yigitcanlat, 2014). Therefore, pursuing a reliable knowledge-based urban development path can bring cities to a stage that meets the economic, social, spatial and institutional needs of the residents (Pancholi et al, 2018). The prevalence and popularity of knowledge-based development - or urban knowledge-based development - has led cities to bring up development strategies in order to develop their own basic knowledge (Yigitcanlar, 2018).

2.2. Knowledge-based cities

May and Perry (2011) argue that today's cities and regions are positioned as the most critical places for knowledge production, addressing the challenges of knowledge-based development (Yigitcanlar et al, 2015).

The city of knowledge is a city based on a knowledge-based regional economy with high value-added exports that is created through research, technology and intellectual power and is purposefully designed to encourage and reinforce knowledge (Yigitcanlar, 2014). The goal of these cities is to achieve sustainable outcomes for a perfectly balanced development (Esmaiel poor arabi & Yigitcanlar, 2016). The city of knowledge is a safe environment, with appropriate and advanced infrastructure for knowledge-based economy by knowledge managers that can attract elites from around the world as the knowledge entrepreneurs. Therefore, the city of knowledge is a sustainable and practical city that meets the human needs of the 21st century.

2.2.1. Urban creativity

Creativity is the potential knowledge in the city (Jafari & Tabibian, 2020). Creative knowledge is defined as an ecosystem of people who participate in a collection of creative and innovative ideas, provocations and inspirations. "Creative atmosphere" also refers to "all the physical and organizational mechanisms of the creative environment that together form a self-sufficient entity."

Creativity is an investment by which creative clusters can be nurtured and creative urban activities can be carried out in a suitable context (Yigitcanlar, 2018). This requires creative industries, creative staff, creative knowledge and cultural richness (Ghorbani et al. 2013). Creativity is considered as a vital resource for attracting investment and talent, which are the drivers of a city's economic vitality (Yigitcanlar & Bulu, 2016). Urban creativity is one of the key drivers for a sustainable economy.

2.2.2. Urban innovation

The term "innovation" refers to the ability to combine science and competence that leads to factors such as technology, new organizations and institutions (Carillo, 2004). The concept of innovative space was introduced in the late 19th and early 20th centuries. The term innovation has evolved throughout history and has gone through various stages (Panne, 2004; gilane, 2017). Each stage of innovation is based on the knowledge and learning of the previous stages. It, therefore, accelerates the speed and scope of innovation in the new phase (Lee & Trimi, 2021).

The key stages of innovation development are: (1) closed innovation (protection of centralized internal research and development), (2) participatory innovation (cooperation with partner organizations to create a global value chain in the form of strategic contracts, joint ventures, technology licensing and market participation agreements), (3) open innovation (searching for new sources of innovation ideas using influential collective intelligence and open source), (4) joint cooperation (participation of organizations with the same main goals) and (5) convergent innovation (the combination or integration of seemingly unrelated objects, ideas, or experiences from external sources including organizations and individuals from different industries and countries that have inspiring goals for greater benefit (Baldwin, 2016). Therefore, knowledge-based cities, through convergent innovation with two main characteristics of

problem-solving capacity and generalizability to other conditions, which we call urban innovation, make the realization of knowledge-based cities possible.

Innovation as the actual product of creativity is described as a complex social process involving new patterns of communication and interaction among actors from diverse social subsystems (science, business, government) to generate the knowledge that is the key product of an innovation system. This is a process in which actors interact and exchange tacit knowledge to develop innovative activities in a specific environment shaped by history, culture and social relationships. The main actors of innovation include: institutions (production and dissemination of knowledge that can be transformed into innovation), companies (the productive economic system that employs and regulates this innovation for production on an industrial scale) and governments (the main policy-maker and organizer, financier and supervisor of this environment (Triple Helix)) (Krama, 2015). Hence, knowledge is acquired and finds its place through innovation and creativity in a fast and easy way (Johnston & Huggins, 2016).

Furthermore, it can be said that innovation is based on existing knowledge and developing countries usually lack knowledge or knowledge-creating staff. In these countries, the production of new technology and knowledge is slower. This slows down the pace of innovation and competitiveness. That is why research and development centers are considered as new centers of knowledge production as very important components for economic development (Oudretch & Feldman, 2004; X et al. 1992; Feldman, 1994). Another point is the process of technology adaptation and derivation, through which developing countries must find the ability to create new knowledge and technology independently (Kacar & Gezici, 2016). Knowledge that creates innovation has commercial value. Thus, production systems have relatively shifted to knowledge-based systems (Kacar & Gezici, 2016).

Consequently, in order for 21st century cities to remain in competition with global cities, they need innovation and creativity in all its pillars, from the economy and business activities to the smallest aspects of urban life, which will not be possible except through knowledge (Kacar & Gezici, 2016).

3. Research background

Newsha Ismailpourarabi et al. (2018) proposed an evaluation framework consisting of a set of indicators derived from three spatial scales (regional, urban and cluster). First, the knowledge gained in this study helps city managers, planners and urban planners to gain a better understanding of the vital issues of place quality in their area of innovation, and second the proposed framework can be used to assess weaknesses and the strengths of their innovation area. Finally, the consequences of the evaluation can help them to provide innovation areas with quality and performance.

Yigitcanlar et al. (2017) fully explored the concept of the dynamics of knowledge-based development in more disadvantaged areas in regional campuses from a triple helix model perspective (university, industry, government) - which is a critical element for KBD success. The aim of this study is to broaden our understanding of the challenges of implementing a successful triple helix model in regional campuses by providing sufficient evidence from different countries such as Australia and Iceland. The findings reveal the challenges of regional campus development by highlighting critical issues related to compatibility, proper implementation, and effectiveness of the KBD policy.

Yigitcanlar et al. (2016) in the article "spatialization for knowledge production, innovation: planning and branding of knowledge-based community environments" evaluated the effectiveness of planning and branding strategies in the development of knowledge and innovation environments. The results indicate that as much as planning and branding strategies and good operations are required, it is also necessary to meet the requirements of internal and external conditions for successful location in knowledge-based community areas.

Emola Rigasler (2013) published the article entitled "knowledge-based development as a new development model". In this article, the theoretical background of knowledge-based

economics and a detailed description of the concept of KBUD are discussed in various dimensions. This study also summarizes and evaluates the most important international benchmarks related to the application of this concept. In addition, this study attempts to map the dimensions of KBUD to arrive at a model that describes this concept.

Mahmoud Jomeh pour et al. (2017) published an article entitled "Codification of Urban Development Strategies with a Knowledge-Based Development Approach (Case Study: Arak Industrial City)". With the aim of presenting urban development strategies, this article tries to analyze multiple social, economic, environmental, institutional, etc. of industrial cities and by evaluating the feasibility of industrial cities in the knowledge-based development, it presents the most effective urban development strategies focused on this approach with emphasis on the city of Arak.

Elnaz Behzadpour et al. (2021) published an article entitled "Structural analysis of drivers affecting the future status of urban competitiveness (Case study: Tehran metropolis)". It has analyzed the structural effects of drivers affecting the future state of urban competitiveness with an emphasis on KBUD. The results show that among the 43 drivers, the key effective drivers of urban governance, the quality of universities and research institutions, e-government, the existence of innovative and knowledge-based businesses, city management and market-oriented management.

Taking into account the findings of previous research, this research has addressed the common criteria of creativity, urban innovation and knowledge, which have made the knowledge-based urban development approach possible and it also identifies its data and achieves effective and practical indicators.

4. Conceptual framework

Knowledge, creativity and innovation are important factors in development. Accordingly, after reviewing the theoretical foundations, patterns and experiences through qualitative analysis of the content of the category as shown in Table 1, the criteria and indicators derived from urban creativity, urban innovation and knowledge-based urban development were obtained:

Table 2 shows the criteria derived from the conceptual model of urban creativity and innovation with a knowledge-based urban development approach. Figure 1 also shows the theoretical framework of urban creativity and innovation with the knowledge-based urban development approach.

5. Research Methods

The present study is practical in terms of goal setting and descriptive-analytical in terms of methodology. The method of collecting information is library and documents. In the first stage, data were extracted from theoretical foundations, experiences and patterns by qualitative content analysis method and screened by 20 experts in three round trips by Delphi method. Finally, criteria less than number 10 were deleted. In this study, at first, 71 indicators were obtained from the content analysis method, which after screening and consensus of experts and also due to lack of quantitative information in the metropolis of Tehran, were reduced to 44 indicators and stabilized.

5.1. Study range

5.1.1. Tehran metropolis

According to the latest general population and housing census in November 2016, the population of Tehran is 8,694,000 (50.3% male and 49.7% female). Compared to the general population and housing census of November 2011, the average annual population growth was 1.72%. In relation to knowledge-based urban development, much emphasis has been placed on the knowledge-based economy in this city. In twelve programs to achieve a part of sustainable development and resistance economy, the development of knowledge-based economy is considered and the knowledge-based plan of economy and society is mentioned in these programs. In reviewing the history of the knowledge-based economy, the general policies of the Fourth Five-Year Development Plan emphasize the effort to achieve a diverse economy based on knowledge and awareness resources and sustainable knowledge-

Table 1. Selected criteria and indicators of knowledge-based urban development

Number	Common codes	Common extracted views	The main criteria	Indicators
1	[1]A6-A7-A10-A17-A20 -B1-B2-B4-B10-B11-B12-C1-C2-C3-C4-C5-C6-C7-C8-D2-D3-D5-D8-D9	-Human knowledge -Knowledge infrastructure -Knowledge staff -Human capital -Highly talented people	Knowledge creating employees	-Having 20% of highly skilled employees in the workforce -Literacy rate level -Level of education -Capitation level of knowledgeable employees
2	A6-A10-A11-A12-A17-A18-A21-B1-B2-B4-B6-B8-B10-C4-C5-C6-C7-D1-D4-D10	-Economic knowledge -Economic infrastructure -Knowledge-based economy -Market knowledge -Economic quality -Market-oriented management -Knowledge infrastructure related to economics global	Knowledge economics	-Number of creative, innovative and knowledge-based industries -Level of knowledge employment -Level of investments in the knowledge affairs of the city -Number of knowledge-based productions -Number of suitable housing for knowledgeable employees
3	A5-A18-A22-B1-B7-B8-B11-C1-C3-C4-C7-D1-D2-D5	-Good ruling -Transparent knowledge management -Institutional arrangements -Those who are involved in knowledge -Institutional quality -Organizational quality	Knowledge management	-Level of vision and organization -Level of government services with electronic facilities -Electronic awareness level (transparency) for application in planning -Number of departments dedicated to knowledge management in government, such as municipalities
4	A1-A2-A5-A8-A17-A18-A22-A24-B5-B7-B8-C1-C2-C3-C4-C5-D1-D2-D5-D7	-Environment -Physical infrastructure the environment -Environmental quality -Knowledge ecologies -Physical form -Physical infrastructure -Physical environment -Quality of place	Creative environment	-The level of government budget for public transport -The level of government budget for environmental programs -Ecosystem innovation number -Number of R&D centers -Number of knowledge industry locations in the urban plan -Number of universities

Table 2. Criteria extracted from the conceptual model of urban creativity and innovation with an urban knowledge development approach

Criteria	Abundance
Technology and communication	6
Innovative and knowledge-based management	15
knowledge creating employees	23
Knowledge-based and creative environment	17
Creative industries	4
Knowledge-based economics	13

based economic growth and knowledge-based development as one of the four general purposes of these programs is stated. On the other hand, the second ideal of the 1404 vision document of Tehran is knowledge-based city, intelligent and global.

5.1.2. Quantitative data collection method

Data were obtained through the website of the Statistics Center of Iran, the Central Bank, municipalities in relation to the city of Tehran. It should be noted that the data have been reviewed in the period of 1954 to 2016.

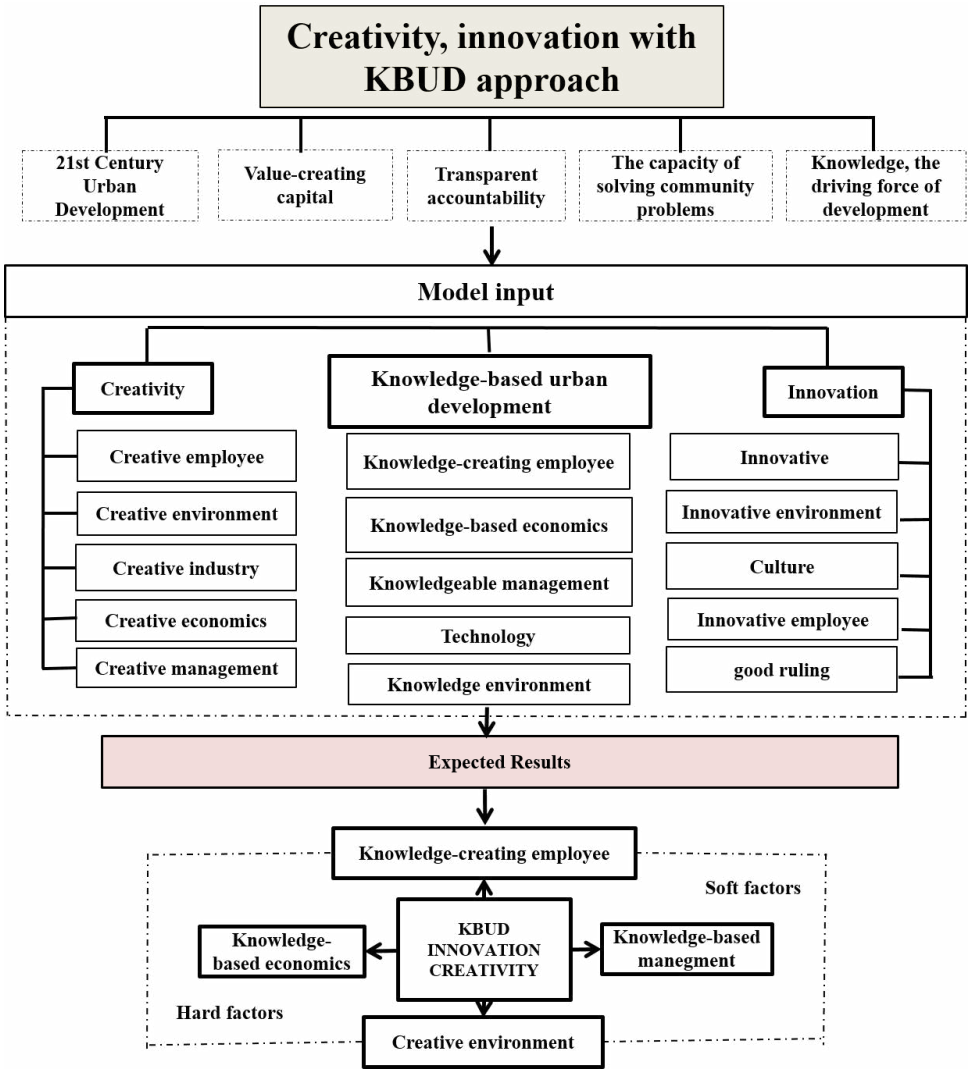

Fig. 1. Theoretical framework of urban creativity and innovation with knowledge-based urban development approach

6. Research Findings

At this stage, the index and quantitative data extracted from the three variables of creativity and urban innovation and urban knowledge-based development in Tehran are identified and then compared with the published results of Melbourne as a knowledge-based city in the global arena. 15 data were extracted from the urban creativity variable, 16 data from the urban innovation variable and 13 data from the knowledge-based urban development variable in Tehran and Melbourne. These criteria and quantitative data are given in Tables 3 to 5.

As the three tables of variables of urban creativity, urban innovation and knowledge-based urban development show that Tehran has significant differences with Melbourne as one of the first knowledge-based cities in the world in the 44 indicators which are studied. Although the city of Tehran has sporadically taken steps towards the vision of 1404 (knowledge-based city), unfortunately this development is far from the current and unbridled development of Tehran, and the city of Tehran must go a long

Table 3. Criteria and quantitative data of urban creativity in Tehran and Melbourne

	Creative economics			Creative employees						Creative environment			Creative management	
city	Number of universities	Percentage of R&D expenditure on GDP	Percentage of international foreign direct investment	Percentage score of world rankings of universities	Number of students	Population density in terms of person per square kilometer	Percentage of literate people	Number of mobile users	Population growth rate	Number of international patents registered in the city in one year	Educational level capitation	Infrastructure of knowledge places of the city area	Gini coefficient	Number of active individual internet banking customers per 1000%	Percentage of participation and cooperation of knowledge and innovation agents and creativity in creating, distributing and applying knowledge
Tehran	137	17.2	0.0036	13.2	902873	12200	97%	84%	17	4.15	4.98	0.0001	0.385	125874	40.2
Melbourne	20	0.064	0.0232	90.124	166526	1500	-	-	1.89	113.7	-	0.008	0.336	-	91.25

Table 4. Criteria and quantitative data of urban innovation in Tehran and Melbourne

	Innovative economy					Innovative employees			Innovative environment				Good governance			
city	GDP capitation	Number of knowledge and innovation centers (science and technology parks + growth centers)	Number of knowledge-based industries	Number of multinational headquarters	Percentage of the city's international score in an innovative economy	Percentage of people with postgraduate education of the total labor force	Number of people in creative industries	Percentage of businesses using ICT space to total businesses in the city	Recreational and cultural facilities capitation in the city	Number of university research and development centers related to industry from all development research centers in the city	Number of R&D centers	Number of knowledge-based companies	Number of government services with electronic facilities	Percentage of knowledge management in organizations and interaction between them	The amount of government spending on education in GDP	The amount of government budget for public transportation
Tehran	1.33	244	6777	24	6.1	0.0360	9760	15.3	1.58	8.2	65	1525	128	30	8.9	61370
Melbourne	38.14	-	4.731	-	17	0.095	20.34	58.4	115.2	8	599	-	-	91.25	29.31	-

Table 5. Criteria and quantitative data of knowledge-based urban development in Tehran and Melbourne

	Knowledge-based economics			Knowledge creating employee		Knowledge				Knowledge management			
city	Number of research and development investments from the whole country	Percentage of use of sustainable transportation style	Number of commercialization companies	Number of knowledgeable employees	Number of researchers per million	Number of international cultural events in a year	Number of knowledge industry locations in the urban plan	Green space capitation	Percentage of intra-city public transport infrastructure score	Percentage of employing knowledge managers in organizations	Ability to access digital content	Number of manpower employed in the public sector	Percentage of public Investment in knowledge-based and innovative activities to the global average
Tehran	-	13	291	18603	1655	50	0	24	3.73	30	19.58	23540	0.3
Melbourne	599	0.52	26.60	321570	-	165	5	116.4	2.56	91.25	115.2	-	2.01

way to become a knowledge-based city. All indicators in the four categories of economy, environment, institution and knowledge staff should be developed simultaneously with regard to infrastructure, and these components are necessary due to the close relationship.

7. Conclusion and Discussion

This study examines the three variables of urban creativity, urban innovation and knowledge-based urban development in Tehran and presents two important achievements. First, the theoretical framework of the research shows that the knowledge-based urban development is not possible unless the three variables of knowledge, creativity and innovation all work together in one city to finally achieve the city of knowledge-based. Creativity is at the heart of knowledge, and when it becomes a business knowledge and the idea turns into action, we can say that creativity has become an innovation (Figure 2). It should be noted that the innovative city is a creative city, but not every creative city

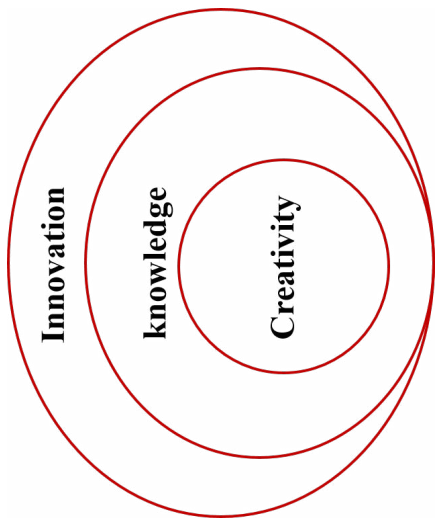

Fig. 2. Status of creativity, knowledge and innovation

can be an innovative one because in the creative city only the idea is current and divergent and even short-lived, but in the innovative city there is a commercial action and product and it is

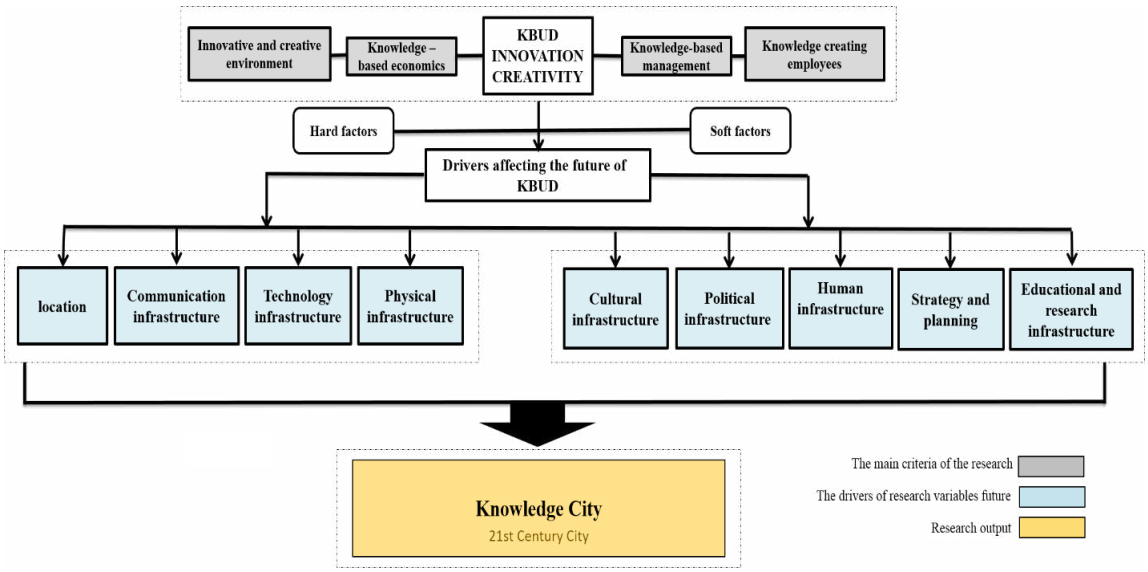

Fig. 3. The model of creativity and urban innovation with a knowledge-based urban development approach

convergent and long-term. The knowledge-based city is an innovative city.

But the second achievement is that the city of Tehran, when it strengthens the four components mentioned in each variable, can implement the vision of a knowledge-based city. The city has a lot of potential, including human capital, universities and global scientific achievements, global competitiveness, as well as a strategic environmental situation, but institutionally it has not yet succeeded in managing knowledge and a comprehensive plan for urban knowledge development. This will not be achieved unless it attracts knowledge employees, both native and foreign, which is necessary to improve the quality of life in this city, because the creative and knowledge employees are elusive, and they will stay in one city if the qualified living conditions are provided for them. Finally the presented conceptual framework with considering the drivers affecting the future of Tehran as a model of creativity and urban innovation with a knowledge-based urban development approach is proposed in Figure 3. The model shows that knowledge-based urban development, creativity and urban innovation has four components of knowledge-creating employees, knowledge-based management, knowledge-based economy and innovative and creative environment. Propellants affecting the future of KBUD are divided into two categories: soft factors and hard factors. Soft factors include educational and research infrastructure, strategy and planning, human infrastructure, political infrastructure and cultural infrastructure. Moreover, hard factors include physical infrastructure, technology infrastructure, communication infrastructure and location. The combination of these factors ultimately leads to the creation of a knowledge-based city that is the sustainable city of the 21st century.

The city of Tehran, like other cities in Iran, has several challenges related to the knowledge-based urban development. One of the challenges is the lack of integrated urban management to achieve knowledge-based urban development because the lack of integrated urban management leads to functional division, program policy divergence, territorial division, division due to multiple stakeholders and influential elements in power, divisive government policy, segregation of laws and regulations, segregation of communication and information infrastructures, as well as segregation of financial capacity. Another challenge is the lack of effective communication between universities, units and educational institutions with growth centers or knowledge-

based industries, which causes parallel work and ultimately the lack of infrastructure and facilities and the escape of knowledge-based employees from the knowledge fields. On the other hand, little attention is paid to the industrialization of products in science and technology parks and inappropriate monitoring of the functions of the establishment units. Another important challenge in relation to a passive society is that it does not participate, especially in urban affairs, and has led to social division. This leads to the implementation of top-down projects, monotonous and far from innovation and creativity, which is now obsolete in the world. This has led to disregard for the natural and cultural context of cities, and in other words, in a city like Tehran and similar cities, has led to mass production and extraction of inefficient designs in today's competitive world. Another challenge is the lack of knowledgeable employees, which is also rooted in politics and society. Yigitcanlar, a leading researcher in the knowledge-based urban development in the model of sustainable and smart development (2014, 2018), proposes the urban development of basic knowledge in four criteria of knowledge development, including: economic, socio-cultural, urban environment and institutional. Pourarabi has done research in line with the opinions of Yigitcanlar and in line with the above four criteria of this researcher with an emphasis on knowledge, as well as Carillo, one of the other prominent researchers in this field, on important points such as strategic initiatives, conceptual and technical capacity, leadership committed to express the social system, he has mentioned the relationship with the institutions in knowledge innovation. On the other hand, Ergazakis, another pioneer in relation to the basic knowledge city, considers "an environment suitable for business, individuals and the environment-friendly government" as one of the important priorities in the knowledge-based urban development. It should be noted that in internal research, four components of Yigitcanlar have been used based on the knowledge variable. This research, in order to complete the mentioned cases that have emphasized knowledge, in addition to knowledge, creativity and urban innovation are also important and based on extensive research in this field, it notes that knowledge without considering the components and indicators of creativity. And the innovation is deficit and the knowledge-based urban development and the output of that knowledge-based city is impossible. Considering that the relationship between creativity, innovation and knowledge is specified in Figure 2, in relation to the knowledge-based urban development, the components and indicators of all three variables must be considered together to reach the knowledge-based city, which is shown in Figure 3.

In order to achieve knowledge-based urban development in Tehran, the following suggestions are presented:

- Increase of financial support for knowledge development as well as knowledge resources and research-development
- Creating different and separate resources such as: creativity resources, knowledge resources, development resources
- The importance of paying attention to the health and safety of society for the presence of people of different nationalities
- Creating conditions and opportunities for the presence of different ethnicities and nations in the metropolis of Tehran in order to promote cultural and social diversity
- Long-term and healthy cooperation of the university with industries in the field of research and development partnership
- Strengthening the culture of entrepreneurship in society
- Connecting with global knowledge-based cities and participating in international knowledge projects
- Create, share, evaluate and update knowledge
- Creating knowledge communities that provide "timely knowledge" when needed
- Strengthening business culture
- Strengthening and developing the diverse and skilled workforce of the city at the regional, national and global levels in order to attract global projects
- Creating a strong knowledge network at the city, regional, national and international levels

In the end, it is suggested for future research to examine the knowledge-based economy in developing countries compared to developed countries.

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