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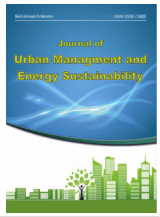

CASE STUDY RESEARCH PAPER

Explaining the factors affecting the sustainable development of Tehran with an emphasis on the components of a creative city

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ABSTRACT

The problems of Tehran not only harm the process of sustainable development but also lead to social issues and inappropriate civic behaviors. Given the complexity of these challenges and the high costs associated with traditional solutions, leveraging the principles of a creative city is an effective approach to utilizing urban capacities for sustainable development. This research aims to examine the impact of creative city components on the sustainable development of Tehran. In the first part, the indicators of a creative city and urban sustainable development are outlined, followed by an analysis of how these components affect sustainable development. Finally, strategies for the sustainable development of Tehran emphasizing the creative city approach are presented. This research is developmental in nature and utilizes a combination of quantitative and qualitative approaches. In the qualitative section, purposive sampling was employed, with semi-structured in-depth interviews conducted with five specialists, and data were analyzed using thematic analysis. In the quantitative section, data were collected and analyzed from a standard 43-question questionnaire based on a Likert scale among 234 urban experts. The results of the data analysis using LISREL software showed that the indicators of "Research and Development Spaces," "Cultural and Recreational Places," "Creative Class," "Ethnic-Cultural Diversity," "Technology," and "Creative Eco-Industries" have a positive and significant impact on the sustainable development of Tehran. Finally, recommendations are provided in three areas: creative environment, cultural vitality, and managerial infrastructure.

Running Title: The sustainable development of Tehran with an emphasis on the components of a creative city

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42	06	03

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INTRODUCTION

Cities, as centers of human gathering, have always faced complex issues such as environmental pollution, crowding, economic problems, and social inequalities. Tehran, in particular, confronts challenges including air pollution, excessive building density, low technology levels, unemployment, and management issues due to its position as the capital of Iran and a cultural and economic hub. These challenges not only disrupt sustainable development but also lead to social anomalies and a decreased quality of life for residents. In this context, achieving sustainable development has become increasingly important as a long-term strategy for addressing urban problems and improving social well-being (Rodrigues & Franco, 2020). Sustainable development is a multidimensional concept that encompasses three main pillars: economic, social, and environmental. It emphasizes meeting the needs of the current generation without jeopardizing the resources and capabilities of future generations (Ratiu, 2013). Given the limitations of traditional urban management methods and the ineffectiveness of many existing policies, innovative approaches like the creative city model have emerged as comprehensive solutions for urban challenges and achieving sustainable development. A creative city relies on creativity and innovation to address social, economic, and environmental issues, leveraging its cultural and human capacities to provide innovative solutions (Winter & Le, 2020).

The Creative City model, first proposed by Charles Landry in the 1990s, is based on the principle that creativity and innovation can act as the main drivers of urban development and improve the quality of urban life by leveraging cultural and social capital (Liu et al., 2020). According to this approach, cities will be successful if they can provide a conducive environment for the growth of creativity and use intangible assets such as culture, art, and innovation to solve their challenges (Rodrigues & Franco, 2020). This perspective has been accepted, especially in developed countries, as a model for promoting urban regeneration and increasing social well-being (Lawton et al., 2010). Within the framework of the Creative City theory, there are three fundamental elements that play a vital role in shaping and advancing this approach: cultural and economic infrastructure, creative leadership, and the presence of a creative class (Ponzini & Rossi, 2010). These three elements interact with each other, and the formation of a creative city requires balanced development of these areas. Global experiences show that cities such as London, New York, and Seoul have been able to achieve significant achievements in the field of sustainable development and improve the quality of life of citizens through investment in these dimensions (Rodrigues & Franco, 2020; Yum, 2020). Despite having significant cultural capacities, prestigious universities, ethnic diversity, and rich social capital, the city of Tehran has not been able to effectively exploit these potentials on the path to sustainable development (Umney & Symon, 2020). Severe air pollution, unbalanced congestion and density, and social inequalities are among the problems that have faced the Iranian capital with serious challenges. One of the main reasons for this inefficiency is the lack of attention to creative capacities and the inability to create the necessary infrastructure for creativity to emerge in different urban dimensions (Goldberg-Miller, 2019). Studies have shown that the use of the creative city approach can pave the way for sustainable development in Tehran (Winter & Le, 2020). By emphasizing innovation, promoting a cultural space, and supporting creative industries, this approach can lead to reducing social inequalities, knowledge-based economic development, and increasing citizen participation in urban management (Nohara et al., 2016). However, the lack of comprehensive research that explains the relationship between the components of a creative city and sustainable development is considered one of the main obstacles to realizing this approach in Tehran (Rodrigues & Franco, 2020). Although large cities contain unique creative talents and resources, if social, cultural,

and economic inequalities exist in these environments, the full realization of the creative city model will not be possible (Winter & Le, 2020). In this context, comprehensive understanding of existing urban capacities and developing specific strategies to support innovation and creativity can provide a suitable platform for sustainable development (Goldberg-Miller, 2019).

This study aims to investigate the impact of creative city components on the sustainable development of Tehran. In the first part, the indicators of creative city and sustainable development are analyzed, and then the relationship between these two concepts in the urban context of Tehran will be examined. For this purpose, the present study uses a mixed research approach and uses semi-structured interviews and theme analysis in the qualitative part, and structural equation analysis in the quantitative part, to test the research hypotheses. The results of this study can provide effective solutions for improving the quality of life of citizens, reducing urban problems, and improving the environmental and social situation of Tehran. Also, by providing practical strategies for urban management based on the creative city approach, this study can help policymakers and urban managers in formulating long-term sustainable development plans. Finally, given the increasing importance of creativity and innovation in the development of future cities, the present study attempts to achieve a better understanding of how to exploit cultural and human capacities to achieve sustainable development in the metropolis of Tehran.

MATERIALS AND METHODS

Creative City

The creative city can be regarded as a "conceptual umbrella" that encompasses and integrates various dimensions of economic, social, and technological creativity (Hölzle et al., 2020). This concept seeks to answer questions about why certain urban spaces are more attractive for creative activities and what factors draw creative activities to an urban environment. In other words, the creative city is an environment that emphasizes intellectual and cultural capital, providing a suitable framework for innovation and the generation of new ideas (Staniulyte, 2017). The creative environment consists of two components: "hard infrastructure," which includes buildings and research institutions, cultural facilities, and urban services, and "soft infrastructure," which includes skilled labor, social networks, and human interactions (Markusen, 2014). This environment enhances the flow of ideas through formal and informal networks, such as clubs and open discussion meetings, and creates broader communications through face-to-face interactions or information technology (Landry, 2008: 133). Richard Florida (2012) introduced the city as a vessel for creativity and a driving force for economic and social development. In this view, creative cities can attract talent by creating frameworks for innovation and addressing complex urban issues through active citizen participation (Mould, 2015). Indeed, the creative city emphasizes intellectual innovation and interaction between government entities, the private sector, and non-governmental organizations, rather than relying solely on physical production (Tajudeen, 2008:60). Studies have shown that creative cities are at the core of the development of the creative class and creative industries. These cities have the capability to provide innovative solutions to urban problems by focusing on cultural production and enhancing human capital (Doyle & Mickov, 2016). Furthermore, the creative city model, as a novel strategy in urban planning, aims to improve quality of life through the integration of technology and human creativity (Goldberg-Miller, 2019).

Creative City Indicators

Measuring creativity in cities has always been one of the main challenges for researchers, because creativity is an intangible concept and an intangible asset. Despite this challenge, there have been numerous attempts to define and measure this concept in urban planning. One of the most influential approaches in this field

is the framework presented by Richard Florida (2002). He proposed two key indicators to define and measure creativity in cities: the creative class index and a set of indicators of talent, technology, and tolerance. According to Florida, the creative class is a multifaceted concept that refers to a group of people who produce new and meaningful forms and ideas. This class is considered the core of economic growth and plays a pivotal role in the economic development of cities. The set of indicators of talent, technology, and tolerance have also been introduced as key criteria for measuring creativity in cities. For example, this set of indicators has been used to analyze the performance of Baltimore as a creative economy (Acs & Megyesi, 2009). They have also been used to create city branding and examine regional similarities and geographical locations in the Czech Republic (Kloudova & Stehlikova, 2010). Complementing the Florida framework, another set of indicators has been proposed by Yam (2020), which includes the creative class, creative infrastructure, and culture. These three indicators provide a more comprehensive understanding of creativity in urban planning. Creative infrastructure refers to the physical and digital environments that support innovation and creativity. Culture also plays a key role in the development of creativity as a platform for the exchange of ideas and fostering social interactions. This set of indicators aims to provide a more comprehensive picture of creative processes and their relationship with urban development.

Another approach that has been proposed in defining and measuring creativity in urban planning is the Contemporary Creative Cities Indicators (Rodrigues & Franco, 2020). This set of indicators is known as a comprehensive and global tool for the integrated assessment of creativity in cities. According to this perspective, creativity, intelligence and urban sustainability are considered to be the three main factors in shaping creative cities. These elements are not only defined as the foundations of the formation of contemporary cities, but also the main pillars of economic development. In the framework provided by the European Union (2017), creativity is measured through three main indicators of cultural vitality, creative economy and favorable environment. These factors contribute to the development of creativity by improving the quality of life and facilitating social interactions. Urban intelligence, as the second main dimension of contemporary creative cities, is based on information and communication technologies (Angelidou, 2017). These technologies increase the efficiency of urban services by providing innovative solutions and lead to an improvement in the quality of life of citizens. The third dimension, urban sustainability, focuses on urban governance strategies (Trivellato, 2016). These strategies help to achieve long-term sustainability by emphasizing resource management, environmental impact reduction, and social justice. According to Hatuka et al. (2018), paying attention to creativity and intelligence indicators in contemporary creative cities facilitates urban economic development, while focusing on urban sustainability strengthens social and environmental development. In general, creative city indicators consist of a diverse set of cultural, technological, and social criteria, each of which refers to an aspect of sustainable and innovative urban development. These indicators help urban managers and planners to better understand creative processes and formulate policies that lead to increased competitiveness and improved quality of life in cities.

Providing a model of creative city indicators

Based on the characteristics extracted from the review of scientific literature and interviews with five specialists and researchers in the field of the creative city, the indicators of the creative city have been refined and detailed under the three components of "creative environment," "cultural vitality," and "managerial infrastructure." Each of these components and their related sub-indicators will be examined in detail.

1- Creative environment

Creative environment refers to the set of infrastructures and spaces that enable creativity to emerge. Providing these infrastructures not only develops creative opportunities, but also increases productivity and enhances innovative capacities in the city. In other words, creative environmental infrastructures are recognized as one of the main pillars of urban vitality (Creative Cities International, 2011). Factors affecting the formation of creative environments can be divided into two main parts:

A) Research and development spaces

- Universities play a key role in shaping creative environments. These institutions are not only centers of knowledge production and innovation, but also act as drivers of economic development in urban areas (Yum, 2020). Cities that score highly on creativity indices often host large research universities (Florida, 2012). Prominent examples of this influence are Boston and Silicon Valley, whose creative development has been dependent on the presence of prominent universities such as MIT and Stanford (Powell, 2007).

B) Cultural, recreational and leisure places and buildings

- Public spaces, especially parks and natural environments, play an important role in fostering creativity (Vanolo, 2008). Research has shown that relaxation and social interactions in cultural-recreational spaces have a positive and significant impact on creativity (Beaty et al., 2014; Ritter et al., 2012). These places not only help generate new ideas, but also help develop the creative capacities of the city by attracting talented individuals (Landry, 2008).

2- Cultural vitality

Culture, as the main platform for creativity, plays a fundamental role in the development of creative cities. Culture not only inspires new ideas, but also shapes the cultural and social identity of the city and creates the basis for creative interactions among citizens (Yum, 2020). Therefore, cultural vitality is considered one of the essential components in measuring urban creativity (Carta, 2009). This component consists of two main parts:

The presence of the creative class

- The creative class refers to a group of people who are involved in the production of cultural products and artistic activities. This social group is the driving force of the creative city and is known as the main factor in the formation of creative industries and the economic development of the city (Florida, 2002). The presence of this class not only increases innovative capacities, but also transforms the urban space into a platform for cultural and social interactions.

Ethnic and cultural diversity

- One of the main characteristics of a creative city is its multiculturalism and multiethnicity. Cultural diversity is the basis for generating ideas and creating new solutions to urban problems and is considered an important factor in the formation of collective creativity (UNESCO, 2001). According to Kamounian (2011), local cultural assets, including cultural facilities, social culture and cultural diversity, form the core of creative city development. Also, the Creative Society Index (2005) lists three key elements for creative communities: cultural literacy, cultural participation and professional production of cultural goods and services.

3- Management infrastructure

Creative management infrastructures include institutions, tools, and policies that create the conditions for the creation, development, and implementation of innovative ideas in a city. As a supporting factor, these infrastructures play a fundamental role in facilitating creative interactions and supporting urban innovations. The factors influencing the formation of creative management infrastructures can be categorized into two main parts:

Technology

- Access to information and communication technologies (ICT) not only enables the introduction and expansion of creative industries on a global scale, but also helps to attract and retain the creative class in the city. These technologies are essential tools for the efficient management of creative resources and the promotion of urban competitiveness (Angelidou, 2017). In addition, ICTs strengthen city branding, making the city an attractive destination for investment and innovative activities.

  Creative industries, ecosystem building and entrepreneurship development

- Creative industries, as the core of the 21st century economy, play a pivotal role in the development of creative cities (Colomb, 2012; O'Connor, 2004). By creating job opportunities and attracting creative talents, these industries strengthen the competitive advantage of cities and increase urban income. For example, in the UK, creative industries create nearly one million jobs and account for 4% of GDP. These industries generate £7.5 billion in export revenue for the country annually (British Council, 2010). Therefore, developing entrepreneurship in the creative industries sector has been proposed as a key strategy for realizing a creative city (Beaty et al., 2014; Takeuchi et al., 2011).

Presenting a conceptual model of a sustainable creative city

Based on the summary of the creative city indicators and the proposed pattern of the three requirements of the creative city, the conceptual model of the research is presented as shown in Figure (1). In the following research, this conceptual model is evaluated in Tehran and the impact of each of the defined indicators for the creative city in creating, maintaining, and strengthening the sustainable development of Tehran in each of the areas of economic, social, and environmental sustainability is examined. (Fig. 1)

Analysis of global experiences based on the conceptual research model

The Nottingham Experience: Creative Commercialization of the Environment

Nottingham is one of the leading cities in England that, by adopting the strategy of "creative commercialization of the environment," was able to achieve sustainable development alongside addressing economic challenges. This approach was based on two main axes: first,

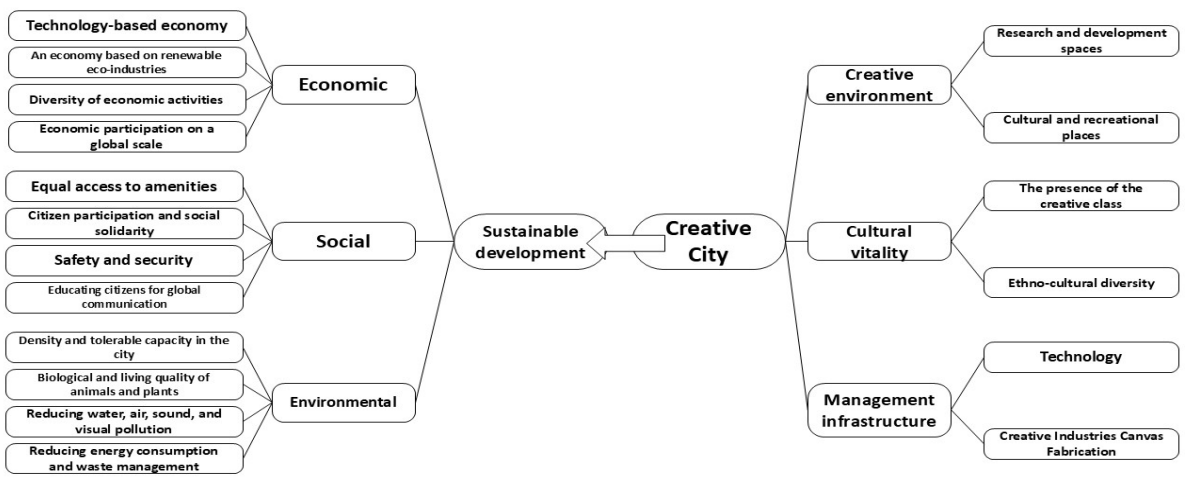

Figure 1: Conceptual research model

"ecological modernization," which emphasized the economic value of environmental assets, and second, "promoting individual behavioral change," which encouraged citizens to accept environmental responsibilities and change their lifestyles (Winter & Le, 2020). Key actions taken by this city included reducing carbon dioxide emissions, investing in renewable energy, establishing the "Robin Hood Energy" company to provide clean and affordable energy, and imposing taxes on urban parking. These policies transformed Nottingham into one of the successful models of sustainable development and urban creativity in England. Nottingham's experience demonstrated that creativity and innovation can serve as effective tools for simultaneously addressing economic and environmental crises. The city's policies, emphasizing citizen behavior change and strengthening clean energy infrastructure, provided a successful example of integrating economic development with environmental protection. This experience highlights the importance of collaboration among government entities, the private sector, and civil society in achieving sustainable development goals. However, the success of this model depends on continuous financial support and broad citizen participation, along with the need for ongoing monitoring and evaluation to maintain its positive outcomes. (Fig. 2)

The New York Experience: Reviving Urban Charm Through Culture and Arts

After the terrorist attacks on September 11, 2001, New York City faced extensive economic and social crises. To address these challenges, the New York City government utilized culture and the arts as tools for urban reconstruction (Goldberg-Miller, 2019). These policies were based on a combination of two approaches: "top-down" and "bottom-up." In the first approach, the municipality strengthened the city's cultural identity by investing in cultural infrastructure, such as the development of museums and galleries. In the second approach, local creativity was supported, and programs were designed to provide financial assistance to artists and creative

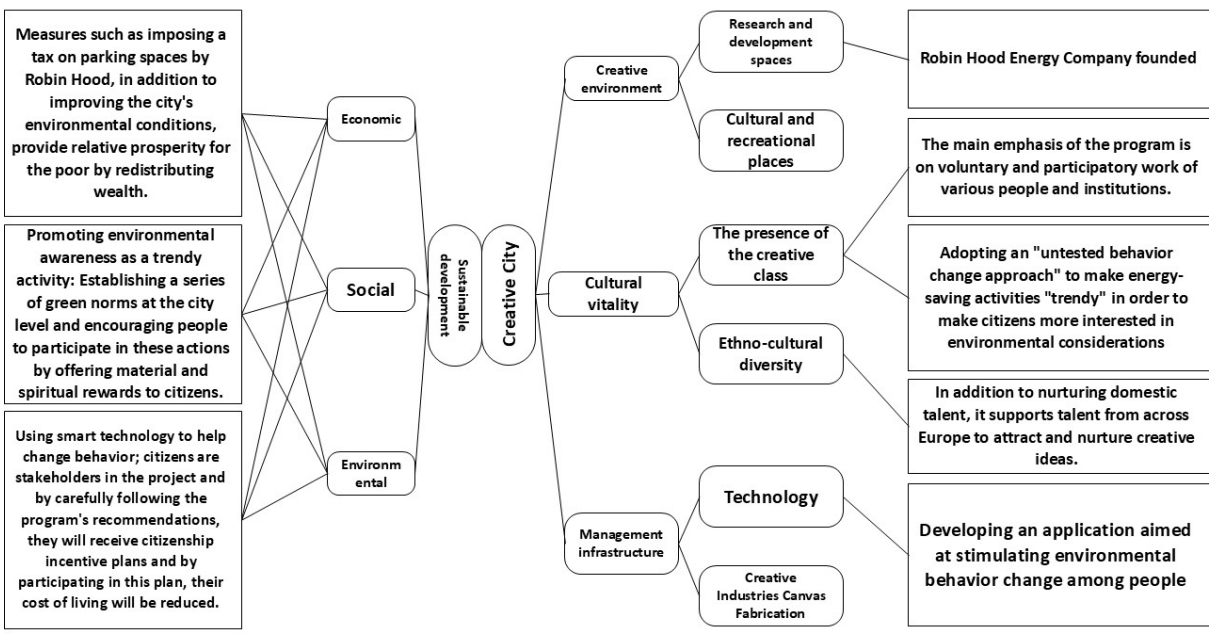

Figure 2: The most important actions of the Nottingham 2020 Plan in line with the sustainable development indicators

entrepreneurs. These actions transformed New York into a successful model for using art and culture for urban reconstruction and enhancing social interactions. New York's experience demonstrated that art and culture are not only tools for economic reconstruction but also play a significant role in reviving social identity and reducing psychological tensions after a crisis. These policies, combining both governmental and participatory approaches, allowed New York City to regain its status as a global cultural and economic center. The success of this initiative underscores the importance of interaction between policymakers and local communities. However, this approach requires sustainable financial resource allocation and attention to cultural diversity to engage all social groups in the urban development process. (Fig. 3)

The Sub-Saharan African Experience: Social Innovation for Sustainable Development

In southern sub-Saharan Africa, developmental challenges such as widespread poverty, lack of infrastructure, and environmental crises prompted policymakers to turn to social innovation as a creative solution for advancing sustainable development (Mbaye & Pratt, 2020). This approach emphasizes strengthening local capabilities, utilizing modern technologies, and creating employment based on indigenous resources. Programs such as the development of renewable energy, vocational skills training for youth, and support for social enterprises are examples of these innovations. The main focus of these policies has been on community participation and empowering individuals to solve their own environmental and social problems. The experience of southern sub-Saharan Africa shows that social innovation can be a sustainable and effective solution in communities facing extensive developmental challenges. This approach, emphasizing the empowerment of local communities and the use of indigenous technologies, led to a bottom-up development based on the real needs of the people. However, the success of these policies depends on sustainable access to financial resources, international

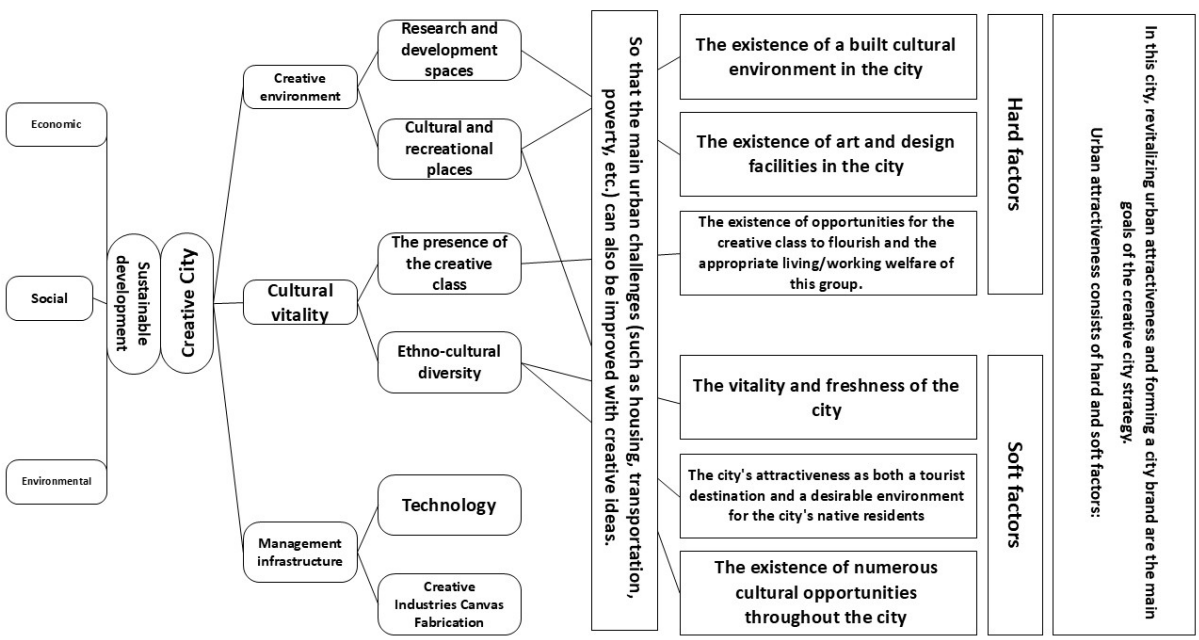

Figure 3: New York's most important actions to revive urban attractiveness based on the Creative City model

cooperation, and ongoing government support. On the other hand, this experience demonstrated that only through active citizen participation and the promotion of innovation can sustainable development and the reduction of inequalities be achieved. (Fig. 4)

According to charts (2), (3), and (4), the set of actions from the Nottingham 2020 program comprehensively covers the indicators of creative cities and sustainable development, and the achievements of the project implementation clearly indicate the level of success of the plan. The project for revitalizing urban appeal in New York offers a newer perspective on the creative city model and attempts to provide a creative response to urban issues by connecting the hard and soft factors influencing urban appeal with the indicators of a creative city. The project in southern sub-Saharan African cities is at a relatively earlier stage compared to the two previous plans. Given the limitations of academic research in this field, the main emphasis of researchers in this project is on urging urban researchers to pay more attention to the creative city and creative economy in academic studies; therefore, all proposed actions in this project are also presented in the first and second stages of the creativity cycle. It is expected that by strengthening the research and development spaces of these cities and focusing on cultural and recreational places, a suitable environment will be created for the formation of a creative environment for innovative ideas to emerge. Furthermore, the presence of the creative class and ethnic and cultural diversity in the city is expected to contribute to the cultural vitality of the city and provide an interactive platform for nurturing creative ideas. After establishing the requirements for a creative environment and cultural vitality in the city, one can move on to the third stage of the creativity flow cycle.

Methodology

This research is considered developmental in terms of its objective, as it aims to provide strategies for the sustainable development of Tehran with an emphasis on the indicators of a creative city. The developmental nature of the research focuses on developing solutions

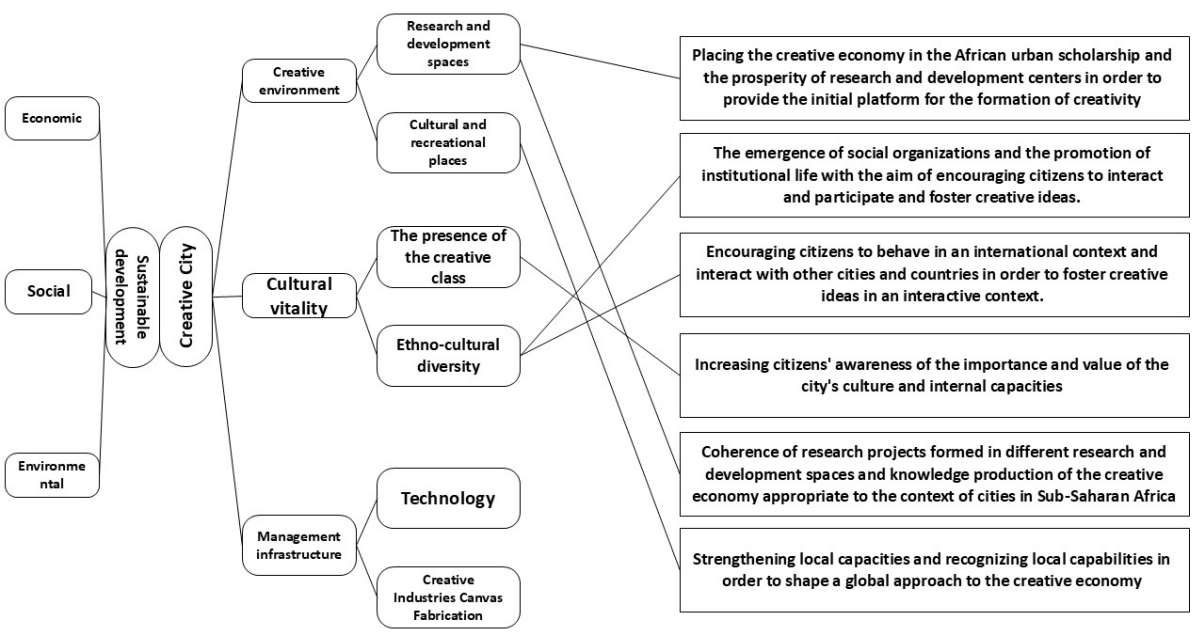

Figure 4: The most important actions of cities in sub-Saharan Africa in line with the Creative City Strategy

that can contribute to improving the indicators related to sustainable development in urban planning. Additionally, this study is descriptive and survey-based in terms of methodology. This choice is made because the aim of the research is to describe existing features and conditions, examine the relationships between variables, and analyze the impact of creative city indicators on the sustainable development of Tehran. The descriptive-survey method allows the researcher to collect the necessary data through various tools and study the current situation in detail. This research utilizes both qualitative and quantitative approaches. In the qualitative section, in-depth semi-structured interviews have been employed to extract the main indicators of a creative city and develop a conceptual model. The semi-structured interview provides the necessary flexibility for deeper exploration of the participants' opinions and allows the researcher to ask new questions based on the interviewees' responses if needed. In this study, five specialized researchers in the field of creative cities and sustainable development were selected using purposive sampling for data collection. The selection of these individuals was based on their expertise, experience, and deep familiarity with the concepts of creative cities and sustainable development. Data analysis from the interviews was conducted using thematic analysis, which enabled the extraction of key themes related to the indicators of a creative city and the formulation of the research's conceptual model. In the quantitative section of the research, a survey method based on a questionnaire was used. This questionnaire was specifically designed to measure the impact of creative city indicators on sustainable development in Tehran and is structured with closed-ended questions. The research questionnaire consists of 43 items divided into two sections: sustainable development indicators and creative city indicators. For each indicator, 2 or 3 items were defined to measure its various aspects. Respondents expressed their opinions on a five-point Likert scale ranging from "strongly disagree" to "strongly agree." The use of the Likert scale was deemed appropriate for this research due to its simplicity and accuracy in measuring attitudes, allowing for precise quantitative analysis of the data.

The statistical population of the research included two distinct groups. The first group consisted of researchers in the field of creative cities who were selected for interviews. The second group included experts and urban specialists related to sustainable development and creative cities, who were studied for quantitative data collection. Based on initial estimates, the number of members in the second statistical population was estimated to be around 600. To determine the sample size, Morgan's table was used, and 234 questionnaires were randomly distributed among the target population. This sampling method was chosen to reduce potential biases and increase the generalizability of the results. The validity of the questionnaire was evaluated to ensure the accuracy and precision of the measurement tool through content validity and leveraging the opinions of experts and specialists. After the initial design of the questionnaire, this tool was presented to several professors and experts in sustainable development and creative cities. Feedback was collected, and necessary adjustments were made to ensure that the questionnaire adequately covered the research objectives and was capable of measuring the desired components. The reliability of the questionnaire was also calculated using Cronbach's alpha method. For this analysis, 20 questionnaires were initially distributed as a pilot, and then reliability was assessed using SPSS software. The Cronbach's alpha coefficient for creative city indicators was found to be 0.954, and for sustainable development indicators, it was 0.966, indicating excellent reliability of the measurement tool.

For the analysis of the collected data, the Structural Equation Modeling (SEM) method was used. This method was chosen due to its high capability in examining complex relationships between observed and latent variables. Data analysis was performed using statistical

software SPSS and LISREL. Structural equations provide a statistical approach that allows for the simultaneous examination of causal relationships between independent and dependent variables. This method not only facilitates testing the conceptual model of the research but also assesses the fit of the model and its compatibility with empirical data. The analysis stages include model specification, model identification, parameter estimation, and model fit evaluation. In this study, absolute, comparative, and parsimonious fit indices were used to assess the quality of the model. Indices such as GFI, AGFI, and CFI should be higher than 0.90 for confirming the appropriate fit of the model, and the RMSEA index should be less than 0.08; all these criteria were confirmed in this study.

DISCUSSION AND FINDINGS

The findings of this research examine the impact of creative city indicators on the sustainable development of Tehran, presenting the results obtained from the analysis of data derived from questionnaires and interviews. Initially, the demographic information of the participants, including gender, age, education level, and work experience, was assessed. The sample of this study included 234 urban experts and specialists in Tehran. The results indicated that 66.2% of the respondents were male and 33.8% were female. The largest age group comprised individuals aged 30 to 40 years (67.9%), and more than half of the respondents (52.6%) held a bachelor's degree. Regarding work experience, 63.7% of the individuals had between 5 to 10 years of work experience. In examining the indicators of a creative city, six main components were evaluated: research and development spaces, cultural-recreational sites, the presence of the creative class, ethnic-cultural diversity, technology, and creative industries. The findings showed that among the components related to the creative environment, the indicator "acceptable quality and quantity of scientific-cultural spaces in Tehran" had the highest score with an average of 4.02. In the cultural-recreational sites section, "holding numerous cultural and artistic events" had the highest importance with an average of 3.75. In the domain of cultural vitality, "introducing products and ideas from the creative class" was identified as an influencing indicator with an average of 3.88. In terms of management infrastructure, "suitable capability for exchanging creative products with other cities" received the highest score with an average of 3.88. According to Table 1, the factor loadings of the questions for the six components of the independent variable of the creative city are significant at a 0.05 error level ($t > 1.96$). The average extracted variance and composite reliability are also at an acceptable level (over 0.5 for extracted variance and over 0.7 for composite reliability). Therefore, the factor loadings of the questions for all six components of the independent variable of the creative city have good validity and measurement quality. (Tab. 1)

Based on the data obtained from the questionnaire, the measurement model of the dependent variable is shown in Figures (5) and (6):

The results of the structural equation modeling analysis indicated that all components of a creative city have a positive and significant impact on urban sustainable development. Among them, research and development spaces had the highest impact on sustainable development with a coefficient of 0.73. Technology followed with a coefficient of 0.66, and ethnic-cultural diversity ranked next with a coefficient of 0.56. These findings confirm that investing in research and technological infrastructure, along with promoting cultural diversity, plays a significant role in enhancing urban sustainability. After ensuring the significant impact of the items on the factors (measurement model), the composite reliability of the measurement models, the adequacy of the sample size, and the internal correlations among observations were also confirmed; the relationships between the variables were addressed, and the hypotheses were tested under the structural model. In Table 2, RMSEA and RMR serve as bad fit criteria for the model,

Table 1: Factor loading values, mean extracted variance, and composite reliability of the creative city variable

Component	Question number	Factorial load	Mean variance extracted	Composition reliability
Research and development spaces	1	0/67	0/62	0/88
	2	0/56		
Cultural and recreational places	3	0/55	0/60	0/74
	4	0/40		
	5	0/79		
The presence of the creative class	6	0/77	0/75	0/85
	7	0/77		
	8	0/72		
Ethnic and cultural diversity	9	0/72	0/59	0/71
	10	0/42		
Technology	11	0/82	0/66	0/82
	12	0/46		
Creative Industries Canvas Fabrication	13	0/71	0/76	0/80
	14	0/81		

where RMSEA should be less than 0.08 and RMR should be less than 0.07. Moreover, GFI, AGFI, and CFI are good fit criteria for the model, with their values ideally exceeding 0.90, and generally, the closer they are to one, the better. It can be observed that, considering the values of these five indices, the proposed structural model has a suitable fit. (Tab. 2)

Table 2: Fit indicators of the research structural model

RMSEA	CFI	AGFI	GFI	RMR
0/065	0/970	0/910	0/950	0/066

Table 3, shows the relationships between the constructs of the research based on the proposed hypotheses. According to the results:

- Research and development spaces have a positive and significant impact on urban sustainable development with a coefficient of 0.73.
- Cultural-recreational sites have a positive and significant impact on urban sustainable development with a coefficient of 0.44.
- The presence of the creative class has a positive and significant impact on urban sustainable development with a coefficient of 0.39.
- Ethnic-cultural diversity has a positive and significant impact on urban sustainable development with a coefficient of 0.56.
- Technology has a positive and significant impact on urban sustainable development with a coefficient of 0.66.
- Creative industries have a positive and significant impact on urban sustainable development with a coefficient of 0.26.

The research's lateral analyses showed that there was no significant difference between the average scores of the creative city and sustainable development components based on gender and work experience. However, in the variable of education level, a significant difference was observed in the scoring of the components of "cultural-entertainment venues" and "sustainable development", such that people with a PhD assigned fewer points to these indicators than those with lower educational levels. This finding shows that people's perception of the city's performance in these areas differs based on their education level. Finally, this research emphasizes that strengthening the creative city indicators not only improves the quality of life

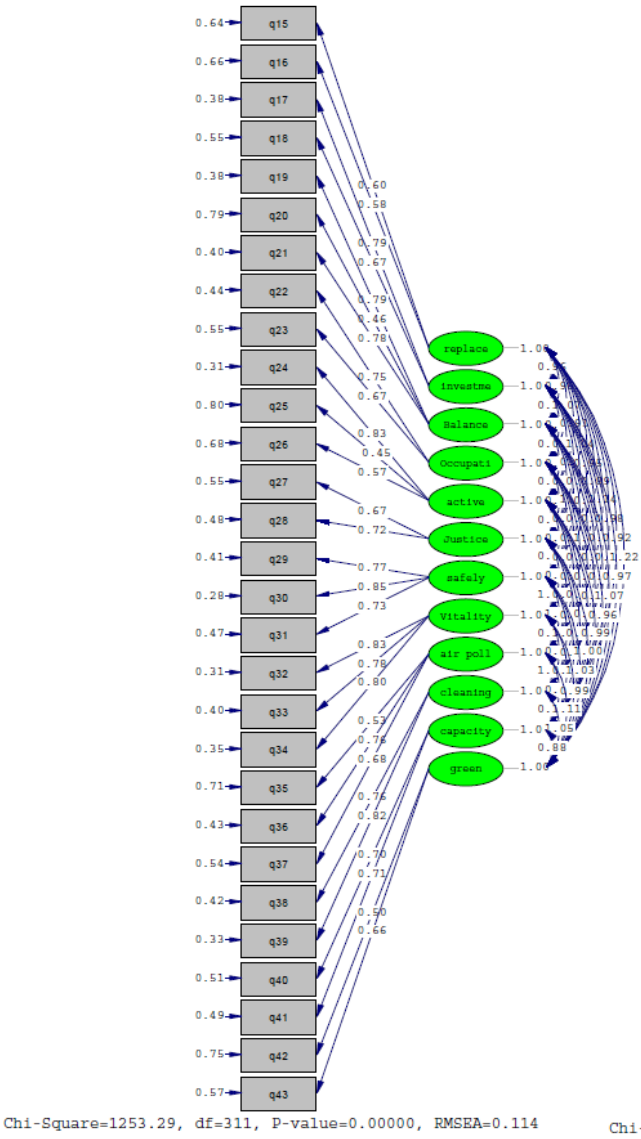

Figure 5: Model for measuring the independent variable components of the Creative City (significance test statistic)

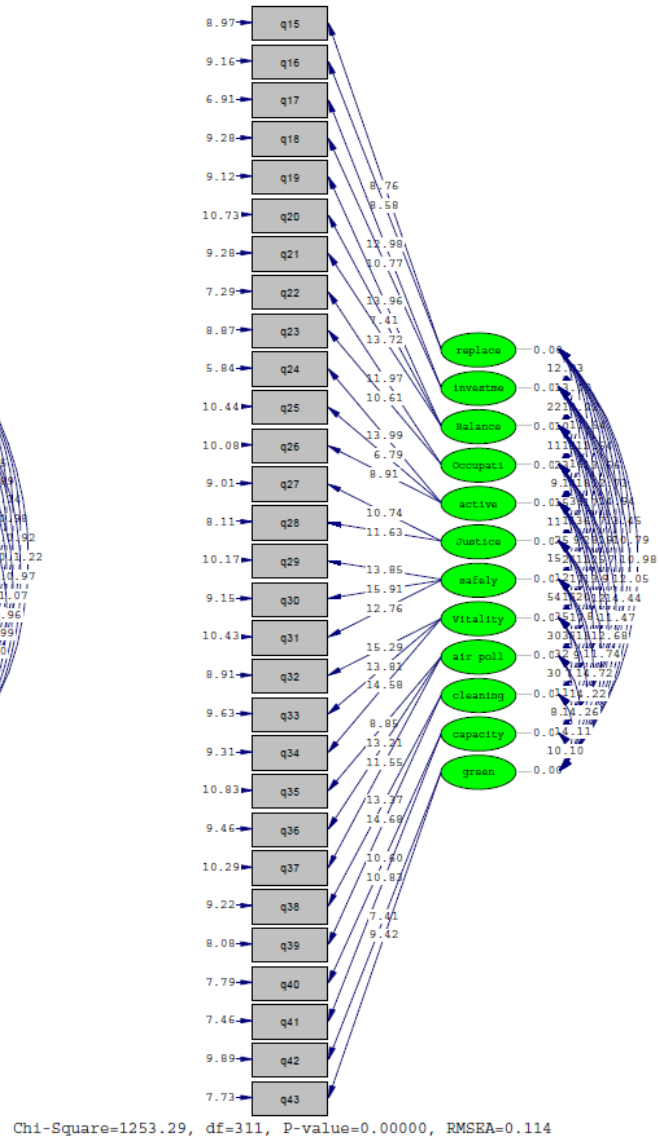

Figure 6: Model for measuring the independent variable components of the Creative City (significance test statistic)

Table 3: Relationships between variables based on the hypotheses proposed

Results	Critical ratio	Impact factor	Relationships between variables
Hypothesis confirmation	6/15	0/73	The impact of research and development spaces on sustainable urban development
Hypothesis confirmation	3/91	0/44	The impact of cultural and recreational places on sustainable urban development
Hypothesis confirmation	3/87	0/39	The impact of the presence of the creative class on sustainable urban development
Hypothesis confirmation	4/66	0/56	The impact of ethnocultural diversity on sustainable urban development
Hypothesis confirmation	5/19	0/66	The impact of technology on sustainable urban development
Hypothesis confirmation	2/12	0/26	The impact of eco-creative industries on sustainable urban development

and economic development, but also acts as an effective tool for advancing the sustainable development of Tehran. Strengthening research and development spaces, creating cultural-entertainment infrastructure, supporting the creative class, promoting cultural diversity, developing technology, and supporting the creative industries of the construction industry can facilitate the path to sustainable development and introduce Tehran as a creative and leading city in the region.

RESULTS AND CONCLUSION

The cities of the future will undoubtedly face complex challenges that can only be addressed through creative and innovative approaches to achieve sustainability. Creativity is no longer merely an option for cities; it has become an unavoidable necessity (Yum, 2020). Developed countries have long recognized the importance of this issue and have established the necessary infrastructure for creative cities, considering this model as a strategic tool for enhancing the quality of life for citizens and achieving sustainable development (Florida, 2012). Meanwhile, Tehran, as one of the largest metropolises in the world, is facing widespread problems such as environmental pollution, population density, housing crises, and social inequalities. Therefore, the present research was conducted to examine the impact of creative city indicators on the sustainable development of Tehran, aiming to provide practical strategies for achieving this goal. The findings of the study showed that the realization of sustainable development in Tehran has a direct and significant relationship with the implementation of the creative city model. Based on the results from the thematic analysis of semi-structured in-depth interviews, three main dimensions of the creative city were identified: the creative environment, cultural vitality, and management infrastructure. These three components were defined through the following elements: the creative environment through research and development spaces and cultural-recreational sites, cultural vitality through the presence of the creative class and ethnic-cultural diversity, and management infrastructure through the development of modern technologies and support for creative industries. The results of quantitative analyses using structural equation modeling also confirmed that all these components have a positive and significant impact on the sustainable development of Tehran. The indicator of research and development spaces had the highest impact on sustainable development with a coefficient of 0.73, followed by modern technologies (0.66) and ethnic and cultural diversity (0.56). These results indicate that investing in innovative and cultural infrastructure has a significant impact on improving the quality of life and achieving social justice. The impact of the creative city on various dimensions of sustainable development was analyzed separately in this research. The findings indicated that economic sustainable development is achieved through supporting creative industries and technology-based economies. From the perspective of social sustainable development, enhancing citizen participation, increasing safety, and educating global communication play a decisive role. Additionally, in the environmental dimension, focusing on reducing pollution, improving urban ecosystem quality, and optimizing waste management are considered effective factors for achieving sustainability. The results of the research align with the findings of researchers like Florida (2012) and Landry (2008), who have emphasized that creative cities are key drivers of sustainable economic development. Similar to the studies by Grodach (2017), this research also demonstrated that sustainable development is realized when urban policies focus on strengthening cultural and innovative infrastructures. Furthermore, the findings of this research align with the study by Costa and colleagues (2007), which highlights the importance of attracting creative human capital for sustainable urban development.

In response to the first research question regarding "What are the indicators for the formation of a creative city and urban sustainable development?", the findings indicate that the creative city model is defined in three dimensions: the creative environment, cultural vitality, and management infrastructure. Each of these dimensions has specific indicators whose realization lays the groundwork for sustainable development. Regarding the second question, "What is the status of the impact of creative city components on the sustainable development of Tehran?", the results from structural equations showed that all six indicators of the creative city have a positive and significant impact on the sustainable development of Tehran. Therefore, planning to strengthen these indicators facilitates the achievement of sustainable development. In response to the third question, "How can the indicators and components of the creative city contribute to the sustainable development of Tehran?", the research findings suggest that special attention to the development of research centers, the expansion of cultural and recreational spaces, support for the creative class, diversification of job opportunities, and promotion of modern technologies will provide a foundation for sustainability in the economic, social, and environmental dimensions of Tehran. Based on the study's results, several practical recommendations are made for policymakers and city managers: strengthening the urban creative environment through the development of science and technology parks and supporting creative entrepreneurs; increasing cultural vitality by enhancing cultural events, supporting the creative class, and promoting ethnic and cultural diversity; and developing management infrastructure with a focus on modern technologies and supporting creative industries to create a city brand and develop a knowledge-based economy. Despite achieving significant outcomes, this research faced certain limitations, including limited access to objective data, challenges in collecting questionnaires, and a lack of local study resources in the area of creative cities. For future studies, it is recommended to examine the following topics: the moderating role of demographic variables (such as age, gender, and education) on the relationships between creative cities and sustainable development; executive policies and prioritization of operational actions for implementing the creative city model in Tehran; and comparative studies between Tehran and other successful global metropolises in the field of creative cities. Overall, the findings confirm that the creative city not only contributes to urban sustainable development but also serves as a comprehensive strategy that improves quality of life, reduces inequalities, and creates a competitive advantage for Tehran. Consequently, urban planning should focus on the indicators of the creative city and leverage local and cultural capacities to achieve sustainable development.

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