International Journal of Digital Content Management (IJDCM)
Vol. 4, No. 6, Winter & Spring 2023; P 31-29
dcm.atu.ac.ir
DOI: 10.22054/dcm.2022.62808.1092

ATU PRESS

Original Research
Accept Date: 18-06- 2022
Receive Date: 23-05-2022
eISSN: 2717-3313
ISSN: 2717-3305

Smart City Planning Future Studies

Mohammadreza Hasanpour *

Khorasan Razavi University, Research Sciences Branch, School of Management

Abstract

The present study was conducted to identify the future dimensions of smart city planning research. Participants in this study were municipal managers and urban planners with at least 15 years of experience and a master's degree or higher. Individuals were selected by purposive sampling. Sampling was performed with the participation of 10 experts. Data collection tools fell into two groups: 1- review and upstream documents, urban planning documents in the library section, 2- semi-structured interview in the field section where the semi-structured interview with the participants continued until the theoretical saturation stage. Content analysis method was used to analyze the qualitative data. In order to ensure the validity, the interview questions were approved by 3 experienced urban planning experts and managers, 1 of whom had a master's degree and 2 of whom had a doctorate. In order to measure the reliability, the krippendorf coefficient was used, the overall coefficient of which was 84%. ATLASTI software has been used in the content analysis section. In order to identify future smart city planning research scenarios, SCENARIOWIZARD software has been used. The results of factor analysis show that out of 176 available indicators (items), 33 basic themes can be identified and 9 categories of constructive themes have been obtained. Finally, 9 scenarios were identified based on the importance of all 9 factors. The results indicate that the main output of the realization of smart cities and e-municipality is to set conditions for providing services in the healthiest way to citizens, eliminating

* Corresponding Author: hasanpoor14mr@gmail.com
How to Cite: Hasanpour, M. (2023). Smart City Planning Future Studies, *International Journal of Digital Content Management (IJDCM)*, 4(6), 31-29.

corruption, creating new job opportunities, and service and transformation in the economic and commercial sectors, increasing the effective presence of the private sector and improving the business environment, reducing damage to the environment, smart governance and increasing satisfaction

Keywords: Futures Studies, Urban Planning, Smart City, Urban Digitization.

Introduction

Digitization is one of several super-trends, including globalization, demographic change, and climate change that fundamentally change policies (Mangnus et al, 2022). For two decades, digital innovation has been at the heart of the discourse around "smart cities" to make urban environments more efficient and livable (Keith et al, 2020). Rapid urbanization, a global phenomenon that has sparked significant debate, has had a significant impact. In our changing society (Muiderman et al, 2020). At the same time, the rapid movement and increasing integration of information systems and technology in all areas of urban life are fueling these changes, in a way that requires depth (Broekman et al, 2019). Innovative and multidisciplinary academic thinking on how to plan, design and evaluate urban life shows that research into the future of cities is of great importance (Guimarães et al, 2020). Urban planning future studies are aimed at increasing the digital and electronic platform and moving toward the smart city to gather information related to the design, construction, operation, and development of future urban spaces and human life, health, and behavior (Albino et al, 2015). Cities are constantly evolving complex systems, and their constant digitization complicates them. The tool is being developed for urban scientists with computational methods ranging from artificial intelligence to machine learning, data mining, and advanced spatial analysis. This intelligence, combined with the vast amount of data on urban phenomena and new lifestyles emanating from virtual and cybernetic systems, makes planning and analysis more challenging and at the same time provides new tools for responding to them (Pelzer & Versteeg, 2020).

Widespread global urbanization now makes cities more economically, culturally, and socially important than ever. At the same time, cities are facing a revolutionary transition to becoming technology-driven environments in which digital systems and algorithms are increasingly leading our lives in unpredictable ways (Lam et al, 2020). These digital revolutionary changes, like the industrial revolution, are unpredictable by default (Bibri et al, 2020). However, urban planning and management are essential to guide urban systems for sustainability, economic sustainability, and quality of daily life (Akande et al, 2018). Approaches to "digital planning and intelligence" have been proposed. As a result, cities must be studied systematically. This research is based on these cases and expands the

technological aspects of the future city both in terms of technology-mediated urban realities and in terms of digital, algorithmic, and other tools that can be used to incorporate these inherent systemic features.

From a systemic point of view, like ecosystems in nature, cities cannot be produced or controlled, they can only be managed. This means avoiding rework and ineffective planning and prioritization (Witt et al, 2020). Second, urban management must be done in an iterative process of small actions, careful monitoring, and process modification (Turcu, 2013). Also, since the future is uncertain by default and urban theories are likely to be only partially applicable, an acceptable approach could be to use correct and citational perspectives on urban life. This situation may imply creative innovations such as self-driving vehicles, renewable energy, virtual reality, and beyond. Therefore, in this research, a methodological approach to the nature of complex urban systems and the need to guide them towards the desired goals is formulated and formulated (Silva et al, 2018).

Foresight work in urban planning has a long history of creating an inherently multidisciplinary research project. However, in this research, theories of complexity, as well as the perspective of intelligent urban digitization systems, are considered (Bendor, 2017). Complexity can be considered by accepting particle interaction and its emerging and sometimes surprising impact on systems dynamics and other dynamic theories related to valid future scenarios to discover possible (or probable) futures and their consequences in the urban environment (Rana et al, 2019).

Applied technologies and related analytical methods that emerge from urban theories may emphasize dynamic changes, including computer models and simulations, spatial data analysis, machine learning, or other tools considering urban nonlinear dynamics, hence They can accept multifactorial dynamics in transformers (Batty, 2009). In the first place, the concept of "smart cities" has been mainly supply-side and sector-oriented. The central role of urban planning is to provide solutions for digital innovation to create new economic opportunities, improve service delivery, and facilitate citizen participation (Waylen et al, 2020). For example, Smart grids help manage energy consumption. Smart pipes help track water quality and detect leaks. Intelligent sensors improve traffic flow, transportation efficiency, and solid waste collection routes. Mobile applications allow citizens to report problems in real-time and connect directly to

municipal services. Low-cost cell phone messaging, telemedicine and video consulting improve health outcomes and reduce health care costs. Self-driving cars and shared car parks also reduce land-use problems (Palupi et al, 2019). Smart city helps eliminate firm-government asymmetry. E-government construction affects firms' perceived environmental regulatory pressure. Firms in regions with better e-government construction cause less environmental pollution. Artificial intelligence enhances public health and urban safety performance(liu at al. 2021)

This paper argues that harnessing the benefits of digitization in cities is important for providing growth and prosperity across economies and human societies (Ashtari et al, 2019). Therefore, the process of digitization and smartening of cities based on urban planning can have a specific pattern. Based on observations of smart city planning around the world, this study seeks to understand what has worked, what has not worked, and what can be improved. In this regard, their full potential for inclusive guidance and sustainable growth should be used. So this research seeks to answer the question " what is the future of smart city planning?"

Literature review

Smart cities are at the crossroads between the social dimension and digital technology. This concept encompasses "cities of any size", including smaller communities or regional municipalities, for which various inspiring examples can also be found (Khanna, 2015). However, much of the debate over smart cities has been centered on the digital technology dimension, largely due to the initial leadership role played by corporate organizations such as IBM, CISCO, Intel, and more recently by GE, Microsoft, Oracle, and Amazon (Ahvenniemi et al, 2017). These projects focus on the development of cloud-based platforms and solutions for smart city projects. Therefore, the role of technology is in empowering new production processes, distribution, and key governance of changing organizational and institutional arrangements; and giving information on individual choices and behaviors (Engin et al, 2020). However, information and communication technologies are not the only components of providing intelligent solutions. Social innovation that creates new social forms and forms of cooperation in society is also essential (Bettencourt et al, 2010). In this regard, the capacity of municipalities to involve various

stakeholders (entrepreneurs, academics, NGOs, and citizens) in planning should be focused on executive processes as well as their ability to agree on the best solutions for development, responsibilities and to emphasize investments as a result of joint efforts (Kleinman, 2016)

Several emerging technologies are expected to affect cities in the areas of management, environment, health, economy, transportation, lifestyle, and social interactions by 2025 (Caragliu et al, 2019). They are expected to have particularly strong implications for urban development and management such as manufacturing (3D printing), Internet of Things (IoT), big data analytics, artificial intelligence (AI), advanced energy storage technologies, urban technology, drones, Vehicles (UAVs), and blockchains. In the medium term, self-propelled vehicles (AVs) will also have a major impact on cities in the first place. To fill the gap left by the lack of a comparable, coordinated, and comprehensive measurement framework, the OECD Smart Cities Program is currently developing a Smart Cities Index Framework that provides benchmarks, data, and measurements to local governments, and national ones about the degree of digitalization that can produce better results and impact citizens (Abbas et al, 2019). Smart city services are an effective solution to solve urban problems. The direction of smart city development in each city is changing. Studies showed that operation and maintenance of smart city services are becoming more important (kim, 2022)

In Iran, the realization of the principles of smart cities and smart cities and e-municipality should always be one of the main priorities of urban management, and municipalities are expected to pay double attention to the issue of smart cities along with infrastructure development (Mahdi Zadeh, 2019). Information technology is one of the driving forces in the process of urban development and promotion of the position of urban management in the administrative and executive system of the country and the welfare of citizens. Great changes are taking place in the city and the municipality (Moradi, 2019). Undoubtedly, information technology is the driving force for the development of urban and rural management of the country in the future, for which proper planning should be done by all relevant agencies and reaching a common understanding and language at all levels in order to provide development opportunities in The IT sector in municipalities and rural areas is very important and should be a

priority. The smartening of urban management activities have a great impact on the development of urban transportation, the fight against corruption, and the elimination of unnecessary formalities, and other issues. Fortunately, the determination of the Minister of the Interior in careful and principled planning for the smartening of cities and villages and the intensity of serious matters is considered good support (Poor Ghorban et al, 2020).

However, it is wrong to think that a city becomes a smart city with a set of applications and sensors, and although the use of technology, software, and applications in smart cities is necessary, for the development of a smart city, building urban infrastructure is very important (Alavi et al, 2018). The development of urban infrastructure requires investment, and in this regard, municipalities can not be expected to do so on their own, but government support is needed directly and indirectly in providing facilities. The discussion of digital developments in cities, which developed significantly at the same time as the Corona epidemic, was introduced as another effective factor in the process of smartening cities. To align the rules with the smartening process, it is necessary to review the rules in the digital axis of urban management.

Method

The present study was conducted to identify the future dimensions of smart city planning research. Participants in this study were municipal managers and urban planners with at least 15 years of managing experience and a master's degree or higher. The individuals were selected by purposive sampling method based on their teaching experience in primary school. Sampling was performed with the participation of 10 experts. Data collection tools fell into 2 groups: 1- review and upstream documents, urban planning documents in the library section, and 2- semi-structured interview in the field section where the semi-structured interview with the participants continued until the theoretical saturation stage. The content analysis method was used to analyze the qualitative data. In order to ensure the validity, the interview questions were approved by 3 experienced urban management and planning experts, 1 of whom had a master's degree and 2 of whom had a doctorate. In order to measure the reliability, the Krippendorf alpha coefficient was used, the overall coefficient of which was 84%. ATLASTI software has been used in the content

analysis section. In order to identify future research scenarios of smart city planning (Vervoort et al, 2012), SCENARIOWIZARD software has been used.

Findings

The qualitative part of this study is based on the views of 12 managers and experts who have management experience and expertise related to the smart city. Table 1 lists the characteristics of these interviewees.

Table. 1: Demographic characteristics of experts

interviewee	Gender	Specialty	Work Experience
Interviewee 1	Man	Municipal managers	More than 10 years
Interviewee 2	Man	Knowledge-based and technological innovations	More than 10 years
Interviewee 3	Man	Smart City	Less than 10 years
Interviewee 4	Man	Innovation and technology development policy	More than 10 years
Interviewee 5	Man	Crisis management, resilience, risk reduction and urban planning	More than 10 years
Interviewee 6	Man	Municipal managers	More than 10 years
Interviewee 7	Man	Municipal managers	More than 10 years
Interviewee 8	Man	Smart City	Less than 10 years
Interviewee 9	Man	Municipal managers	More than 10 years
Interviewee 10	Man	Knowledge-based and technological innovations	More than 10 years

In the present study, the content analysis method was used to analyze qualitative data. The thematic analysis method has been used to identify the indicators of smart city development. The process of qualitative data analysis begins when the researcher identifies and considers meaningful propositions and expressions related to the topic. This analysis begins with a repeated review and study of the data and is coded after identifying meaningful propositions related to the research topic. The practical process of data analysis consists of four steps: preparation, familiarization, coding, and obtaining the main

categories.

In order for the researcher to become familiar with the depth and scope of the data content, it is necessary to immerse oneself in them to some extent. Immersion in data usually involves "repeated reading of data" and active reading of data (ie, searching for meanings and patterns).

In this study, coding was done in software. The following are some of the interviews:

Table. 2: some of the interviews

Initial code	interview
Distinguish intelligence and electronic city	I think it is very important in the discussion of the smart city whether we understand the smart city just to be electronic or something beyond electronic, and much closer to our definitions of a sustainable city or a viable city.
Injustice Unhealthy administrative relations	Tools, in this way, discourses and lessons can reinforce in different ways, for example, suppose there is injustice or injustice in the city, or they can reinforce the unhealthy relationships that exist in the city.
Information processing Information circulation	Well, a good example of that is the discussion of information flow, which can help a lot, reprocessing information is very important to me, and how it is used.
Automation systems	For example, if we have automation systems in the municipality, how is all the information processed?
Information sharing Decision optimization Inter-organizational cooperation Support new businesses	Well, this sharing of information is very important, because this information is obtained from inside the city and can be a tool for decision-making in a form that is dispersed and published to be available to different people in this way. Many municipalities tried to make geographic information more freely available, and this in itself led to more companies now wanting to innovate and start new businesses in these areas and start using it. And then a lot of the collaborations that took shape, instead of being just collaborations, we just hired a project, hired a contractor to do a project, most of the collaborations that the municipality did were collaborations.
Increase information transparency	This information is not something that should only be available to the powerful, which made transparency very central to the discussion of the smart city, at least in the municipality of Tehran.
provision of budget Municipal revenues	Things like that there is not enough budget for municipalities or there are no coherent views, or

Initial code	interview
Integrated management	approaches in this field by the municipality, and at the same time that non-integrated urban management actually harms the city governance and has been the focus of municipal discussion for years. Managing an integrated city has also hit the issue of smart city development in some way.
Synchronization methods The importance of integrated management Interdepartmental collaborations	In contrast to these types of coordination methods, in fact, in my opinion, even if we see that in a very long horizon we are going to achieve integrated management, what in the short and medium-term can be the result of co-operation and coordination between them.
Coordination of supply and demand	This supply and demand must grow together. Unfortunately, our development processes in the country, in different places, in different dimensions, are more supply-oriented.
Information circulation Information quality Information processing	Well, a clear example of this is the issue of information flow, which can help a lot. Reprocessing information is very important to me and how it is used. These are all things that can be used in the direction of social and economic affairs that are important in the development of the city.
Infrastructure factors Administrative and structural changes	That is, if we want to put intelligence in the right place, apart from the infrastructural discussions, administrative and structural changes that an organ in the country needs, for example.
Manpower training Structural changes Attitude	In many cases we go to talk about technology, we train our manpower, we have it all, but we are unaware of the structure of our organization, whether this structure, which we are still adapting to before we adapt these new services, is still in the same structure. Front. At least it has not been tested to see if this structure responds to this new approach to the new way we want to proceed with services.
Flexibility Organizational Agility Strategic review	However, the flexibility issue that you have so far called agility, we can have our own system that can allow us to adapt it without drastically changing our strategy.
Purposeful planning Urban planning Smart planning	These things have been thought of faithfully, I know that different studies have been done in the cities. So somewhere in this direction of urban management in planning, in the implementation of the issue of smart city has finally been raised and discussed . From another direction, in another place, such as the Ministry of Roads

Initial code	interview
	and Urban Development, in view of urban planning, the issue of smart city has been raised, and there have been studies, and sometimes decisions have been made.
Inter-organizational cooperation	Other organizations, such as the Ministry of Intelligence, have been talking about the smart city in recent years. As a result, and now the private sector aside, I said from a governmental point of view, large and small private sector groups have also worked in providing services, infrastructure and development in real city applications. It's the same.
Prioritize the elimination of obstacles and strategies	We have seen that this view of both the definition of a smart city, the priorities of a smart city, and the strategies to achieve a smart city are not the same at all.
Intelligent localization with urban needs	One feature that was present in all of them was that everyone said that it could not be copied, sir .You need to go for your own city based on the actual needs, the challenges, the future you envision, and possibly a strategy that is good for that city.

The results of factor analysis show that out of 176 indicators (items), 33 basic themes can be identified and 9 categories of constructive themes have been obtained. Based on the existing literature, background, and theories, these components were named in the table below.

Table. 3: Identify the overarching theme

Axial category	Category (secondary code)	Open source (source code)
Smart city governance	Smart city management	Development of smart tools in city management
		Smart traffic
		Intelligent transportation
		Smart police
		Smart urban service
		Smart Hospital
		Centralization
		Standardization
		Creating an indigenous framework to increase urban adaptation
		Development of urban smart tools
	Executive role	Create a coordinating body

Axial category	Category (secondary code)	Open source (source code)
		Needs assessment in the community
		Balance in the supply and demand system
		Inter-organizational cooperation
		Culture building the role of urban operators in the development of smart cities
		Utilizing the potential of the private sector in the executive sector
		Executive coordination of organizations
		Implement intelligent transformation pattern
		Balance the top-down and bottom-up approach
	Authoritative role	Appoint an upstream manager
		Proper and accurate monitoring of the implementation of basic infrastructure
		Create a competitive platform
		Monitoring organizational responsibility
		Planning and organizing inter-institutional links
		Appoint a supervisory board
		Management integration
	Internal government	Balancing the internal and external procedures of smart city development
		Transparency The role of organizations in smart city planning
		Clarifying the role of the urban planning organization
		Support the public or private sector as a sponsor
		Cooperation between government, industry and academia
		Institutional mapping design
		Clarifying the role of the municipality
	Digital government	Proper establishment of e-government
		Continuous optimization of electronic service delivery
		Public-government partnerships based on digital technology
		Proper use of digital tools and communication systems to serve the people
		Match the output format of organizations
Intelligent interaction	Digital citizenship interaction	Creating a culture of intelligence in society
		Identifying the factors affecting the acceptance of intelligence in people

Axial category	Category (secondary code)	Open source (source code)
		Identifying the behavioral gap in accepting people's intelligence
		Use smart tools to increase public participation
		Use gamification tools to increase public participation
		Illustration of increasing the quality of life for people based on the development of the smart city
		Involvement of people in urban issues
		Improving the spirit of public cooperation
	Digital social interaction	Intelligence based on people's social characteristics
		Promotion of social capital
		Identifying the level of social expectations
		Intelligence transparency to improve social justice
		Building social trust
	Organizational interaction	Communicate online with people
		Online communication with other organizations
		Online on-line interaction in service delivery
Intelligent stability	Digital social components	Improving people's consumption patterns and lifestyles
		Improving responsiveness to people
		More precise control of infectious diseases
		Increase order in social life
		Understanding the role of social responsibility in individual life
		Monitoring social living conditions
		Reducing time waste
		Reducing the overall cost of living
	Environmental components	Reducing the production and emission of environmental pollutants
		Supervising executive operations in green space and nature
		Improving air quality (reducing air pollution)
		Reducing noise pollution
		Paperless administrative process
		Creating a culture of environmental protection and green space
		Increasing green space
	Digital energy	Water smartening

Axial category	Category (secondary code)	Open source (source code)
	management	Intelligent buildings to reduce energy consumption
		Optimizing energy consumption with IoT tools
		Electrical intelligence
		Fossil fuel intelligence
		Implementation of smart meters
		Energy Internet implementation
Public-private partnership	The role of government institutions	Vision determination, decision optimization
		Controlling and simulation of project growth
		Determining the progress of project processes using technology
	The role of private institutions	Planning actions and meeting the needs of the public sector
		Creating efficient services or products
		Introducing successful international examples to the government and its localization in Iran
	Complexity of cooperation	Restructuring government processes versus the private sector
		Determining the level of ownership and outsourcing
		Improving the regulation of cooperation between the private and public units
	Targeting of projects	Achieving a common vision between the public and private units
		Identifying the solution based on the interests of stakeholders and the people
		Identifying measurable goals, sub-goals
		Identifying specific outcomes based on probabilities (participation or non-participation of the people)
	Digital infrastructure investment	Call for private sector investment and industrialization
		Identifying urban demand potentials and investment opportunities
		Identifying new strategies for attracting investors (public and private)
		Stock market participation
		Starting projects with subsidies and initial budget and attracting investors
		Laying the groundwork for startups and start-ups

Axial category	Category (secondary code)	Open source (source code)
Knowledge integration	Data sharing management	Sharing information and experiences through meetings and brainstorming
		Creating an inter-enterprise data access platform
		Consulting with international units
		Coordinating and connect different parts for data exchange
		Establishing inter-organizational meetings and consultations
	Changing digital attitudes	Creating a culture of data sharing as a valuable investment in a smart city
		Knowledge sharing in order to identify popular specialties
		Creating a culture of the need for data sharing among organizations
		Sharing knowledge with people to enhance smart learning
	Knowledge unit	Creating a live lab to unveil small-scale smart projects
		Creating a base for collecting and maintaining knowledge
		Creating a data integration unit
		Creating an intelligent technology park
	Transparency of digital knowledge	Creating a scale to measure the accuracy of data
		Increase the transparency of reports based on output and recorded data
		Strengthening Transparency and Smart City Working Group
		Recording data away from orientation and statistics
		Policy for transparency of data sharing
		Improving the system of transparency of institutional actions
		Establishing a unit to monitor the registration of information and data
	Data digitization standardization	Creating a common language in data sharing
		Creating a consistent template and standard for understanding data
		Specifying standards for recording, maintaining and publishing data
Support for	Digital	Creating a coordination platform to use project

Axial category	Category (secondary code)	Open source (source code)
smart innovation	integration platform	data
		Conducting the project as usual and identifying the innovation part (innovation benefits)
		Integrating potentials and use a systems approach
	Innovation standardization	Implementing innovation and integration with other smart units
		Creating an innovation unit to gain experience from other researchers and identify new and error-free solutions
		Creating an innovation framework in existing systems (identifying needs and demands)
	Generalization of innovation	Creating a platform for private sector participation in providing creativity and innovation
		Supporting ideas for innovation and creativity
		Public call for innovation
	Encourage innovation	Increasing public acceptance of the importance of innovation and smart city development
		Increasing the motivation of the private unit to participate in the development of the smart city
		welcoming to innovations in popular suggestions and criticisms
		Financial support for innovations and startups
Intelligence infrastructure	Digital technical infrastructure	cloud computing
		Fiber optic development
		IoT platform building
		Smart technologies
		high speed Internet
		social media
		Semantic Web
	Human resource infrastructure	Human resource training
		Definition of academic disciplines related to smart city
		Use of intelligent specialists and experts
	Financial infrastructure	Allocation of sufficient government budget to the implementation of the smart city
		Proper financial planning for smart city development processes

Axial category	Category (secondary code)	Open source (source code)
		Reviewing the pricing system
		Identifying the sources of income of organizations in the process of smart city development
		Creating sustainable revenue sources in the smart city development process
		Allocation of facilities required for smart city development projects
		Determining the exact financial resources of the municipality (VAT, renovation fees, business and car, renting municipal buildings and other revenues, and selling real estate, loans or participation bonds)
	Landscaping	Wise space management and optimal land allocation
		Expansion of public and human-centered transportation
		Providing a mixed use model with land use planning efficiently and effectively in saving land
		Balance in the proper distribution of urban services, facilities and equipment at all levels of the city
		Preserving and saving land that prevents the creation of automotive and organic metropolises
		Integration of city management based on GIS information
		Integration of spatial data and long-term planning
Intelligent strategies	Brucotic culture	Creating internal stability
		Reducing cumbersome rules
		Increasing group synergy
	Paradigm shift	Creating rational thinking
		human recourse development
		Creating a smart attitude
Smart economy	International aspect	Connecting to international trade
		Modeling global businesses and localizing them
		Identifying global markets
		Global customer focus
		Internationalization of the city and strategies

Axial category	Category (secondary code)	Open source (source code)
		for the promotion of the city at the international level
		Improving the economic position among the international community
	National aspect	Entrepreneurship
		Production line smartening
		Economic growth of the country
		Reducing country costs
		Increasing sustainable income
		Sales and immediate service
		Supporting home businesses
		Flexibility and increasing the number of sustainable jobs
		Reducing the unemployment rate

In this step, based on 9 criteria and 33 sub-criteria, the appropriate scenario is identified based on the analysis of the wizard scenario software. First, a cross-structure matrix is formed. The CIB matrix is used in the form of verbal expressions to reduce the effect of the probability of a state occurring from one descriptor to another state of another descriptor.

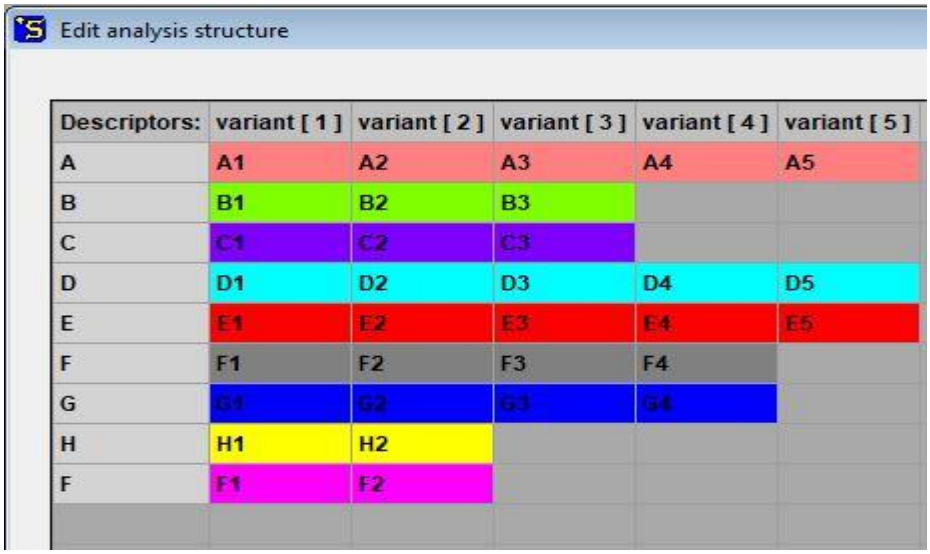

Figure.1: Cross matrix structuring

In the following, the cross matrix is weighted based on a score of 3 to 3.

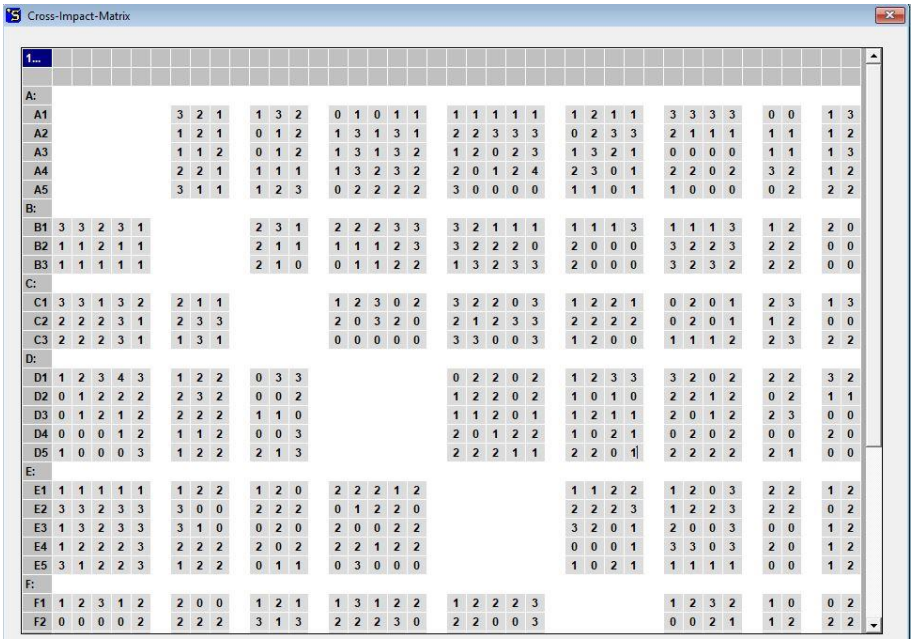

Figure.2: Completing the cross matrix

In order to obtain the scenario with the highest compatibility, the cross-matrix was homogenized.

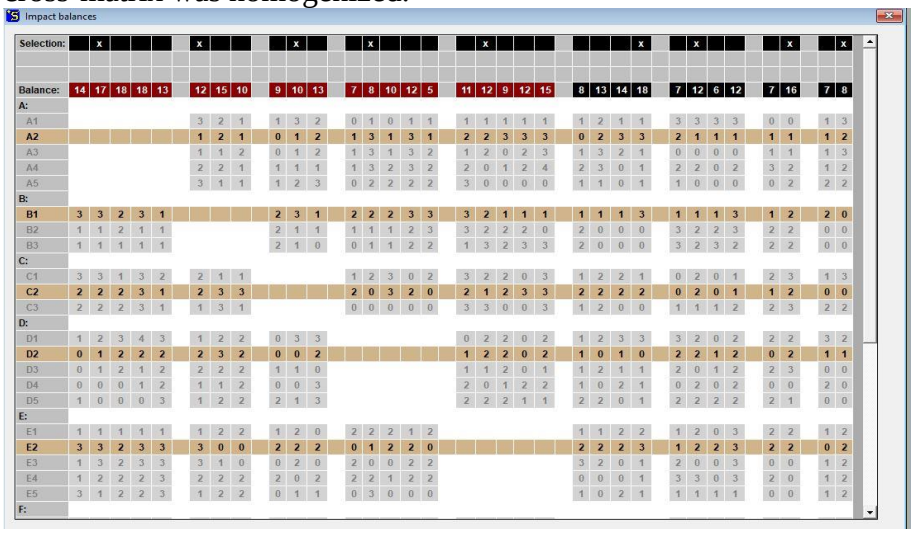

Figure.3: Cross-matrix homogenization

Finally, due to the importance of each of the 9 components, 9 scenarios were identified using ScenarioWizard software.

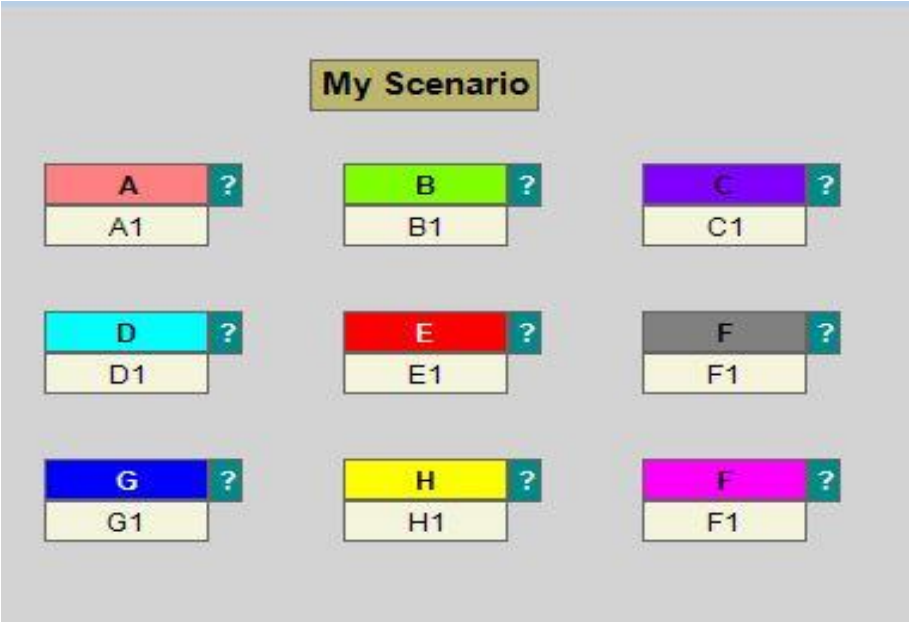

Figure.4: Identified scenarios

Conclusion

Government agencies create resistance, or disruption as well as structured bureaucracies for competitive innovation. The existence of more risks necessitates looking beyond technology for effective political and managerial tools to deal with the dangers of smart cities (Moghtaderi Esfahani, 2020). The following factors have been identified in interviews as the main concerns of smart projects in the city:

- Lack of equal competitiveness of Iranian cities on a global scale (interviewee 1, 4)

Necessary financing problems for the implementation of city smart projects (interviewees 1, 2, 3, 5, 6, 7, 2).

Digitization and electronification instead of intelligence (project implementation and lack of intelligent planning) (interviews 3, 6).

Ignoring indigenous needs and regional priorities and failing to invest (interviews 3, 6, 8).

The slow progress of projects due to management problems

(interviews 1, 4, 8, 10).

Focus on short-term consequences and lack of long-term attitude (interviews 5, 8, 10, 12).

-Repeat the solutions of one city for all cities (interviews 1, 3, 4, 8, 9, 10)

- Social differences (digital divide, class divide, lack of equal access to information and communication technology) (interviews 5, 7, 9, 11)

-Problems related to security and monitoring and control over privacy (interviews 1, 4, 9)

Need to update the knowledge of employees and managers (Interview 5, 7, 8, 10, 12).

- Lack of public trust (interviews 4, 5, 8, 9)

- Creating internal plans (protection plan) and enlarging domestic products (Barakat vaccine) (interviews 1, 4, 9, 10).

Given the technological changes that have affected various industries and sectors in recent years, the need to think of ways to take advantage of these changes in order to solve the country's problems and to determine the priorities, as well as to use its capacity to create economic value and use force. It has more and more identified educated and educated human beings (Candy & Dunagan, 2017). This technology change has led to significant innovations in various fields and sectors of the economy and business and has been able to provide new services with more added value and introduce new business models, also challenging the traditional business sector and the emergence of new actors called knowledge-based technology companies and startups. Startups needed to develop a smart city can include:

- Development and optimization of sustainable urban transportation with the aim of reducing pollution (possibility of booking, renting, and using common vehicles or renting using online platforms) (interviewees 1, 4, 7).

-Working out new solutions with the help of technology to reduce traffic (collecting public transport information, parking reservation, traffic control, vehicle traffic, identifying the nearest parking lot and routing intelligent transportation equipment) (interviewees 1, 3, 5, 6).

- Monitoring the level of air pollution in order to maintain health (creating particle detection sensors in the air, preparing pollution charts and maps at any time and place, the possibility of checking the

routes between starting-point and destination based on the number of air pollutants, weather forecasting, and urban crisis information) (Interviewee 5, 8, 10).

- Waste management and recycling growth (monitoring the routes of waste vehicles to know the exact time, statistics, and information on the amount of waste produced in each area and increasing public awareness of waste segregation, creating smart public bins for filling, designing appropriate platforms for creating related businesses Recycling, creating appropriate and backup software to make recycling companies smarter). (Interviewees 1, 4, 6, 7, 8, 9).

Gathering information and processing it to improve urban decision-making and planning (creating smart sensors and precision cameras for collecting urban information, creating an inter-organizational interaction and data-sharing platform, cultivating people to inform about urban problems, using smart information technology to manage crises) Urban). (All interviews)

Gathering and analyzing information of urban infrastructure networks (collecting and sharing information of primary sources in the field of electricity and water and other cases, assessing the consumption status and identifying problems in energy networks with the help of sensors and technology, smartening energy distribution network based on citizen consumption) Intermediaries for transmitting data on energy problems and crises, facilitating consumption monitoring and integrated energy management to reduce consumption (interviewee 1, 2, 3, 4, 6, 8, 11).

Creating an information-sharing unit in each organization

Data and information are very important in an intelligent system. Inter-organizational information exchange and transparency of this data can pave the way for smartening. Creating a fixed unit in any organization for data sharing (as a human unit or automatically and mechanically), can solve the problems of access and exchange of information between organizations. In this regard, to eliminate the unwillingness of organizations to share data, the following can be done to create an information-sharing unit:

Creating legal requirements to provide services

- Development of guidelines and criteria for standardization and harmonization of information sharing

Active participation of the legislature and the judiciary (all interviews)

Creation of a coordinator unit

In order to reduce the problems in the field of inter-organizational cooperation, data sharing and exchange, and integrated management, it is necessary to create a coordinating unit that has the highest executive position in a smart city. The municipality is the starting point for supportive and strategic actions. The municipality can act as a resource provider or cross-sectoral coordinator. Apart from cultural and social issues, the municipality, as the main center of city management, has a key role in achieving intelligence. Today, many municipal services such as transportation, roads, waste management, construction, etc. are provided by the municipality, and mobile services are also provided to the people by the municipality. On the one hand, it is the responsibility of the municipality to make the municipal service system intelligent to the people, and on the other hand, it is the responsibility of the municipality to formulate laws and monitor and direct the city's intelligence, especially in the areas of construction, traffic, health, and energy. Bypassing the required laws, the municipality can be turned into the main unit for smartening. In this case, other organizations will not have problems with cooperation, participation, and data exchange by obeying this unit. (All interviews).

Creating key performance indicators

The lack of criteria for an accurate evaluation of the performance or effectiveness of the smart city project as well as the lack of monitoring systems is appropriate. Several indicators need to be measured. But those indicators must be measured that are appropriate to the project objectives. This issue requires identifying different parameters of Tehran city and similar cities and extracting appropriate criteria. These criteria and related indicators can include socio-economic, geographical, political, administrative, etc. areas. Finally, it is better for Tehran and other cities to have the same system index for better use of methods and more accurate evaluation (Interviewees 8, 12).

The smartening of the city is not limited to information technology and equipment, and in this way, cultural and infrastructural transformation to improve the lives of citizens should be on the agenda, and in fact, the main pillar of a smart city is the level of citizen participation in using technology. The main output of the realization of smart city and e-municipality is to provide conditions for providing services in the healthiest way to citizens,

eliminating corruption, creating new job and service opportunities and transformation in the economic and commercial sectors, increasing the effective presence of the private sector and improving the environment Business is reducing environmental damage, smart governance and increasing people's satisfaction. Fortunately, a lot of work has been done in this area by the municipalities, but it is by no means enough, and the Ministry of Interior and the Organization of Municipalities and Rural Affairs are ready to cooperate with the municipalities of metropolises and related agencies to continue this path and eliminate existing shortcomings and obstacles. Utilization of existing legal capacities is one of the special commissions of government metropolitan affairs

Reference

Abbas, H., Shaheen, S., & Amin, M. (2019). Engineering Large Complex Critical Infrastructures of Future Smart Cities as Self-Adaptive Systems. In *Security in Smart Cities: Models, Applications, and Challenges* (pp. 143-170): Springer

Ahvenniemi, H., Huovila, A., Pinto-Seppä, I., & Airaksinen, M. (2017). What are the differences between sustainable and smart cities? *Cities*, 60, 234-245.

Akande A, Gomes P, Cabral P (2018) The Lisbon ranking for smart sustainable cities in Europe. Sustain Cities Soc 44, 475–487

Alavi, A. H., Jiao, P., Buttlar, W. G., & Lajnef, N. (2018). Internet of Things-enabled smart cities: State-of-the-art and future trends. *Measurement*, 129, 589-606.

Albino, V. Beradi, U. and Dangelico, R.M. (2015), "Smart Cities: Definitions, Dimensions, Performance, and Initiatives", *Journal of Urban Technology*, Vol. 22.

Ashtari, D., & de Lange, M. (2019). Playful civic skills: A transdisciplinary approach to analyse participatory civic games. *Cities, 89*, 70–79

Batty, M. (2009) Cities as Complex Systems: Scaling, Interaction, Networks, Dynamics and Urban Morphologies. In Encyclopedia of Complexity and Systems Science. Springer. 1-62

Bendor, R. (2017). Interaction design for sustainability futures: Towards worldmaking interactions. In M. Hazas, & L. Nathan (Eds.), *Digital technology and sustainability: Engaging the paradox* (pp. 205–216). Abingdon: Routledge.

Bettencourt, L., & West, G. (2010) A unified theory of urban living. Nature, 467(7318): 912-913.

Bibri SE, Krogstie J, Kärrholm M (2020) Compact city planning and development: emerging practices and strategies for achieving the goals of sustainability. Dev Built Environ 4:1–2.

Broekman, M., Harmelink, M., Bakker, R., & Peekel, A. (2019). *Activities on citizen engagement and motivating feedback Utrecht*.

Candy, S., & Dunagan, J. (2017). Designing an experiential scenario: The people who vanished. *Futures, 86*, 136–153

Caragliu, A., & Del Bo, C. F. (2019). Smart innovative cities: The impact of Smart City policies on urban innovation. *Technological Forecasting and Social Change*, 142, 373-383.

Engin, Z., van Dijk, J., Lan, T., Longley, P. A., Treleaven, P., Batty, M., & Penn, A. (2020) Data-driven urban management: Mapping the landscape. Journal of Urban Management, 9(2): 140-150

Guimarães. J. C. F, Severo. E. A, Júnior. L. A. F, Costa. W. P. L. B and Salmoria. F. T (2020), "Governance and Quality of Life in Smart

Cities: Towards Sustainable Development Goals", *Journal of Cleaner Production*, Vol. 253, 20.

Keith, M., O'Clery, N., Parnell, S., & Revi, A. (2020). The future of the future city? The new urban sciences and a PEAK Urban interdisciplinary disposition. *Cities, 105*, Article 102820.

Khanna, P .(2015). Urbanisation,Technology,and the Growth of Smart Cities, Asian Management Insights , Vol. 2:2, pp. 59-52

Kim, J. (2022). Smart city trends: A focus on 5 countries and 15 companies. Cities, 123, 103551. https://doi.org/10.1016/j.cities.2021.103551

Liu, W., Xu, Y., Fan, D., Li, Y., Shao, X. F., & Zheng, J. (2021). Alleviating corporate environmental pollution threats toward public health and safety: The role of smart city and artificial intelligence. *Safety Science, 143*, 105433.

Kleinman, M. (2016), Cities, Data and Digital Innovation, IMFG Papers on Municipal Finance and Governance

Lam, P. T. I., & Ma, R. (2019). Potential pitfalls in the development of smart cities and mitigation measures: An exploratory study. *Cities, 91*, 146–156.

Mahdi zadeh, M. (2019). Investigating the relationship between smart city and sustainable development and the challenges of achieving a sustainable smart city. *Shabak*. 5(7), 119-128. (In Persian)

Mangnus, Joost, M. Vervoort, W. (2022). Envisioning alternatives in pre-structured urban sustainability transformations: Too late to change the future? Cities, 120: 103-113.

Moghtaderi Esfahani F. Conceptualizing Smart Cities and the Process of Deploying Smartness in Urban Environment. Urban Design Discourse- a Review of ContemporaryLitreatures and Theories. 2020;1- (2):119-128.

Moradi, Sh. (2019). Investigating the thematic course of smart city studies. Scientific Research Journal. 5(1), 139-160. (In Persian)

Muiderman, K., Gupta, A., Vervoort, J., & Biermann, F. (2020). Identifying four approaches to anticipatory climate governance: Varying conceptions of the future and their implications for the present. *Wiley Interdisciplinary Reviews: Climate Change*, 1–29 (February 2019)

OECD (2019), OECD Regional Outlook 2019: Leveraging Megatrends for Cities and Rural Areas, OECD, Paris

Palupi. H. A, Tony. S. H, Susanto. D (2019), "Modelling the Smart Governance Performance to Support Smart City Program in Indonesia", *Procedia Computer Science*, Vol. 161.

Pelzer, P., & Versteeg, W. (2019). Imagination for change: The post-fossil city contest. *Futures, 108*, 12–26.

Por ghorban, Sh., Por ahmad, A., Darban astaneh, A., Zanganeh shahraki, S.

(2020). Identifying Indicators of Urban Development Strategy for Resilience and Empowerment of Kish Island in the Horizon of 1417. *Journal of Iran Futures Studies*. 5(1), 189-217. (In Persian).

Rana, N. P., Luthra, S., Mangla, S. K., Islam, R., Roderick, S., & Dwivedi, Y. K. (2019). Barriers to the development of smart cities in Indian context. *Information Systems Frontiers*, 21(3), 503-525

Silva, B. N., Khan, M., & Han, K. (2018). Towards sustainable smart cities: A review of trends, architectures, components, and open challenges in smart cities. Sustainable Cities and Society, 38

Turcu, C. (2013). Re-thinking Sustainability Indicators: Local Perspectives of Urban Sustainability. *Journal of Environmental Planning and Management*, 695–719

Vervoort, J. M., Kok, K., Beers, P. J., Van Lammeren, R., & Janssen, R. (2012). Combining analytic and experiential communication in participatory scenario development. *Landscape and Urban Planning, 107*(3), 203–213

Waylen, K. A., Blackstock, K. L., Marshall, K. B., & Dunglinson, J. (2015). participation–prescription tension in natural resource management: The case of diffuse pollution in Scottish water management. *Environmental Policy and Governance, 25*, 111–124.

Witt, T., Dumeier, M., & Geldermann, J. (2020). Combining scenario planning, energy system analysis, and multi-criteria analysis to develop and evaluate energy scenarios. *Journal of Cleaner Production,* 242

How to Cite: Hasanpour, M. (2023). Smart City Planning Future Studies, *International Journal of Digital Content Management (IJDCM)*, 4(6), 31-57.
DOI: 10.22054/dcm.2022.62808.1092