

Original Article

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Drivers and challenges of developing urban diplomacy in Iran based on emerging technologies and artificial intelligence

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Abstract

In recent years, the proliferation of modern technologies and information technology-based tools has significantly transformed urban governance practices worldwide. In Iran, urban diplomacy, as a critical dimension of urban governance, faces challenges in adapting to these technological advancements. The utilization of modern technologies and artificial intelligence (AI) in urban diplomacy and strategic decision-making has not yet realized its full potential. The present study aims to identify the drivers and challenges associated with the adoption of modern technologies and AI in the development of urban diplomacy in Iran. A mixed-methods approach was employed. In the first phase, domestic and international literature and documents were reviewed to identify indicators relevant to the development of urban diplomacy. Subsequently, the structural relationships among these indicators were examined using the Cross-Impact Matrix (CIM) methodology, based on the opinions of 30 experts, and analyzed using MICMAC software. In the second phase, a Likert-scale questionnaire was designed and administered to the same group of experts to identify the principal challenges, focusing on their criticality and frequency of occurrence. The results indicated that the main challenges in leveraging emerging technologies for urban diplomacy in Iran include the absence of appropriate executive guidelines, insufficient capacity and experience, limited infrastructural resources, and the lack of regulations aligned with AI functionalities. Conversely, the key drivers identified include the enhancement of technological infrastructure and equipment readiness, heightened citizen expectations of government adoption of innovative solutions for service delivery, and the implementation of data-driven approaches in urban diplomacy. These drivers underscore the importance of stakeholder engagement and the management of inter-stakeholder relationships. Overall, the findings suggest that the advancement of urban diplomacy in Iran necessitates strengthening technological infrastructure, revising existing policies, and enhancing the competencies of specialized human resources. These insights provide a robust foundation for urban policymakers and the country's foreign policy authorities to utilize emerging technologies more effectively.

Keywords

Artificial Intelligence
Emerging Technologies
Futures Studies
Iran
Propulsion
Urban Diplomacy

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1. Introduction

Nowadays, in most developed governments, the use of Emerging technologies and tools based on information technology is essential. In recent years, emerging technologies and information technology-based tools have transformed urban governance practices in many countries. In Iran, despite the importance of technology and artificial intelligence, Urban diplomacy still faces serious challenges. Cities face limitations, including a lack of understanding of the capabilities of emerging technologies, weak technological infrastructure, and inadequate strategies for utilizing AI in transnational interactions. This situation has caused Iran's position in the global network of cities to be less than its actual capacity in utilizing technology and urban diplomacy.

In today's world, data and AI technology have become the strategic resources of every country. One of the essential strategies in achieving peace and urban development is urban diplomacy, which allows for communication between different cities of the world and cooperation in the economic, cultural, urban management, and scientific fields (Engstrom et al., 2023:19). To play an effective role in urban diplomacy, cities must enhance their capabilities and showcase their internal potentials to find a suitable place in the global network of cities (Tupokigwe & Isagah, 2023:434). Among them, the latest technology that has emerged in recent years, along with its applications, has presented a new conundrum to the scientific and executive elites of countries: "artificial intelligence." Artificial intelligence has revolutionized governments by increasing efficiency, decision-making, and the provision of public services (Chinen, 2023:32).

In today's world of interaction and communication, cities are no longer limited to their political and geographical boundaries, unlike in the past. Nowadays, the requirements of urban development in the modern world, shaped by current spaces and discourses, lead cities to expand their transnational interactions and communications with urban counterparts in various fields. Therefore, considering the pivotal role of artificial intelligence and its tools in the development of urban diplomacy in urban policies and managers' approaches, we can expect a fluctuating trend in this sector over the coming years. In this regard, the processes based on the development of urban diplomacy, utilizing emerging technology and artificial intelligence, have been poorly understood; however, urban managers face significant challenges in this field.

One of the major problems is the lack of sufficient understanding of the capabilities of urban diplomacy based on emerging technologies such as artificial intelligence. Lack of appropriate guidelines and executive procedures for the use of emerging technologies, weakness of technological infrastructures in cities that prevent the effective use of smart tools, lack of understanding and awareness of urban managers about the capabilities of urban diplomacy based on new technology, What facilities emerging technology have provided for cities and urban managers to be able to respond to urban challenges more efficiently, faster and in accordance with the needs of the day and provide a better quality of life for citizens, needs to be analyzed. In other words, the drivers and factors that affect urban diplomacy in the era of information technology and artificial intelligence, as well as the obstacles that exist in this process, need to be identified. Therefore, this research seeks to identify the drivers and barriers to the development of urban diplomacy based on Emerging technologies and artificial intelligence in Iran with a futures studies approach.

1.2 Concept of Diplomacy

Diplomacy means directing and managing relations between countries by their official representatives, who use correspondence, private negotiations, and exchange of ideas to summarize, coordinate, and provide exceptional services with the public interests of the country (Ezadi, 2010: 16). Some thinkers, such as Mellison, consider diplomacy as a set of rules, communication, and dialogue through which governments guide their relations (Faraji Sis, 2014:10). Diplomacy is aimed at preventing hostilities and wars and spreading peace and cooperation among countries (Zarif & Sajjadpour, 2008:43). As a tool in foreign policy, diplomacy makes it possible to plan and achieve national goals beyond borders (Zolfagharzadeh & Sanai, 2013:46). In the field of urban diplomacy, these definitions show that cities can also manage their relationships with other cities and transnational actors by using diplomacy. Emerging technologies and artificial intelligence have provided new opportunities to increase efficiency, facilitate data-driven decision-making, and enhance intelligent interactions between cities. According to various definitions, diplomacy is considered a set of policies, rules, tools, and interactions related to the management of international relations, aimed at preventing hostility and promoting cooperation at the local, national, and

transnational levels, while advancing national interests. This definition serves as the basis for analyzing the drivers and challenges of urban diplomacy in Iran, particularly in relation to emerging technologies.

1.3. Urban Diplomacy and Its Necessity

Urban diplomacy is the concept of decentralizing the management of international relations and recognizing the role of city representatives and local authorities as key global actors. The leading actors of urban diplomacy include mayors and city officials, representatives of local government, and representatives of international NGOs (Ghorchi, M., & Amani, M., 2010:295). In urban diplomacy, metropolitan managers engage in inter-city dialogue in global affairs to develop various international relations and pursue their urban interests by establishing specialized relations (Ahmadipour et al., 2012:6).

According to some thinkers, urban diplomacy is a new phenomenon. However, it is worth noting that urban diplomacy has a history that extends beyond traditional government diplomacy. The history of urban diplomacy dates back to ancient Greece and its state-city relations. Still, with the formation of the treaty in the modern era of international relations, cities were no longer the exclusive actors of foreign policy. The role of the local state in creating diplomatic peace became the arena of action for the newly established European states. However, with the advent of the era of globalization and the resurgence of cities, urban diplomacy was reintroduced (Karimi et al., 2018, p. 6). In fact, urban diplomacy is considered a desirable and effective policy for promoting peace, human rights, and public participation. In the process of globalization, the transfer of goods, services, people, thoughts, and other things has expanded in the shadow of diplomacy. In many places, especially in developed countries, cities have found an independent role in relation to finance, politics, and services (Hayati, 2016:30).

Some other experts believe that the necessity of urban diplomacy, the rapid expansion of the world's computer networks, and a wide range of political and economic activities in the digital age have raised questions about the effectiveness of government authority and democratic participation, paved the way for progress in transnational issues, and led to the expansion of urban diplomacy (Basirat, M., & Jalili, S. M., 2014:55). A strong and effective presence in the field of urban diplomacy can have a significant impact

on improving the position of metropolises and cities in the global era in global governance. Among them, the leading actors of urban diplomacy, which are mayors and city officials, representatives of local governments, and representatives of NGOs, can be called urban ambassadors (Basirat, M., & Jalili, S. M., 2014:56-57).

1.4. Artificial Intelligence

Artificial intelligence includes machine learning algorithms that enable machines to perform tasks automatically or semi-autonomously with varying degrees of cognitive capacity and autonomy. These capabilities will enable AI to replicate human functions, such as object recognition, language processing, and learning from experience (Junfeng & Jiao, 2023, p. 5). Artificial intelligence plays a vital role in shaping cities and urban development. It is used in various aspects such as smart city strategies and governance standards (Fabio, Iapaolo, 2023:38). Artificial intelligence contributes to urban transformation by enabling smart city innovations (Marta, Galceran-Vercher, 2023:6). The relationship between AI and urban planning is complex, influencing urban planning, governance, and social interaction, highlighting the interdisciplinary nature of AI's impact on urban development (Federico, Cugurullo, 2023:3).

1.5. Smart Governance

Smart governance plays a crucial role in the development of smart cities. For this purpose, it can be stated that information and communication technology infrastructure, as part of smart governance models, plays a crucial role in smart government (Pereira, 2018, p. 32). It is essential to note that governance and government are two distinct yet related concepts. Smart governance refers to the capacity to apply informed actions and caring activities, and make decisions about various matters (Scholl, 2016:41). Modern infrastructure in the field of information technology is one of the most critical sectors in smart cities. Additionally, smart governance offers numerous benefits to governments, including stability, political participation, accountability, transparency, effective public and social services, efficient political strategies, justice, and control over corruption, as well as adherence to the rule of law. (H., & Keshtkar, 2022:300).

Each technological tool serves a distinct purpose for different actors. Therefore, smart city governance should be designed and created with the knowledge

and opinions of influential actors in the city, to meet their real needs and incorporate innovative practices (Pelzer, 2014: 16).

1.6. Artificial Intelligence and Urban Diplomacy

Artificial intelligence plays a crucial role in urban diplomacy by enhancing communication, collaboration, and decision-making processes (Stephanie, 2023:11). Artificial intelligence technologies, such as predictive models and automated systems, facilitate the analysis of data, the prediction of threats, and the optimization of urban operations. (Newman, 2023:43) In urban environments, AI facilitates urban diplomacy processes and enables the simulation and analysis of various urban phenomena in fine detail (János, 2022:46).

Additionally, AI-based communication tools can enhance public diplomacy between countries by facilitating the creation of targeted foreign policy objectives. However, in Iran, the use of AI in urban management and urban diplomacy remains limited and fragmented, necessitating careful policy-making and intelligent infrastructure development. Overall, the integration of AI into urban diplomacy not only enhances urban planning and decision-making but also fosters collaboration and communication among stakeholders, ultimately leading to more efficient and resilient urban environments (Robyn, 2022:27).

Infrastructural limitations and the lack of experience of urban managers in Iran have prevented the full utilization of these capacities. Using AI-based decision-making models can play a crucial role in optimizing governance, public security, and crisis management, ultimately promoting urban security (Abdiu, 2020:88). AI-powered communication tools can improve public diplomacy by creating targeted foreign policy objectives and translating language directly (Vacarelu, 2021:18). In addition, AI could revolutionize traditional diplomatic practices by providing new tools for conducting international relations and diplomacy and potentially changing the future of government engagement (János, 2022:16). In the area of cooperation, AI algorithms can facilitate negotiation and agreement on joint plans and create more effective communication. Also, AI combined with human-enhanced technologies can significantly increase the speed, bandwidth, and optimization of diplomacy, demonstrating the potential for collaborative advances in this area (Buch et al., 2022:47).

2. Research Background

In relation to the subject of this research, to date, there has been no domestic sample specifically titled "The Impact of Artificial Intelligence on Urban Diplomacy" that has directly addressed this issue. Since this research aims to investigate the impact of technology and artificial intelligence on urban diplomacy development, it is necessary to review previous research on both urban diplomacy and artificial intelligence from various dimensions. Therefore, the related research and its results, published in recent years, include doctoral and master's theses, as well as Persian and English articles. Asadi (2015), in his doctoral thesis entitled "Analysis of Urban Space Management in the Global Space of Cities with an Emphasis on Urban Diplomacy," with an analysis of Iran's urban space management in the global space, states that urban diplomacy is formed when modern themes are known and pursued by the dominant discourse in geographical space. Mashayekhi (2017), in his thesis entitled "Strategic Analysis of the Development of Urban Diplomacy in Mashhad Metropolis," examines the role and position of Mashhad city in urban diplomacy. Accordingly, using the SWOT model and referring to the opinions of experts, it is concluded that the position of urban diplomacy in Mashhad requires this metropolis to employ strategies that capitalize on external opportunities to address internal weaknesses. In their research titled "Composition of Urban Diplomacy Studies in Iran", Skoyeh Aras et al. (2024) have reviewed the studies conducted in the last ten years. The research findings reveal the weaknesses of studies in the early 2010s in the field of urban diplomacy in Iran. Notably, the metropolises of Tehran, Mashhad, and Shiraz have had the highest number of research works in this field. Urban diplomacy in Iran has not been able to use all its potential capacities as it deserves, and as a result, it has led to the weakening of this field in the country. Abgheri et al. (2024) in a study entitled "The Role of City Intelligence in Efficient Governance" have investigated smart in urban governance using the grounded theory method and concluded that this concept is formed by using information and communication technologies to improve urban management, increase transparency, citizen participation, and optimize urban resources. Lorenzo et al. (2020), in their research titled "Smart City Diplomacy," show that there are several opportunities to implement smart city diplomacy,

including partnerships with foreign companies and cooperation in financing programs and mechanisms implemented by international organizations. In their research titled "Artificial Intelligence: Strengthening or Replacing Traditional Diplomacy", Morris (2021) examines the adoption of AI in the field of international relations and diplomacy and believes that traditional diplomatic practices are gradually giving way to AI-based approaches. In a study titled "Artificial Intelligence as a Tool for Thoughtful Public Diplomacy", Robin et al. (2022) explored possible AI solutions for improvement. Aspects of communication in public diplomacy between Iran and the United States have been discussed. In a study titled "Cyber Diplomacy and Artificial Intelligence: Opportunities and Challenges," Stephanie and Oliveira (2023) have explored the application of AI in cyber diplomacy, providing a promising prospect for strengthening international efforts in cybersecurity.

3. Research Methodology

In terms of the research process, this study employs a qualitative-exploratory research approach with a futures studies perspective, aiming to identify the drivers and challenges in the development of urban diplomacy based on artificial intelligence and new technologies. Data collection was conducted using a mixed-method approach. First, by reviewing internal and external sources, including books, articles, theses, reports, and information related to key factors and related indicators, the relevant factors and associated indicators were identified. Then, to analyze and prioritize the indicators and challenges, paired comparison questionnaires and four-choice Likert questionnaires were used. Data analysis using MICMAC software. This was done to determine the structural and functional relationships between the components. Additionally, to validate the reliability of the tools, a limited quantitative analysis was conducted using SPSS software.

In this study, two questionnaires were designed to identify the drivers and challenges of urban diplomacy development based on artificial intelligence. In the first questionnaire, 30 experts in the field of urban diplomacy and artificial intelligence, using pairwise comparison and in the form of the Cross-Impact Matrix (CIM), determined the effectiveness and effectiveness of the indicators with numbers in the range of 0 to 3 and potential relationships (P) to identify the effective drivers. The experts were selected based on their expertise and experience, and the snowball sampling method was used. MICMAC software was analyzed. In the second questionnaire, the same experts identified the challenges ahead using the four-point Likert scale. This spectrum was chosen because it obliges respondents to make definitive decisions and avoids intermediate or neutral answers. To ensure the validity and reliability of the questionnaires, their content validity was reviewed and modified by several experts and professors in the fields of urban diplomacy and artificial intelligence. The pre-test was conducted on a sample of experts similar to the target group to measure the transparency of the questions. Reliability was confirmed using Cronbach's alpha coefficient. ($\alpha > 0.7$) Finally, the results of the questionnaire for identifying challenges based on necessity and necessity were analyzed and evaluated through the Importance-performance analysis (IPA) in SPSS software.

Fundamentalism means the subsidence of a challenge, so that it can be effective in solving other challenges. Urgency also means the need to address the challenge as soon as possible. Sometimes neglecting a challenge can cause irreparable damage to urban management. Obviously, challenges that are more urgent than other challenges are prioritized. Due to the rapid changes in technology, the appropriate and logical timeframe for the use of emerging technology in the field of urban diplomacy was considered to be 5 years.

Table 1. General profile of respondents

Index	Feature	Number	Index	Feature	Number
sex	Man	22	Education	M.Sc.	10
	women	8		Ph.d.	16
Age	25-30	5		Postdoctoral	4
	30-40	7	Job	Employee	15
	40-50	12		Faculty of the University	5
	Above 50	6		Student	10

The composition of the sample population reveals that the majority of respondents are middle-aged men (40-50 years old) with doctoral education and significant work experience, who play a major role in professional and academic fields. From a job perspective, the largest share was related to the university's employees and faculty members. This demographic structure can influence the perspectives and priorities of drivers, as well as the challenges they face, which may result in research outcomes that reflect the experiences and attitudes of professional and academic experts, rather than those of younger or less educated groups.

4. Results

4.1. Identifying Primary Parameters

At this stage, by homogenizing the findings of the review of the sources and the responses of 30 experts, 19 components were identified as key drivers that shape the development of urban diplomacy based on artificial intelligence and new technologies. These components are based on five main areas, including urban research, urban development, urban security, Urban representation, and urban culture. This classification has been selected based on the scientific

literature and theoretical models in the field of urban diplomacy and urban smartening (Anoushei & Rezaei, 2023; Fathi et al., 2021; Kiani et al., 2020) to comprehensively cover the key aspects of interactions, decision-making, and performance of cities in urban diplomacy with a focus on new technologies. The final list of these effective drivers is presented in Table 2.

Additionally, according to Table 3, 15 indicators have been identified as challenges facing this area and categorized based on two criteria: essentiality and urgency. The list of barriers and challenges was presented, along with a questionnaire, to validate the responses of 30 experts. After confirming the validity of the questionnaire, the obstacles and challenges of the research topic were validated and prioritized by a group of experts in the field of urban diplomacy and artificial intelligence through the IPA matrix using the Likert spectrum, in the form of fundamentality and urgency, and after removing the commonalities, they are presented as specific components in the form of challenges or drivers were finalized. The results of the questionnaires were then analyzed and evaluated using SPSS software, as shown in Figure 4 and Table 8.

Table 2. Effective drivers in the development of urban diplomacy based on artificial intelligence and emerging technologies

Dimensions of Urban Diplomacy	Component
Urban Research	<ol style="list-style-type: none"> 1. Creating the Ground for Information Exchange (Anoushehi, Rezaei, 2023:4) 2. Acceleration and Data Analysis (Anoushehi, Rezaei, 2023:4) 3. Using a Data-Driven Approach in Urban Diplomacy (Anoushehi, Rezaei, 2023:4) 4. Awareness to managers (Asadi, 2019:17)
Urban Development	<ol style="list-style-type: none"> 1. Increasing the readiness of technological infrastructure and equipment (Fathi, 2021:176) 2. Virtual Diplomacy and Negotiations Based on Artificial Intelligence (Anoushehi, Rezaei, 2023:4) 3. Technology-based urban systems for service delivery (Afshar et al, 2020:18) 4. Empowering government organizations to produce, exchange, and analyze data (Asadi, 2018:321) 5. Urban Smartening Planning (Fathi, 2021:176) (Potera et al., 2022) 6. Planning for the development of artificial intelligence (Anoushehi, Rezaei,2023:4)
Urban Security	<ol style="list-style-type: none"> 1. Planning for the government's regulatory role on data exchange (Afshar et al, 2020:18) 2. Planning and Clarification on the Performance of Related Institutions in the Field of Urban Diplomacy (Afshar et al, 2020:18) (Grandi, 2020) 3. Creating a strong regulatory mechanism in cities and smart regulation (Fathi, 2021:176) (Asadi, 2018:321)
Municipal Representation	<ol style="list-style-type: none"> 1. Development of Inter-Urban Relations (Afshar et al, 2020:18) (Asadi, 2018:321) 2. Long-term support for urban diplomacy-related activities (Koelemajij, 2023) 3. Creating international networks in the field of urban diplomacy (Afshar et al, 2020:18) (Alejo, 2022)
Urban Culture	<ol style="list-style-type: none"> 5. Creating an organizational culture to embrace change and use technology (Fathi, 2021:176) 6. Expansion and Promotion of Emerging Technologies in Urban Management (Fathi, 2021:176) 7. Increasing citizens' expectations in using new solutions to provide government services (Fathi, 2021:176) (Dines, 2021)

Table 3. challenges influencing the development of urban diplomacy based on artificial intelligence and emerging technologies

Criteria	Challenges
Essentiality	<ol style="list-style-type: none"> 1. Lack of proper enforcement guidelines (Fathi, 2021:176) 2. Lack of experience and required potential (Vahedi, 2022:106) 3. Limited Infrastructural Facilities (Fathi, 2021:176) 4. Lack of attention to the social and technical complexities of city administration (Malay, 2022:322) 5. Lack of equal and equitable distribution of urban services (Malay, 2022:322) 6. Lack of Consistent Regulations on the Functioning of Artificial Intelligence (Malay, 2022:322) 7. Lack of an appropriate mechanism to prevent criminal activities (Vahedi, 2022:106) 8. Failure to improve interactions and interactions within and outside the city (Malay, 2022:322) 9. Cities' unwillingness to produce and exchange information (Malay, 2022:322)
Urgency	<ol style="list-style-type: none"> 1. Malicious Cyber Attacks (Fathi, 2021:176) 2. Security considerations among the related organizational and institutional responsibilities (Vahedi, 2022:106) 3. Privacy and Disclosure Issues (Fathi, 2021:176) 4. Shortage of specialized human resources in the field of artificial intelligence (Vahedi, 2022:106) 5. Distrust of technology-based solutions (Vahedi, 2022:106) 6. Ambiguity in the appropriateness of using artificial intelligence or other emerging technologies in urban diplomacy (Vahedi, 2022:106)

4.2. Analyzing the Effective Drivers in the Development of Urban Diplomacy Based on Emerging Technology and Artificial Intelligence

After identifying and extracting the drivers, it is time to prioritize and analyze the relationships between them and develop the main drivers. For this purpose, 30 selected experts with relevant expertise and experience were recruited using the snowball sampling method to create sufficient diversity in terms of field of expertise, experience, and level of executive and research activities. Then, using the structural analysis method and MICMAC software, the propulsion of the main factors affecting the development of urban diplomacy based on artificial intelligence and emerging technology was identified and ranked.

According to the results output from the MicMac software, the sum of the variable data of the rows, the amount of ether, and the sum of the variable data of the columns indicate the effect rate. The degree of

filling of the interaction matrix, as calculated in Table 4, is approximately 94.73%, indicating a relatively high coefficient of influence between the selected variables and factors. These factors affect each other in more than 94% of the cases. In other words, the index indicates that the relationship structure between the drivers and indicators is relatively complete and coherent. Although high filling can be an indication of the strength of the relationships between variables, it alone is not a sufficient criterion to prove validity. Therefore, this value has been presented as evidence of validity and used in conjunction with expert evaluation to confirm the accuracy and validity of the extracted data (Godet, 2006). Out of a total of 361 evaluable relationships in this matrix, 19 relationships of number zero, 72 relationships of number one, 151 relationships of number two, and 112 relationships of number 3 and number 7 were obtained as P.

Table 4. Preliminary analysis of the data of the interaction matrix

Index	Matrix Dimensions	Number of repetitions	Number Zero	Number one	Number two.	Number three.	P	Collect	Degree of Filling
Amount	19×19	2	19	72	151	112	7	361	73/94

In this study, the matrix related to the indicators was analyzed after two data rotations to ensure the stability and coherence of the relationships between the indicators. After this process, the degree of desirability of the matrix was calculated to be close to 100%, indicating high consistency and coherence between the experts' responses and the indicators

used. It should be noted that this value only indicates the stability and consistency of the data. In the literature, Structural analysis involves multiple iterations to stabilize relationships. A high percentage of desirability indicates the high quality of the collected data and confirms the reliability of the analysis (Godet, 2006).

Table 5. The degree of desirability and optimization of the matrix

Rotate	Influence	Influence
1	88%	93%
2	100%	100%

4.3. Analysis of the Direct and Indirect Impact/Impact of Drivers

In this section, the relationships between the variables were measured using MICMAC software, which assigns a numerical score to each indicator, classifying them in

terms of effectiveness and impact. The direct and indirect impacts of indicators affecting the development of urban diplomacy based on emerging technologies and artificial intelligence are presented in Table 6.

Table 6. The direct and indirect influence of variables on each other

Row	Index	Direct Effects (MDI)		Indirect Effects (MII)	
		Effectiveness	Impact Rate	Effectiveness	Impact Rate
1	Creating the context for information exchanges	35	39	49290	53971
2	Acceleration and Data Analysis	31	41	43872	56725
3	Using a Data-Driven Approach in Urban Diplomacy	37	35	51800	49390
4	Awareness of managers	34	40	47670	55315
5	Increasing the readiness of the technology infrastructure and equipment	43	28	60545	39688
6	Virtual Diplomacy and AI-Based Negotiations	34	37	48168	51701
7	Technology-based urban systems to provide services	40	42	56643	58177
8	Empowering government agencies to produce, exchange, and analyze data	43	39	60657	54463
9	Urban Smartening Planning	43	36	59288	50576
10	Planning for the development of artificial intelligence	45	36	62358	50288
11	Development of inter-city relations	34	38	47862	53025
12	Long-term support for urban diplomacy-related activities	34	39	47178	54645
13	Creating International Networks in the Field of Urban Diplomacy	37	39	51808	54454
14	Increasing citizens' expectations in using new solutions to provide government services	37	34	51902	48204
15	Expansion and promotion of emerging technologies in city management	46	39	63356	59283
16	Building an organizational culture to embrace change and use technology	36	38	50615	53696
17	Planning for the Government's Supervisory Role on Data Exchange	39	38	53307	53883
18	Planning and Transparency on the Performance of Relevant Institutions in the Field of Urban Diplomacy	36	37	50331	82083
19	Creating a strong regulatory mechanism in cities and smart regulation	26	31	36994	44068
Collect		710	710	710	710

According to the information in Table 6, the greater the effectiveness of an indicator, the more it is located

in the area of risk and target variables, making it considered an essential factor. According to the data in

the table, the indicators of urban diplomacy development were analyzed from the perspective of impact and effectiveness. In the direct effects section (MDI), the indicators with the highest impact are: the development and promotion of emerging technologies in city management (46), planning for the development of artificial intelligence, increasing the readiness of infrastructure and technology equipment (43), and empowering government organizations (43). Indicators are known as key drivers because they have the most

significant impact on other indicators, and their successful implementation can significantly boost the development of AI-based urban diplomacy. In contrast, the three indicators with the most direct impact are: technology-based urban systems for service delivery (42), acceleration and data analysis (41), and informing managers (40). These indicators show that their success depends on the realization of other effective indicators.

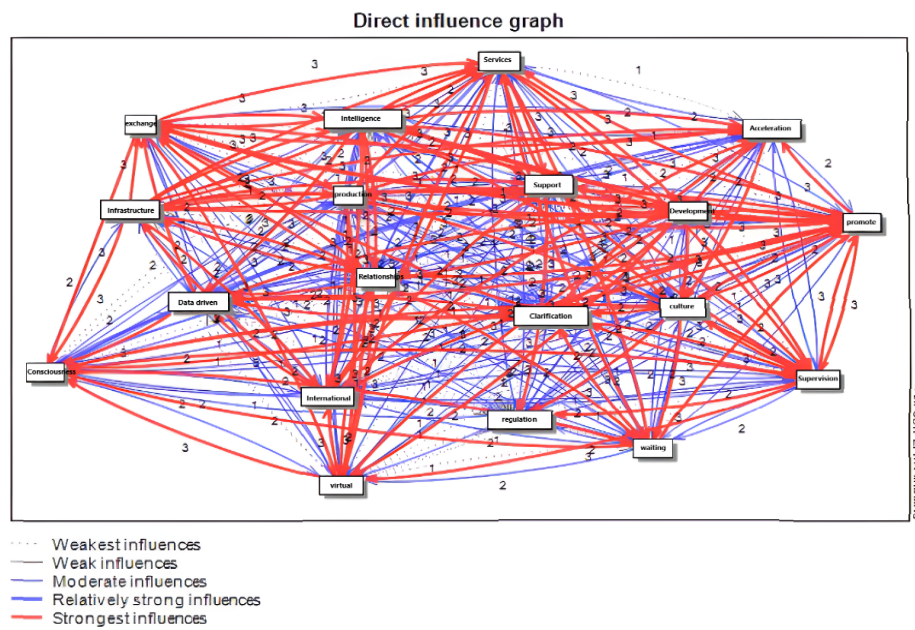


Figure 1. direct effects (very weak to strong effects)

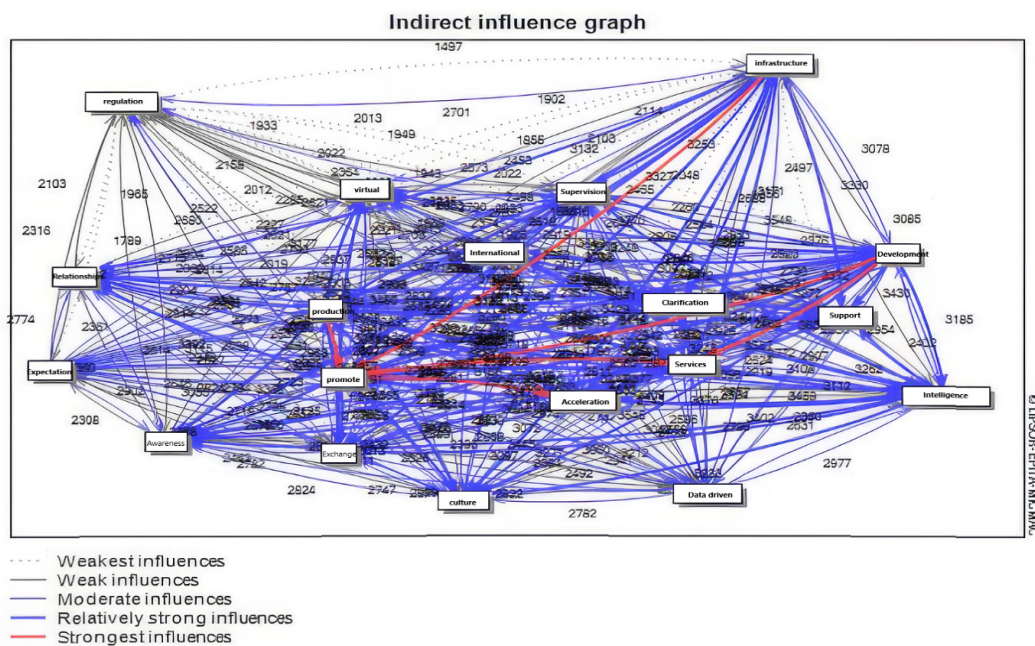


Figure 2. indirect effects (very weak to strong effects)

4.4. Interpretation of system drivers according to their position in the chart

Based on the definition and interpretation of the

variables in the Mac chart, the position of each critical factor in this study is illustrated in Figure 3.

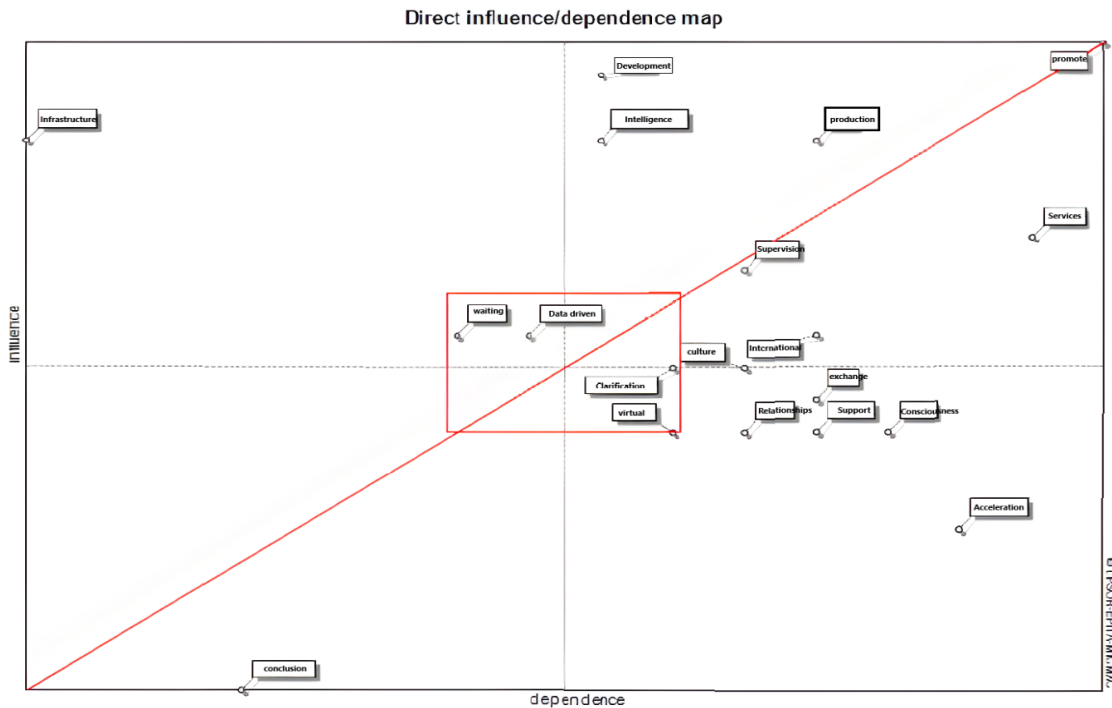


Figure 3. Distribution of Variables in Influence and Influence Plan

Based on the results, five categories of variables (influencing factors, two-faceted factors, regulatory factors, and independent factors) have been identified. In the diagram of the direct effects of the variables, the following can be seen:

Strategic Variables (Risk Factors and Target):

This group has a high impact and is divided into two categories: “risk” and “target”. The risk variables are located above the diagonal line and in the northeastern region of the map and have a high potential to become key players in the system; therefore, policymakers should focus on controlling and managing these risks. The target variables, located below the diagonal line of the same area, indicate that the desired results and objectives are systems that can be monitored as the leading indicators of success in the development of urban diplomacy based on artificial intelligence.

Effective variables (Two-faceted):

These variables are located in the northwestern part of the map and have a significant impact on other variables; however, they are also influenced by several different variables. Such variables play a role in medium-term and operational policy-making, and any changes in them can have significant effects on the

entire system. Therefore, planning and improving these variables is crucial in determining the development process of urban diplomacy.

Affected variables (result):

This group is located in the southeast of the graph and has a high impact, but its effectiveness is limited. These variables represent the operational results of the system, and their status depends on the performance of independent and influential variables. In other words, the success of urban diplomacy and the use of artificial intelligence is directly influenced by the performance of these variables.

Independent variables:

These variables have a minimal impact and are located in the southern portion of the graph. They act as the foundation of the system, and significant changes are less noticeable; however, maintaining and strengthening them helps to stabilize and sustain the system.

Regulatory variables:

This group is located around the center of gravity of the graph and serves as a secondary lever. They can maintain the balance of the system and play a moderating and supportive role in the coordination

between the influential and affected variables. A summary of the status of each variable, based on its classification, is presented in Figure 3, which is derived from the output of the Mac software, as shown in Table 7. The study of the position of the factors in

Figure (3) and Table (7) shows that the factors that fall into the group of two-sided factors of the development of urban diplomacy based on emerging technology are both the result of policy and planning, and have an effect on them.

Table 7. The status of each of the drivers based on their class type.

Row	Classification	Variables
1	Influencing factors	Increasing the readiness of technological infrastructure and equipment, growing citizens' expectations in using new solutions to provide government services, and using data-driven approaches in urban diplomacy
2	Two-faceted factors	Risk Planning for the development of artificial intelligence, preparing for the smart city, empowering government organizations towards the production, exchange, and analysis of data, expansion and promotion of emerging technologies in the management of cities
		Goal Planning for the government's supervisory role on data exchange, building an organizational culture to accept change and use technology, creating/joining an international network in the field of diplomacy, and making urban systems technology-oriented to provide services.
3	Factors Affecting (Dependent)	Planning and clarifying the performance of relevant institutions in the field of urban diplomacy, virtual diplomacy, and negotiations based on artificial intelligence, developing inter-city relations, creating the ground for information exchange, long-term support for activities related to urban diplomacy, informing managers, and accelerating and analyzing data
4	Independent Factors	Accelerating and analyzing data, creating a strong monitoring mechanism in cities, and implementing intelligent regulation
5	Regulatory factors	Using a data-driven approach in urban diplomacy, increasing citizens' expectations in using new solutions to provide government services, planning, and clarifying the performance of relevant institutions in the field of urban diplomacy, virtual diplomacy, and negotiations based on artificial intelligence.

5.4. Analyzing the Challenges of Urban Diplomacy Development Based on Emerging Technology and Artificial Intelligence

In the second part of the study, a list of barriers and challenges was presented, along with a questionnaire to validate the responses of 30 experts. After confirming the validity of the questionnaire, a group of experts in the field of urban diplomacy and artificial

intelligence validated and prioritized the barriers and challenges of the research topic using the IPA matrix, which employed a Likert scale to assess the essentiality and urgency of each barrier. Then, the results of the questionnaires were validated and prioritized in the SPSS software environment. The analysis and evaluation were conducted, as shown in Figure 4 and Table 8.

Table 8. The acquired average of each of the obstacles resulting from the experts' responses

Index	Mean Fundamentalism	Average urgency
Lack of proper enforcement guidelines	48/1	27/3
Lack of experience and potential required	48/1	82/2
Limited Infrastructural Facilities	56/1	79/2
Lack of attention to the social and technical complexities of urban management	18/3	04/2
Lack of equal and fair distribution of urban services	24/2	97/1
Negative Consequences of Using Technology in Urban Diplomacy	78/1	86/1
Lack of Compliance Regulations for the Functioning of Artificial Intelligence	43/1	63/2
Lack of a proper mechanism to prevent criminal activity	43/1	82/2
Failure to improve interactions within and outside the city	21/2	91/1

Index	Mean Fundamentalism	Average urgency
Cities' unwillingness to produce and exchange information	18/2	09/2
Cyber Malicious Attacks	27/2	43/2
Security considerations in the context of related organizational and institutional responsibilities	34/2	43/2
Privacy issues in the field of AI	09/2	88/2
Shortage of skilled workforce in the field of artificial intelligence	07/2	98/2
Distrust of technology-based solutions	93/1	21/2
Ambiguity in the appropriateness of using artificial intelligence or other emerging technologies in urban diplomacy	04/2	31/2
Threshold Reviewed	92/1	465/2

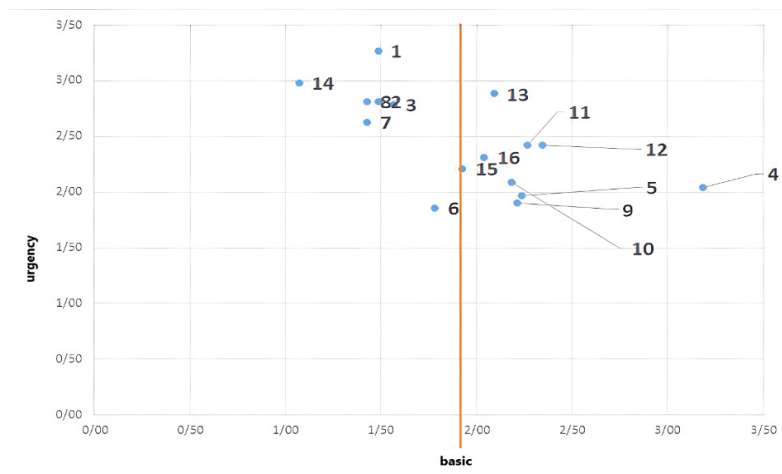


Figure 4. Demonstrating the fundamental urgency of the challenges identified in the ipa matrix.

By analyzing the matrix of essentiality and urgency, it is possible to create a relatively clear picture of the priority of the obstacles to the development of urban

diplomacy based on emerging technology and artificial intelligence. Accordingly, the barriers and challenges are categorized and summarized in Table 9.

Table 9. Analysis of obstacles and challenges of urban diplomacy based on emerging technologies

Row	Explain	Position in the IPA Matrix	Description
1	Lack of proper enforcement guidelines	First quarter	A focus and priority area that requires focus and action for improvement.
2	Lack of potential and experience required		
3	Limited infrastructural facilities		
7	Lack of Compliance Regulations for the Functioning of Artificial Intelligence		
8	Lack of a proper mechanism to prevent criminal activities		
14	Shortage of skilled workforce in the field of artificial intelligence		
11	Malicious Cyber Attacks	Second Quarter	The current situation is good, and the same path should be continued.
12	Security considerations in the context of related organizational and institutional responsibilities		
13	Privacy issues in the field of AI		

Row	Explain	Position in the IPA Matrix	Description
15	Distrust of technology-based solutions	Third Quarter	Third-quarter barriers are not of great importance.
6	Negative Consequences of Using Technology in Urban Diplomacy		
4	A Lack of Understanding of the Socio-Cultural Complexities of Urban Development	Fourth Quarter	The attention and resources available are better spent on other obstacles.
9	Failure to improve interactions within and outside the city		
10	Cities' unwillingness to produce and exchange information		
5	Lack of equal and fair distribution of urban services		
16	Ambiguity in the appropriateness of using artificial intelligence or other emerging technologies in urban diplomacy		

By analyzing the IPA matrix, the following obstacles are prioritized in terms of fundamentality and urgency. In the path of developing urban diplomacy based on new technologies, especially artificial intelligence, they should pay great attention to:

First Quarter (Focus and Priority):

Obstacles such as “lack of appropriate executive instructions”, “lack of required experience and potential”, “limited infrastructure facilities”, “lack of regulations in accordance with the operation of artificial intelligence”, “lack of appropriate mechanism to prevent criminal activities”, and “lack of specialized manpower in the field of artificial intelligence” have been included in this quarter. These barriers are both fundamental and urgent, meaning that if left unmanaged, they can severely limit the development of AI-based urban diplomacy. Actions include developing and updating executive guidelines and regulations for the use of AI in urban diplomacy.

It is recommended to implement training and capacity-building programs for managers and specialized personnel, improve infrastructure and invest in technological equipment and cybersecurity, and establish monitoring mechanisms to prevent data- and technology-related criminal activities.

Second Quarter (Favorable Situation/Continuity of Current Path):

Barriers such as “malicious cyberattacks,” “security considerations in the field of organizational and institutional responsibilities,” and “privacy issues in the field of artificial intelligence” are addressed in this quarter. This quarter demonstrates that the current situation is appropriate; however, it is necessary to maintain continuity of measures and policy updates. Implementing ongoing cybersecurity training courses and periodically revising privacy policies are

appropriate operational measures to address these challenges.

Third Quarter (Low Importance and Low Priority):

Obstacles such as “distrust of technology-based solutions” and “negative consequences of using technology in urban diplomacy” have been identified in this quarter. These barriers have a lower priority, and more attention should be devoted to the first and second quarters. However, continuous monitoring and communication with other drivers is recommended to prevent future problems.

Fourth Quarter (Low-Importance and Low-Urgency):

Obstacles such as “lack of attention to the social and technical complexities of urban management”, “inadequacy in improving interactions within and outside the city”, “unwillingness of cities to produce and exchange information”, “lack of fair distribution of urban services”, and “ambiguity in the appropriateness of using emerging technologies” are included in this quarter. Limited attention should be devoted to more significant barriers, but they should be closely monitored to prevent adverse effects.

5. Discussion & Conclusion

In the era of information and communication science and technology, the conditions and conditions have been provided for urban and urban planning experts to respond to the numerous problems of cities in contemporary and future times by using the abundant and unique capacities of new technologies, and to move in line with their planning goals, i.e., access to justice, ensuring the welfare of citizens, sustainable development of the city, or any other corrective action. In comparison to previous studies, the present study has taken a step further by integrating two relatively distinct fields — urban diplomacy and artificial

intelligence — into a single analytical framework. While Asadi (2015) and Mashayekhi (2017) have examined urban diplomacy from a strategic and institutional perspective, and Abgheri et al. (2024) have focused on smart governance and urban technologies, the present study combines these two currents of thought. Moreover, unlike Renzo et al. (2020) and Maris (2021), who have only dealt with the theoretical aspects of “smart diplomacy”, this study has tried to quantitatively analyze the causal relationships between drivers and obstacles using the structural analysis method (MICMAC). From an innovation perspective, the findings show that the role of AI in urban diplomacy is effective not only at the level of technological infrastructure but also in redefining intercity interactions, regulatory mechanisms, and cultural patterns. This result aligns with Stefani and Oliveira’s (2023) studies in the field of cyber diplomacy, but it places greater emphasis on managerial and urban dimensions.

The purpose of this study is to identify the barriers and drivers of the use of emerging technologies and artificial intelligence in the development of urban diplomacy in Iran. This field has not been explored in this specific context to date. Future studies are a field of study that has extensive results in planning and policy-making. Considering the future, it is possible to understand the weaknesses of policy-making and the main and fundamental challenges in the development of urban diplomacy based on emerging technologies and artificial intelligence, and to establish a more intelligent future path.

In this study, an attempt has been made to identify the primary drivers and obstacles to the development of urban diplomacy in Iran using the Interaction Analysis Method (IAM) and the Essentiality-Urgency Analysis Matrix (E-UAM). According to a review of the research literature and the opinions of 30 urban and artificial intelligence experts, five main areas — urban research, urban development, urban agency, urban culture, and urban security — were identified, along with 35 corresponding indicators.

The results of the research indicate that if the rapid development of technology and its consequences are not taken into account in the urban management process, it will have adverse effects on community management. By reviewing the literature in the field of urban diplomacy, it can be concluded that rulers are compelled to adopt emerging technologies in urban management and transition towards technology-based cities. For this reason, rulers must adopt a more

modern approach and equip themselves with technological and innovative solutions, while also addressing the challenges posed by technology. Each of the studied drivers has a unique feature that makes the process of using and exploiting artificial intelligence in urban diplomacy development smoother.

According to the drivers identified through interaction analysis (CIM), it can be said that the most critical strategic drivers in the research on the development of urban diplomacy based on artificial intelligence in the country, which have two common characteristics, high effectiveness and effectiveness and have a very high potential to become essential players in the system, include: Increasing the readiness of infrastructure and technological equipment, increasing citizens’ expectations from the government in using new solutions to provide services, and the use of data-driven approaches in urban diplomacy emphasize the need to pay attention to stakeholders and manage the relationships between them.

Empowering and pressuring governance structures and government organizations to create, exchange, and analyze to develop infrastructures, processes, and procedures that help the organization to be empowered in data collection and analysis and to make more efficient and effective decisions at the national and international levels. Empowering infrastructure with new tools in the field of technology enables urban diplomacy to focus on improving the foundation of emerging technologies. Increasing the expectations of rulers in the field of government agility and the use of new and innovative solutions in urban diplomacy enhances the quality of services, transparency, and accountability, providing a suitable opportunity for artificial intelligence technology to improve these aspects.

Regarding the barriers identified using the IPA matrix, it can be concluded that the most critical issue in the field of the use of artificial intelligence and emerging technology in urban diplomacy in Iran is the lack of appropriate executive instructions, the lack of the required potential and experience, limited infrastructural facilities, and the lack of regulations in accordance with the function of artificial intelligence. Issues related to laws, regulations, and standardization pose a severe crisis, weakening governance institutions and hindering the ability to use and monitor the operation of this emerging technology. On the other hand, it is essential to acknowledge that the absence of a robust legal framework can raise doubts and concerns regarding security and legal issues related to

the use of artificial intelligence in urban diplomacy, underscoring the need for policymakers to engage in this field. In general, the future of urban diplomacy is influenced by and depends on the parameters of emerging technologies, such as artificial intelligence, which is not only impacting urban diplomacy but also almost all areas of human life, including the economy, culture, and politics. It has also affected the situation in such a way that awareness of the challenges and drivers caused by emerging technologies and artificial intelligence is a vital necessity for researchers, academic elites, as well as officials and decision-makers in the foreign policy apparatus, especially policy-making institutions related to the country's urban management.

6. Suggestions

In this regard, the authors of the article attempt to analyze the various dimensions and angles of urban diplomacy development, based on emerging technologies and artificial intelligence. Finally, the following suggestions are presented as operational solutions:

- Convening joint specialized meetings between government representatives, academic elites, and relevant public institutions in line with the policy of the development of artificial intelligence. Presenting an Operational and Comprehensive Model in Explaining the Position of Urban Diplomacy Using Emerging Technology and Artificial Intelligence to Improve the Position of Transnational Interactions and Communications in Metropolitan Cities
- Identifying the Basic Infrastructure in the Development of Urban Diplomacy Based on Emerging Technology and Artificial Intelligence
- Medium-term planning regarding forecasting the costs of implementing emerging technologies, preparing the grounds for attracting foreign investment, encouraging and attracting the domestic private sector for the development of communication infrastructure, supercomputers, etc. To help promote urban diplomacy based on emerging technology
- Considering new approaches to urban governance, such as open governance, network governance, etc.

Authors' contributions

All authors have contributed equally to the research stages, from design to writing and final revision of the article.

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Conflict of Interest

The authors of this article declare that there is no conflict of interest in conducting research, writing, or publishing this article.

References

- Afshar, M. M., Barzegar, K., & Kiani, D. (2020). Identify the Cyber-space Megatrend Affecting the Future of Public Diplomacy (with Structural Analysis Approach, Interaction). *Strategy*, 29(1), 97–129. doi: [20.1001.1.10283102.1399.29.1.4.2](https://doi.org/10.1001.1.10283102.1399.29.1.4.2) [In Persian]
- Abagheri Mahabadi, N., Fathi, S. and Zare, Z. (2024). Urban Smartization and Efficient Governance. *Urban Economics and Planning*, 5(2), 202217. doi: [10.22034/uep.2024.472170.1527](https://doi.org/10.22034/uep.2024.472170.1527) [In Persian]
- Ahmadipour, Z., Ghorchi, M., & Kadri Hajat, M. (2012). Explaining the place of urban diplomacy in the development of the geopolitical sphere of influence. *Quarterly Journal of Geography and Urban Development*, 5(1), 158–182. <https://www.magiran.com/p1118388> [In Persian]
- Anousheyi, A. A., & Rezaei, A. A. (2023). Evaluating the role of artificial intelligence tools in urban management development. *Journal of New Research Approaches in Management and Accounting*, 7(24), 16231632. Retrieved from <https://majournal.ir/index.php/ma/article/view/1981> [In Persian]
- Alejo, A. (2022). Diasporas as actors in urban diplomacy. *The Hague Journal of Diplomacy*, 17(1), 138–150. <https://doi.org/10.1163/1871191X-bja10094>
- Asadi, R. (2015). Analysis of urban space management in the global space of cities with emphasis on urban diplomacy (Doctoral dissertation). Ferdowsi University of Mashhad, Iran. [In Persian]
- Asadi, R. (2018). Qualitative meta-analysis of research conducted on urban diplomacy in Iran. *Geography and Regional Development*, 17(2), 315340. doi: [10.22067/geography.v17i2.82239](https://doi.org/10.22067/geography.v17i2.82239) [In Persian]
- Asadi, R. (2021). Preparing urban diplomacy strategies in Mashhad with an emphasis on Islamic countries. *Geography and Urban Space Development*, 7(2), 123105. doi: [10.22067/jgusd.2021.48380.0](https://doi.org/10.22067/jgusd.2021.48380.0) [In Persian]
- Bárbara, S. N. O. (2023). Cyber diplomacy and artificial intelligence: Opportunities and challenges. *The International Conference on Cybersecurity and Cybercrime*, 11, 1–15. <https://doi.org/10.19107/cybercon.2023.11>
- Basirat, M., & Jalili, S. M. (2014). Analysis of the opportunities and challenges of the development of urban diplomacy in the metropolis of Tehran. *Journal of Fine Arts: Architecture & Urban Planning*, 19(3), 53–66. <https://doi.org/10.22059/jfaup.2014.55404>

- Buch, A. M., Eagleman, D. M., & Grosenick, L. (2022). Engineering diplomacy: How AI and human augmentation could remake the art of foreign relations. *Science & Diplomacy*.<https://doi.org/10.1126/scidip.ade6798>
- Chinen, M. (2023). The Need for International Governance of AI. In *The International Governance of Artificial Intelligence* (pp. 8–33). Edward Elgar Publishing. <https://doi.org/10.4337/9781800379220.00007>
- Chegeni, H., & Keshtkar, M. (2022). Intelligent governance (knowledge-based) based on the model of developing the functions of think tanks. *Islamic Politics Research*, 10(21), 293–327. <https://doi.org/10.22054/jps.2022.166756>
- Cugurullo, F., & Palmi, O. (2023). Charting AI urbanism: Conceptual sources and spatial implications of urban artificial intelligence. *Discover Artificial Intelligence*, 3(1), 15. <https://doi.org/10.1007/s44163-023-00060-w>
- Engstrom, D. F., & Haim, A. (2023). Regulating government AI and the challenge of sociotechnical design. *Annual Review of Law and Social Science*, 19, 277–298. <https://doi.org/10.1146/annurev-lawsocsci-120522-091626>
- Ezadi, J. (2010). *Diplomacy of the Islamic Republic of Iran: Foreign policy, nuclear energy*. Tehran: Abrar Contemporary Cultural and Research Institute. [In Persian]
- Iapaolo, F. (2023). The system of auto-mobility: Computer vision and urban complexity—Reflections on artificial intelligence at urban scale. *AI & Society*, 38(3), 1111–1122. <https://doi.org/10.1007/s00146-022-01590-0>
- Faraji Sis, J. (2013). The impact of social and political relations of the sisterhood of small cities of East Azerbaijan with the country of Azerbaijan (Master's thesis). Islamic Azad University. [In Persian]
- Fathi, M. Y. (2021). Identifying the drivers and obstacles of using blockchain technology to target the governance of the city of Tehran (Master's thesis). University of Tehran. [In Persian]
- Galceran-Vercher, M. (2023). Artificial intelligence and cities: The global race to regulate algorithms. Notes Internacionals CI-DOB,286.<https://www.cidob.org/en/publications/artificial-intelligence-and-cities-global-race-regulate-algorithms-0>
- Ghorchi, M. (2014). *Writings about the globalization of global cities and the transnational role of cities*. Tehran: Tehran Studies and Planning Center Publications. [In Persian]
- Ghorchi, M., & Amani, M. (2010). Urban diplomacy in the process of globalization. *DaneshShahrMagazine*,(7). Tehran: Center for Studies and Planning of Tehran City.https://www.iiwe.com/article/urban/urban_diplomacy/ [In Persian]
- Godet, M. (2006). Creating futures: Scenario planning as a strategic management tool. 2nd edition. *Economica*.<https://www.amazon.com/Creating-Futures-Scenario-Strategic-Management/dp/2717852441>
- Hayati, A. (2015). Evaluation and analysis of dimensions of global localization in the metropolis of Mashhad (Master's thesis). University of Zabol. [In Persian]
- Kramár, J., Eccles, T., Gemp, I., Tacchetti, A., McKee, K. R., Malinowski, M., Graepel, T., & Bachrach, Y. (2022). Negotiation and honesty in artificial intelligence methods for the board game of Diplomacy. *Nature Communications*, 13(1), 7214. <https://doi.org/10.1038/s41467-022-34473-5>
- Phillips, C., & Jiao, J. (2023). Artificial intelligence & smart city ethics: A systematic review. In *Proceedings of the 2023 IEEE International Symposium on Ethics in Engineering, Science and Technology*(pp.15). IEEE.<https://doi.org/10.1109/ETH-ICSS57328.2023.10154961>
- Koelmaij, J., Taveirne, S., & Derudder, B. (2023). An economic geography perspective on city diplomacy.*Urban Studies*, 60(6), 9951012. <https://doi.org/10.1177/00420980221137021>
- Karimi, M. (2018). The Role of Local States in Peacebuilding. *International Quarterly of Geopolitics*, 14(51), 1–30. <https://doi.org/20.1001.1.17354331.1397.14.51.1.1>[In Persian]
- Kihlgren Grandi, L. (2020). City diplomacy for peace. In *City Diplomacy* (pp. 69–82). Palgrave Macmillan. https://doi.org/10.1007/978-3-030-60717-3_4
- Malay, K. (2022). The place of artificial intelligence in diplomacy: Considerations for the Islamic Republic of Iran. *Strategic Studies Quarterly*, 25(4), 311–331. <https://doi.org/10.1001.1.17350727.1401.25.98.10.3>[In Persian]
- Mashayekhi, M. (2017). Strategic analysis of urban diplomacy development in Mashhad (Master's thesis). Ferdowsi University of Mashhad. [In Persian]
- Vacarelu, M. (2021). Artificial intelligence: To strengthen or to replace traditional diplomacy. In F. Roumate (Ed.), *Artificial Intelligence and Digital Diplomacy* (pp. 1–23). Springer. https://doi.org/10.1007/978-3-030-68647-5_1
- Ajuriaguerra Escudero, M. Á., & Abdiu, M. (2022). Artificial intelligence in European urban governance. In F. Roumate (Ed.), *Advances in Electronic Government, Digital Divide, and Regional Development* (pp. 88–104). IGI Global. <https://doi.org/10.4018/978-1-7998-9609-8.ch006>
- Potera, N. A. (2022). Measuring the impact of international tools in local governance: The new urban diplomacy. *Rozwój Regionalny i Polityka Regionalna*, 60s, Article 9. <https://doi.org/10.14746/rpr.2022.60s.09>
- Dines, N. (2021). Moroccan City Festivals, Cultural Diplomacy, and Urban Political Agency. *International Journal of Politics, Culture and Society*, 34(1),115<https://doi.org/10.1007/s10767-020-09390-4>
- Oskouee Aras, A., Babaei Aghdam, F., Teimouri, I., & Hosseini, A. (2025). Meta-synthesis of city diplomacy researches in Iran. *Journal of Urban Economics and Planning*, 5(4), 98–116. <https://doi.org/10.22034/uep.2025.488723.1556>[In Persian]
- Parycek, P., & Pereira, G. V. (2017). Drivers of smart governance: Towards evidence-based policy-making. In *Proceedings of the 18th Annual International Conference on Digital Government Research* (pp.564565).ACM.<https://doi.org/10.1145/3085228.3085255>
- Pelzer, P, Geertman, S., van der Heijden, R., & Rouwette, E. (2014). The added value of planning support systems: A practitioner's perspective. *Computers, Environment and Urban Systems*, 48, 16–27. <https://doi.org/10.1016/j.compenvurbsys.2014.05.002>
- Williams, R., & Otto, L. (2022). Artificial intelligence as a tool of public diplomacy: Communication between the United States and Iran. *The Thinker*, 90(1). <https://doi.org/10.36615/thinker.v90i1.1171>
- Scholl, H. J., & AlAwadhi, S. (2016). Smart Governance as Key to Multi-Jurisdictional Smart City Initiatives: The Case of the eCityGov Alliance. *Social Science Information*, 55(2), 255–272. <https://doi.org/10.1177/0539018416629230>
- Isagah, T., & Ben Dhaou, S. I. (2023). Problem formulation and use case identification of AI in government: Results from the literature review. In *Proceedings of the 24th Annual International Conference on Digital Government Research* (pp. 434–439). ACM. <https://doi.org/10.1145/3598469.3598518>
- Vahedi, A. (2022). Identifying the challenges of applying artificial intelligence in organizational crisis management: Case study of government organizations in Kermanshah city (Master's thesis). University of Ilam. [In Persian]
- Ye, X., Newman, G., Lee, C., Van Zandt, S., & Jourdan, D. (2023). Toward urban artificial intelligence for developing justice-oriented smart cities. *Journal of Planning Education and Research*, 43(1), 6–7. <https://doi.org/10.1177/0739456X231154002>
- Zarif, M. J., & Sajjadpour, K. (2008). Multilateral diplomacy. Tehran: Studies Office Publications. [In Persian]
- Zolfagharzadeh, M.M., & Sanai, M. (2013). Science and technology diplomacy: Theoretical framework and practical proposals. *Rahyافت*, 23(54),4566.https://rahyaft.nrsip.ac.ir/article_13537.html [In Persian]