Application of the DEMATEL Method in Analyzing Citizen-Centric Development Strategies in Public Administration (Case Study: Zanjan Municipality)

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Abstract

Citizen-centric public administration enhances active citizen participation in decision-making processes. It encourages citizens to share their opinions, ideas, and feedback on policies and programs. Promoting citizen-centricity in municipalities can highlight the importance of civic education and capacity-building initiatives. Municipalities provide opportunities for residents to enhance their understanding of local governance processes, rights, and responsibilities. The purpose of this study was to identify and examine the influence and impact of citizen-centric development strategies in public administration. This research is applied in terms of its purpose and falls within the category of mixed-method research using a deductive-inductive approach. The qualitative segment of the study involved professors and experts in policy-making, public management, and urban management. A purposive sampling method with the snowball technique was employed, resulting in a sample size of 17 participants. The quantitative segment included managers and staff of Zanjan Municipality. Using a non-probability convenience sampling method, 52 managers participated in the study. In the qualitative section, data from the interviews led to the identification of 10 citizen-centric development strategies in public administration. The quantitative analysis was conducted using the DEMATEL method. According to the DEMATEL analysis, networking, participation mechanisms, and citizen empowerment are both highly influential and highly influenced strategies. Fluid bureaucracies, evidence-based decision-making, and professional competencies of agents are the most impactful strategies. Additionally, effective technologies, participation mechanisms, and open information are more susceptible to influence compared to other strategies.

Keywords: *Citizen-Centric Development, Public Administration, Zanjan Municipality, DEMATEL*

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1. Introduction

Citizen-centric governance refers to a management approach that prioritizes the needs, rights, and interests of citizens in the design and implementation of policies, programs, and public services. This approach recognizes that citizens are not merely passive recipients of government services but active participants in governance processes. Citizens feel more involved and invested in governance processes, which increases trust in government. Citizen-centric governance leads to more effective and responsive public services that better meet the needs of citizens. Citizens' voices are heard and considered in decision-making processes, resulting in more informed decisions. Government officials are accountable for their actions and decisions, promoting transparency and good governance. By prioritizing citizen-centric governance, governments can build trust with citizens, promote accountability, and deliver more effective public services [1]. Emphasizing citizen-centricity can foster a positive organizational culture characterized by empathy, collaboration, and a strong sense of purpose. This, in turn, can lead to higher employee morale, productivity, and retention. Engaging citizens in dialogue and co-creation processes allows organizations to proactively identify risks, challenges, and potential opportunities. This proactive approach to risk management can help organizations mitigate potential negative impacts on operations and reputation. Prioritizing citizen-centricity in organizations can lead to a wide range of positive outcomes, including enhanced problem-solving, empowerment and inclusion, improved public policy, responsiveness to change, strengthened civic engagement, economic benefits, improved organizational culture, and reduced risk. These outcomes collectively contribute to the overall well-being of citizens, communities, and the organizations themselves [2].

The citizen-centric approach aims to foster a culture of accountability, empathy, and collaboration within organizations, ultimately resulting in more effective and citizen-friendly outcomes [3]. Citizen-centric public administration promotes active citizen participation in decision-making processes. It encourages citizens to share their opinions, ideas, and feedback on policies and programs. This can be achieved through public consultations, town hall meetings, focus groups, or online platforms for citizen input. Citizen-centricity adopts a service-oriented mindset in which citizens are viewed as customers, focusing on delivering high-quality, efficient, and accessible public services that meet citizens' expectations and needs. This includes improving service delivery, enhancing user experience, and ensuring responsiveness to citizens' inquiries and complaints. Citizen-centricity values transparency and accountability in government operations. It promotes open and transparent communication with citizens and makes information about policies, decisions, and performance readily available. It communicates openly with citizens, providing information about municipal activities, decisions, and performance, and ensures municipal officials are accountable for the outcomes of their policies and programs. This process involves establishing mechanisms for citizen oversight and feedback, such as performance evaluations and public reporting [4-6].

A citizen-centric municipality recognizes the importance of collaboration and partnership with various stakeholders to effectively address community challenges. It actively engages with community organizations, businesses, educational institutions, and other local entities to leverage their expertise, resources, and networks. This collaborative approach helps build trust, share responsibilities, and develop innovative solutions to local issues [7].

Citizen-centric public administration refers to the management and organization of public services in a way that places citizens' needs and expectations at the center. This approach seeks to create more effective communication between government and citizens, aiming to improve quality of life, increase transparency, and enhance public services. Citizen-centricity emphasizes focusing on citizens' needs, and public services should be designed and delivered based on citizens' real needs and expectations. This involves creating channels for dialogue and participation to gather citizen opinions and suggestions for decision-making [8].

Citizen-centric public administration considers citizen participation and collaboration in decision-making and public management as a fundamental principle. This approach aims to improve urban quality of life and create a space for greater interaction between government and citizens [6]. It not only helps improve the quality of public services but also fosters a dynamic and committed community where citizens are key actors in governance processes [2].

The citizen-centric approach in public administration emphasizes not only citizen participation but also transparency and accountability as fundamental pillars of good governance. It enables citizens to participate in decision-making and policy formulation processes. Through public consultations, surveys, and participatory sessions,

citizens' voices are heard, and their needs and wants are taken into account. Key principles emphasized by the citizen-centric approach include active citizen participation, transparency, accountability, public trust management, and the protection of citizens' rights. These principles not only ensure improved governance quality but also create a dynamic and participatory society where citizens feel a greater sense of responsibility and belonging to their environment [9]. Transparency and accountability not only enhance governance processes but also create a committed and active community where citizens feel their voices are heard and have a role in shaping their society's future.

Government officials must present information about decision-making, budgets, and policies in a clear and understandable manner for citizens. This includes publishing reports, statistics, and performance-related information so that citizens are informed about the state of affairs [10]. A citizen-centric municipality refers to local governance that prioritizes the needs and interests of its citizens in decision-making processes, service delivery, and overall governance. This approach places the well-being and participation of citizens at the core of municipal operations, policies, and programs [11].

The literature review highlights various studies emphasizing citizen-centric strategies in public administration. Nasi and Choi (2023) discuss the concept of Public Service Logic (PSL), advocating for public services to be treated as participatory and value-driven, with citizen involvement essential for strategic orientation in public service organizations, despite its challenges. They argue that design theory, focusing on empathy and stakeholder engagement, can overcome these obstacles, leading to service design strategies that align with stakeholder interests [12]. Göçüoglu and Karkin (2023) emphasize the need for more research on direct citizen participation in public policy, noting that recent shifts in public management perspectives, along with advancements in internet and information technologies, have paved the way for more direct and explicit citizen engagement. They highlight how e-participation and e-governance channels facilitate more efficient citizen involvement in public policy [4]. Gurses et al. (2023) analyze the use of social media by local governments in Turkey, finding that metropolitan municipalities mostly use social media for one-way information sharing rather than fostering citizen-driven policies. Their findings indicate that engagement levels are generally low, underscoring the potential for more interactive use of these platforms [5]. Potipiron (2022)

explores the impact of bureaucratic formalization on street-level bureaucrats (SLBs), suggesting that rigid rules perceived as harmful can lead to rule-breaking behaviors driven by empathy for citizens. Potipiron's study of local government employees in Thailand reveals that frequent citizen contact amplifies the perception of administrative burdens and increases the likelihood of social rule-breaking, pointing to the importance of balanced formalization in government-citizen interactions [13]. Hofmann et al. (2021) investigate which public services are suitable for digital communication channels, emphasizing that digitalization's benefits depend on citizen acceptance and a shift from traditional channels. They critique the assumption that all services are fit for digitalization, proposing an in-depth analysis of service suitability from both citizen and public sector perspectives [14]. Lastly, Ho and Wu (2021) examine diverse participatory mechanisms in citizen-centric governance, noting that residents' preferences vary based on demographic factors like race, income, age, and neighborhood. They find that tailored engagement strategies, such as e-governance for younger residents and public meetings for marginalized communities, can effectively increase participation. Their study highlights the importance of customized mechanisms to engage diverse demographic groups, particularly those who may feel overlooked by the system. Collectively, these studies underscore the significance of strategic citizen engagement, technology use, and adaptive governance models to meet citizens' needs and preferences [15].

Municipalities, as local entities, have a vital role in environmental conservation, economic development, and cultural heritage preservation. Through appropriate policies, they can help reduce pollution and improve citizens' quality of life. Moreover, creating necessary infrastructure and a favorable business environment can attract investment and facilitate more job opportunities. Preserving historical and cultural sites not only maintains the city's identity but also attracts tourists and strengthens the local economy. Finally, involving citizens in decision-making enhances transparency and social cohesion, leading to sustainable development and public well-being. This study aims to identify and analyze the influence and impact of citizen-centric development strategies in municipalities. The research seeks to address existing research gaps and contribute to the literature in the field.

2. Methodology

The present study is based on a mixed-methods approach, incorporating both qualitative and quantitative paradigms in an inductive-deductive framework. It is applied in terms of purpose and descriptive-survey in terms of data collection method. The qualitative segment of the study included all university professors and experts in policy-making, public management, and urban management. Given the research objective, purposive sampling was employed using the snowball technique, resulting in a sample size of 17 participants. The sample size was determined using the principle of theoretical saturation, such that after interviews with the fifteenth and sixteenth participants, no new factors were identified, and the interview process concluded with the seventeenth participant. The qualitative interviews were conducted face-to-face with open-ended questions, followed by a coding process to identify citizen-centric development strategies in public administration. To ensure the accuracy of the coding and the extracted concepts, the codes obtained from the interviews were shared again with the interviewees to confirm their validity. The goal was to capture the interviewee's main ideas accurately.

The quantitative population of this research comprised managers and employees of Zanjan Municipality. Ultimately, using a non-probability convenience sampling method, 52 managers and employees from this area were selected and participated in the study. Sample adequacy was verified using the KMO test. The data collection instrument in the quantitative section was a questionnaire, with validity and reliability confirmed through the CVR index, Cohen's kappa test, and test-retest method. For the CVR index, the necessity of the concepts was questioned, and the results for all indices were above 0.74, indicating appropriate content validity. Cohen's kappa test, with a significance level and test value above 60%, confirmed the required reliability. The content validity of the questionnaire was approved by consulting four subject matter experts knowledgeable in the research topic.

To analyze the data, the DEMATEL method was utilized. This method can confirm the interrelationships among variables and restrict relationships that reflect the characteristics of a system. The DEMATEL method also allows for the assessment of individuals' subjective perceptions, integrating personal insights into complex issues. The final product of the DEMATEL process is a mental map that guides the respondent in organizing actions around the world or adhering to the stated priorities.

For data collection, a pairwise comparison questionnaire was used. This questionnaire, structured according to the number of factors in the rows and columns, determined the intensity of relationships among citizen-centric development strategies in public administration. The pairwise comparison scale ranged from zero to four, where zero indicated that factor A had no impact on factor B, one indicated a slight impact, two indicated a moderate impact, three indicated a relatively strong impact, and four indicated a very strong impact of factor A on factor B. This scale can also be defined in ranges from zero to ten or zero to one hundred.

The results indicated that the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.806, suggesting that the sample size was sufficient for factor analysis. Bartlett's test of sphericity was significant (χ^2 = 83.743, df = 51, p < .001), indicating that the data were suitable for this analysis. The reliability of the measures, assessed using Cohen's kappa test, showed a significant agreement value of 0.634 (Approx. T = 6.128, p < .001) with a standard error of 0.103. Content validity ratios (CVR) and kappa values for the strategies ranged from 0.62 to 0.85 for kappa and from 0.74 to 0.84 for content validity, demonstrating acceptable levels of reliability and content validity across the strategies.

3. Findings

The qualitative section of the study involved 17 experts, comprising 4 women and 13 men. Additionally, 11 participants were university faculty members, and 6 were managers. In the quantitative section, there were 44 men and 8 women, with 18 individuals holding a bachelor's degree, 26 holding a master's degree, and 8 holding a Ph.D.

The qualitative interviews were conducted face-to-face using open-ended questions, and citizen-centric development strategies in public administration were identified through a coding process. This extraction was performed by reviewing interview transcripts using Maxqda software and coding them. The interviews, consisting of four main questions, were conducted after providing the necessary explanations to the participants. The interview texts were then analyzed.

To ensure the accuracy of coding and concept extraction, the codes derived from the interviews were returned to the interviewees to confirm the validity of the extracted codes. The aim was to capture the interviewees' main ideas. Based on the interview analysis, the final selected codes were extracted.

Table 1. Citizen-Centric Development Strategies in Public Administration

Code	Theme	Concepts
A1	Participation Mechanisms	Citizen committees, public meetings, online platforms, surveys and voting, workgroups
A2	Citizen Empowerment	Education and information, transparent processes, formation of participation groups, creating a safe environment
A3	Open Information	Free and unrestricted provision of data, information, and knowledge, increasing public access to information, protecting privacy and intellectual property rights
A4	Effective Technologies	Urban information systems, interactive platforms, citizen support systems, participatory platforms
A5	Bureaucratic Fluidity	Reducing complex and lengthy processes, using technology for process automation and reducing manual intervention, increasing flexibility, facilitating access to information
A6	Evidence-Based Decision Making	Using available data, information, and evidence for decision-making, data-driven decisions, cost-benefit analysis, risk analysis, multi-criteria analysis
A7	Professional Competence of Officials	Strategic thinking, interpersonal communication, environmental awareness, analytical and review abilities, necessary knowledge and experience, understanding laws and regulations, risk management, privacy protection
A8	Networking	Identifying and leveraging key individuals, gaining stakeholder support, strategic alliances
A9	Public Reporting	Sensitivity to public issues, knowledge and expertise, professional ethics, innovative reporting tools, reporting under challenging conditions and tight schedules
A10	Social Media Capacity	Targeted advertising, increasing public awareness, direct communication with officials, information dissemination

The DEMATEL decision-making method is a comprehensive approach for constructing and analyzing a structural model of causal relationships among multiple complex factors. Initially developed by the Battelle Memorial Institute in Geneva between 1972 and 1976 to address and solve complex and interwoven issues collectively, this method helps researchers address interrelated topics and indicators by creating a suitable hierarchical network system. DEMATEL provides a clear understanding of interacting factors and enables the development of a hierarchical network system. It collects group opinions to identify cause-and-effect relationships among factors, aiding in the resolution of complex issues. The outcome of the DEMATEL process is a visual representation that allows the user to prioritize and make decisions regarding the factors or categories involved.

The DEMATEL method involves several steps, which are described below along with the results obtained from this study.

Step 1: Calculating the Average Matrix

This matrix integrates expert responses, with each entry calculated using Equation 1, where H is the number of experts and xij represents their assigned values.

Table 2. Average Matrix of Citizen-Centric Development Strategies in Public Administration

M	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
A1	0	2.38	3.07	3.11	3.96	2.11	3.19	2.11	2.88	1
A2	3.92	0	3.15	3.19	3.11	2.15	3.19	3.15	3.96	1.57
A3	2.88	3	0	3.88	2.96	3.92	3.96	3.92	3.92	2.85
A4	3.92	2.07	3.02	0	3.92	2.98	3.92	3.96	2.11	3.07
A5	3.96	3.07	1.5	3.92	0	3.07	3.11	3.07	3.96	1.95
A6	3.07	1.23	3	1.89	3	0	2.11	3.11	3.92	3.07
A7	3.96	2.07	3.88	2.92	3.11	3.19	0	3.07	2.96	2.11
A8	3.07	3.07	1.96	3.96	2	3.11	3.96	0	3.96	3.92
A9	3.11	3	2.85	2.11	2.07	3.96	3.11	3.96	0	3
A10	2.11	2.11	3.19	2	2.11	2.07	3.07	3.11	3	0

A1 to A10 represent the 10 citizen-centric development strategies identified from the interviews.

Step 2: Calculating the Normalized Direct-Relation Matrix (D)

Matrix A is transformed into the normalized direct-relation matrix D using Equations 2 and 3.

Table 3. Normalized Direct-Relation Matrix (Relative Intensity of Direct Relationships)

M	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
A1	0	0.0761	0.0981	0.0994	0.1266	0.0674	0.1019	0.0674	0.092	0.032
A2	0.1253	0	0.1007	0.1019	0.0994	0.0687	0.1019	0.1007	0.1266	0.0502

A3	0.092	0.0959	0	0.124	0.0946	0.1253	0.1266	0.1253	0.1253	0.0911
A4	0.1253	0.0662	0.0965	0	0.1253	0.0952	0.1253	0.1266	0.0674	0.0981
A5	0.1266	0.0981	0.0479	0.1253	0	0.0981	0.0994	0.0981	0.1266	0.0623
A6	0.0981	0.0393	0.0959	0.0604	0.0959	0	0.0674	0.0994	0.1253	0.0981
A7	0.1266	0.0662	0.124	0.0933	0.0994	0.1019	0	0.0981	0.0946	0.0674
A8	0.0981	0.0981	0.0626	0.1266	0.0639	0.0994	0.1266	0	0.1266	0.1253
A9	0.0994	0.0959	0.0911	0.0674	0.0662	0.1266	0.0994	0.1266	0	0.0959
A10	0.0674	0.0674	0.1019	0.0639	0.0674	0.0662	0.0981	0.0994	0.0959	0

The sum of each row j in matrix A represents the total direct influence exerted by factor i on other factors, indicating the factor with the greatest direct influence. The sum of each column i indicates the total direct influence received by factor i from other factors, reflecting the factor most affected by others. Matrix D is obtained by dividing all elements of matrix A by the scalar m, the lesser of these sums. Each element dij in matrix D has a value between zero and one.

Step 3: Calculating the Indirect Influence Matrix (ID)

Matrix ID and the resulting graph represent the indirect relationships among citizen-centric development strategies.

Sometimes, factors do not have a direct influence on each other, necessitating the calculation of indirect influences to show the overall effect of each factor on others.

Step 4: Determining the Hierarchy of Elements

In this step, the potential hierarchy or structure of the elements is identified. The influence order of one element on others, or its susceptibility to influence, defines the hierarchical structure for addressing or resolving the issue. The T matrix below shows the hierarchical order of elements.

Table 4. T Matrix of Citizen-Centric Development Strategies in Public Administration

T	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10
A1	0.5493	0.4836	0.5601	0.5884	0.5984	0.5576	0.6328	0.5999	0.6385	0.4536
A2	0.7316	0.4672	0.6248	0.6547	0.6381	0.6228	0.7039	0.6975	0.7394	0.5248
A3	0.7799	0.6106	0.6005	0.7405	0.7006	0.7392	0.7992	0.7941	0.8165	0.6218
A4	0.7581	0.549	0.6447	0.5875	0.6837	0.6681	0.75	0.7445	0.7188	0.5872
A5	0.7313	0.5535	0.5797	0.6705	0.5467	0.6443	0.6989	0.6932	0.7367	0.5339
A6	0.6377	0.4552	0.5614	0.5561	0.572	0.4972	0.607	0.6302	0.6707	0.5157
A7	0.7267	0.5251	0.6404	0.6431	0.6342	0.6464	0.6064	0.6906	0.709	0.5368
A8	0.732	0.5723	0.617	0.6932	0.6289	0.6688	0.7474	0.6306	0.7627	0.6089
A9	0.6962	0.544	0.608	0.6133	0.598	0.6596	0.6891	0.7074	0.6169	0.5572
A10	0.5841	0.4569	0.543	0.5336	0.5227	0.5333	0.6048	0.6021	0.6165	0.4036

The following section shows the order of the elements' impact on each other. The highest row sum (R) indicates the order of factors that have the strongest influence on other factors. For instance, A3, A4, and A8—bureaucratic fluidity, professional competence of officials, and networking—represent the citizen-centric development strategies that exert the greatest influence on the other identified strategies

in this study. The highest column sum (J) indicates the order of factors that receive the most influence from other factors. For example, A9, A1, and A7—participation mechanisms, open information, and citizen empowerment—are the strategies that are most influenced by the other strategies identified in this research.

Table 5. Final Indicators for Prioritizing Citizen-Centric Development Strategies in Public Administration

R-J		R+J		J		R	
Value	Code	Value	Code	Value	Code	Value	Code
1.2235	A3	13.4516	A8	7.0257	A9	7.2030	A3
1.1874	A2	13.3155	A9	6.9270	A1	6.6914	A4
0.4105	A4	13.1981	A7	6.8395	A7	6.6617	A8
0.2654	A5	13.1826	A3	6.7899	A8	6.4048	A2
0.0572	A10	12.9723	A4	6.2809	A4	6.3887	A5
-0.1282	A8	12.5890	A1	6.2373	A6	6.3587	A7
-0.4808	A7	12.5120	A5	6.1233	A5	6.2898	A9

-0.5341	A6	11.9405	A6	5.9795	A3	5.7032	A6
-0.7359	A9	11.6222	A2	5.3434	A10	5.6621	A1
-1.2649	A1	10.7441	A10	5.2174	A2	5.4006	A10

The (R-J) column indicates the position of an element on the horizontal axis: positive values indicate a strong influence, while negative values show susceptibility to influence. The (R+J) column shows the total intensity of an element's impact or influence.

According to these columns, networking (A8), participation mechanisms (A9), and citizen empowerment (A7) are the top three influential and influenced factors. Bureaucratic fluidity (A3), evidence-based decision-making (A2), and professional competence of officials (A4) are the top influencing strategies, significantly interacting with the system and prioritized for further development. Effective technologies (A6), participation mechanisms (A9), and open information (A1) are the most affected strategies.
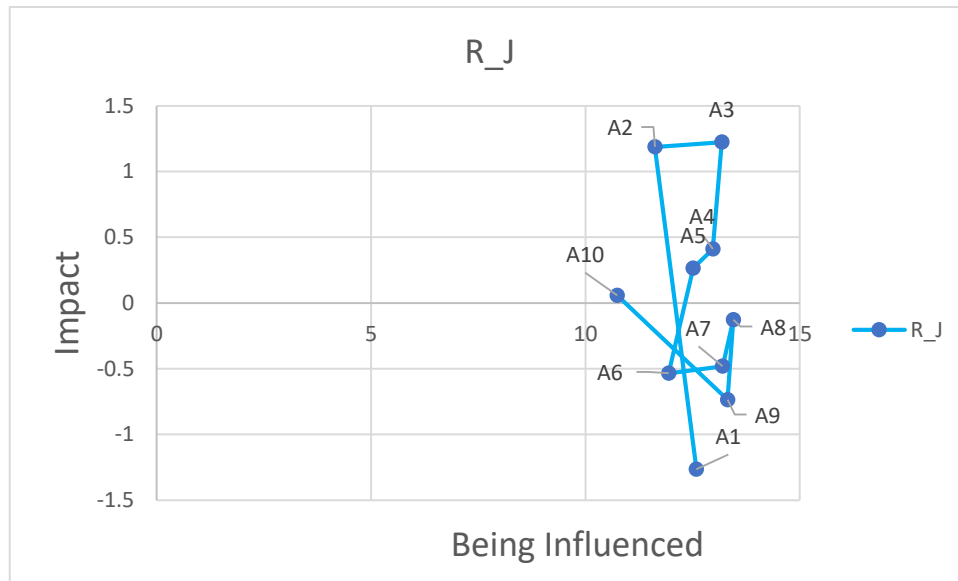

Figure 1. Position and Priority of Citizen-Centric Development Strategies in Public Administration

4. Discussion and Conclusion

Citizen-centric development in municipalities means prioritizing the needs and desires of citizens in urban planning and decision-making. This approach involves creating accessible public spaces, increasing citizen participation in management processes, and improving the quality of life through optimized urban services. Moreover, using modern technologies to collect citizen feedback and opinions facilitates greater transparency and accountability in municipal operations. Promoting a culture of collaboration among government entities, civil society, and the private sector helps strengthen the sense of belonging and responsibility among citizens. Ultimately, citizen-centric development can lead to a sustainable and resilient city that effectively meets both the present and future needs of its residents.

This study aimed to identify and prioritize the influence and susceptibility of citizen-centric development strategies in public administration. Initially, strategies were identified through expert interviews, and in the second step, these strategies were prioritized and their effects on each other were determined using the DEMATEL technique. The findings of this research included the identification of ten citizen-centric development strategies in public administration and the prioritization of their influence and susceptibility. The governing strategies identified include participation mechanisms, citizen empowerment, open information, effective technologies, bureaucratic fluidity, evidence-based decision-making, professional competence of officials, networking, public reporting, and social media capacity.

Based on the analysis, it was found that A3, A4, and A8—bureaucratic fluidity, professional competence of officials, and networking—are the strategies that have the greatest impact on other identified strategies. Meanwhile, A9, A1, and A7—participation mechanisms, open information, and citizen empowerment—are the strategies most influenced by others. Networking (A8), participation mechanisms (A9), and citizen empowerment (A7) are among the top three in

terms of the intensity of influence and susceptibility, indicating their dual role as both highly influential and highly influenced.

This study also showed that bureaucratic fluidity (A3), evidence-based decision-making (A2), and professional competence of officials (A4) are the top three in net influence and are fundamental to the system, having significant interactions and ranked as the most impactful strategies for citizen-centric development. Effective technologies (A6), participation mechanisms (A9), and open information (A1) are among the strategies most influenced.

It is noteworthy that Göçüoglu and Karkin (2023) highlighted the role of citizen participation and the use of effective technologies [4]. Gurses et al. (2023) emphasized the role of social media for sharing information, events, announcements, and news to create citizen-centric policies [5]. Ho and Wu (2021) mentioned the diversity of participatory models, public meetings, technology mechanisms, and more. Therefore, the findings of this study align with those of other research [15].

One of the limitations faced by researchers was obtaining the agreement and support of experts. It is recommended to examine the variables and relationships using other statistical methods, such as the AHP approach, and to compare the findings with this study's data. Finally, several suggestions for future research are provided:

Designing a citizen-centric development model in public administration using the spherical fuzzy ELECTRE approach.

Conducting a comparative study of research conducted domestically and internationally.

Identifying barriers to citizen-centric development in public administration using thematic analysis and prioritizing solutions with the fuzzy Delphi method.

Authors' Contributions

Authors equally contributed to this article.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

All procedures performed in this study were under the ethical standards.

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