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ORIGINAL ARTICLE

Designing a Digital Governance Model Based on Crowdsourcing in National Center of Iran's Cyberspace

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EXTENDED ABSTRACT

Introduction

With the continuous advancements in Information and Communication Technology (ICT), digital governance has become a cornerstone of governmental and public development worldwide. This concept, which leverages digital technologies to improve governmental processes and facilitate public services, can enhance transparency, accountability, efficiency, and accessibility of public services (Daoi, 2022). However, implementing effective digital governance can present unique challenges in countries undergoing digital transformation. These challenges encompass technical barriers, organizational resistance, cultural issues, and limitations in human and economic resources. This issue is particularly complex in countries like Iran, operating within specific political, economic, and social conditions. In this context, the National Center for Cyberspace in Iran, as a key institution in the field of digital governance, can play a significant role in guiding and implementing digital models across various sectors of the country. However, to achieve this goal, a digital governance model tailored to Iran's unique circumstances must be designed. This model should not only consider novel technologies but also address the country's cultural characteristics and internal capabilities. One approach that can be effective is "crowdsourcing." Rooted in participatory principles, crowdsourcing relies on concepts such as process design, problem identification, participation, transparency, access to information, issue management, awareness, and the use of appropriate research methods. It can be applied to governance processes, particularly in implementing digital governance, to harness collective intelligence and expertise. The objective of this research is to design a digital governance model based on crowdsourcing at the National Center for Cyberspace in Iran. This model should specifically consider internal capacities, committed human resources, and national needs, while leveraging the principles of crowdsourcing as an effective solution for accelerating the implementation of digital governance. In this model, in addition to focusing on technical and technological aspects, components such as identifying public issues, transparency, and awareness will be considered in the context of digital governance. Numerous researches have been conducted globally and regionally on digital governance, primarily emphasizing the importance of effective implementation and related challenges. For example, research by Arefin et al. (2025) on digitalizing public services in Indonesia indicates that one of the most significant challenges in the digital governance process is aligning digital systems with the cultural and social characteristics of the society (Arefin, Subagja & Hakim, 2025). Furthermore, some researchers emphasize the need for coordination between digital governance and the use of appropriate research methods like case studies and content analysis (Gickova, 2017). In Iran, there is also a strong emphasis on adopting modern management approaches to improve the performance of governmental organizations. Jandighi et al. (2021) found that the processes of identifying important issues and areas requiring public participation are prerequisites for crowdsourcing digital governance. Zolfagharlouzeh & Shahsavari (2019) and Abbasi & Danshfar (2021) have also confirmed

this. Therefore, examining digital governance models globally and adapting them to Iran's local context is particularly important. Studies by Lukes (2022) and Leoni, Maione & Mazara (2023) on evaluating and improving digital governance systems in various countries demonstrate that attention to local and cultural characteristics is essential for the success of this type of governance. Lukes (2022), based on successful digital governance models in developed countries, concluded that digital governance must align with internal needs and capacities within governmental organizations to effectively improve the quality of public services and transparency of governmental processes. Similarly, domestic research emphasizes the importance of localizing digital processes in Iran. Salehi-Pour & Pourian (2021) concluded that successful digital governance requires implementing digital processes considering the specific conditions and characteristics of each organization and country, and leveraging internal capacities in this regard. This can reduce organizational and cultural resistance to digital changes and facilitate digital transformation processes. Therefore, the main question of this research is: What are the dimensions and components of a digital governance model based on crowdsourcing designed for the National Center of Cyberspace in Iran?

Methodology

This study, aiming to develop a digital governance model based on crowdsourcing, adopts a quantitative, developmental research approach. The research process consists of four main stages. First, a systematic literature review was conducted to identify dimensions and components related to digital governance. Data were collected through library research, examining both domestic and international credible sources. Second, the Delphi technique was used to refine and validate the identified components. This exploratory stage involved 15 experts—university scholars (PhD in Information Technology Management, Public Administration, and Public Policy) and organizational experts (senior IT and digital policy managers from public and private sectors with at least a Master's degree and 10 years of relevant experience)—selected via purposive sampling. After three rounds of the Delphi technique, consensus was achieved, and the final components were confirmed. Third, the research model was evaluated using structural equation modeling (SEM). The population included 690 senior managers and experts from the National Center for Cyberspace and its affiliated institutions. A sample size of 248 was determined using Morgan's table and selected through stratified random sampling. Questionnaires were distributed, and their construct validity was assessed via confirmatory factor analysis, reliability via Cronbach's alpha, and content validity using the Lawshe method. All items achieved a Lawshe coefficient above 0.62 (exceeding the 0.49 threshold for 15 experts), confirming content validity. Fourth, collected data were analyzed using an artificial neural network (ANN) to identify non-linear relationships for more accurate prediction of research variables. The ANN model, with input, hidden, and output layers, was optimized using the backpropagation error algorithm. Data analysis and hypothesis testing were conducted using MATLAB and SmartPLS software.

Findings

The digital governance model development involved 35 components across six dimensions: digital ecosystem, digital economy, digital infrastructure, legal & regulatory, cultural & social, and crowdsourcing. "Digital literacy enhancement" was excluded due to low average scores and inconsistent change between phases. "Managerial capability in technology" was excluded due to consistently low scores. All other components were confirmed. The Delphi technique, spanning three rounds, led to the elimination of 7 components, resulting in consensus on 28. Structural equation modeling (SEM) using SmartPLS validated the model on a larger sample. Factor loadings exceeded the threshold, indicating significant relationships. R^2 values for inner variables were moderate to strong, and path coefficient significance (t) was above 1.96 for all variables. The model's quality (Q^2) and goodness-of-fit ($GoF = 0.6737$) were strong. Analysis revealed that "legal & regulatory" had the highest impact ($t=45.421$, factor loading=0.85), followed by "digital economy" ($t=33.899$, factor loading=0.838) and "digital infrastructure" ($t=30.747$, factor loading=0.812). "Cultural & social" ($t=20.277$, factor loading=0.733) and "crowdsourcing" ($t=9.037$, factor loading=0.574) also showed significant impact. "Citizen empowerment" ($t=4.019$, factor loading=0.419) had the lowest correlation. Neural network training achieved a 0.0781 stopping criterion after 9 iterations with an average squared error of 10% and a correlation of 0.68. Performance plateaued after the third iteration. The best prediction was achieved when all dimensions were included, with $MSE=1.0345e-1$ and $r=6.9814$. Removing any dimension increased error and decreased correlation, highlighting the importance of all components. "Digital economy" demonstrated the highest correlation ($r=6.9814$) and is crucial for the model.

Discussion and Conclusion

This study reveals that digital governance based on crowdsourcing requires integrating multiple dimensions: digital ecosystem, digital economy, technology infrastructure, legal and regulatory systems, cultural and social aspects, and a crowdsourcing approach. It emphasizes the roles of government, private sector, and citizens, improving technology and innovation management, enhancing cybersecurity, developing domestic infrastructure, and establishing data governance policies. To achieve sustainable digital governance, international cooperation in digital diplomacy and clear legal frameworks for data independence and security are essential. Citizen participation, transparency, access to information, and public issue management are key components of crowdsourcing, enhancing internal capacity and digital efficiency. Findings align with prior research. Gasco-Hernandez et al. (2022) stress organizational capacity, matching the digital ecosystem dimension. Leoni et al. (2023) highlight data and big data management, consistent with data governance. McLennan and Tiah (2022) emphasize public values, similar to citizen engagement. Kloppenburg et al. (2022) underline data transparency and user participation, aligning with cultural and social aspects. Lukes (2022) identifies technology infrastructure and cybersecurity as critical, also emphasized here. Validation on a larger sample confirmed significant correlations among digital governance dimensions. The most critical finding is the legal and regulatory dimension's strong impact, consistent with Arefin et al. (2025), who found legal transparency essential for digital service success. This study also aligns with Alghraev (2024), emphasizing data governance and digital regulations in Islamic digital economies. High correlation between cybersecurity and digital infrastructure supports the importance of security, as noted by Noueimi et al. (2022), who identify strong, secure infrastructure as foundational for sustainable digital transformation. The strong link between organization, coordination, and resource allocation with the digital ecosystem matches Ansariani and Dimaro (2018), who highlight human resource management and investment in organizational capacity. The significant correlation between citizen participation and crowdsourcing underscores the role of citizens, also highlighted by Alghraev (2024), who emphasizes social participation and local approaches in Islamic digital economies. The cultural and social dimension's strong correlation with social networks emphasizes the role of communication technologies, aligning with Arefin et al. (2025), who found increased digital social interaction enhances digital governance effectiveness. Overall, results show that digital governance requires a comprehensive approach integrating technical infrastructure, laws, innovation, social participation, and data management. Alignment with international studies indicates the model's high implementability, with its unique emphasis on crowdsourcing and citizen participation in Iran. The best performance in predicting digital governance was achieved when all dimensions—digital economy, legal and regulatory, crowdsourcing, digital infrastructure, cultural and social, and digital ecosystem—were included. Removing any dimension increased error and decreased correlation, highlighting the importance of all components. Notably, removing the crowdsourcing dimension caused the highest error increase and correlation decrease, indicating its key role in improving the model. This finding underscores the growing importance of crowdsourcing and digital governance, which offer innovative solutions to challenges in centralized systems. A central institution, involving IT experts, government managers, and civil society representatives, should be established to develop strategic policies and oversee digital governance implementation. This institution should prioritize public values, agile decision-making, and efficiency. Reforming administrative processes and reducing legal barriers using digital technologies and participatory management will accelerate e-service delivery and improve organizational efficiency. Finally, researchers are encouraged to focus on designing intelligent monitoring systems for digital governance using big data and artificial intelligence to enhance transparency, accountability, and reduce digital corruption.

KEY WORDS

Digital Governance, Crowdsourcing, Cyberspace.

