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Citizen Role Representation in Digital Government Maturity Models: A Systematic Review

Qurrota Ayun Majid[1], Dana Indra Sensuse[2]

[1,2]Faculty of Computer Science, University of Indonesia, Depok, Indonesia

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Corresponding Author:
Author Name*:
Qurrota Ayun Majid
Email*:
qurrota.ayun31@ui.ac.id

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Abstract. This study investigates how citizen roles are represented and structurally positioned within Digital Government Maturity Models (DGMMs). Using a Systematic Literature Review guided by Kitchenham's protocol, the review analyzed studies published between 2020 and 2025 across seven major academic databases. From 900 initial records, 14 studies met the inclusion and quality criteria. Through backward tracing, policy reference analysis, and cross-model extraction, these studies produced 77 DGMMs as the final units of analysis. The models were examined using a role-based analytical lens that classifies citizen representation into five levels: None, Limited, Implicit, Explicit, and Strong. The findings show that the Limited category remains dominant, indicating that most DGMMs still position citizens mainly as end-users or service recipients rather than active participants in digital governance processes. However, the increasing presence of Explicit and Strong models reflects a gradual shift toward participatory, collaborative, and citizen-centric digital governance. This study contributes by proposing a typology of citizen role representation that extends prior descriptive mappings into a deeper structural evaluation of how citizen participation, engagement, and co-creation are embedded within digital maturity

Keywords: digital government maturity model, citizen participation, citizen-centric governance, role-based analysis, systematic literature review

1. INTRODUCTION

The digital transformation of government has evolved from simply digitizing administrative services to citizen-centric, data-driven, and collaborative governance [1], [2]. Within the digital government and GovTech paradigm, digital maturity is no longer solely measured through technology integration or bureaucratic efficiency, but through the creation of public value, transparency, and meaningful citizen engagement in government processes [3], [4]. In this context, Digital Government Maturity Models (DGMM) have emerged as the primary evaluative instrument for measuring the level of development of government digital transformation [5], [6].

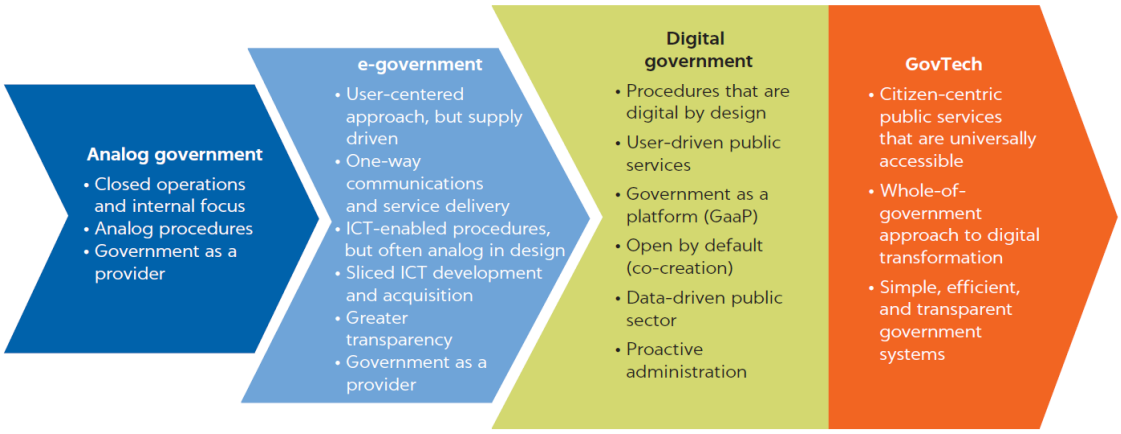

Figure 1. Evolution of digital government [1]

Most DGMMs are developed as evolutionary stages or multidimensional frameworks that emphasize institutional and technological progress. Despite the shift from administrative efficiency-oriented models to more complex digital governance, citizens in many models are still positioned primarily as service users, rather than as collaborative actors in the digital government ecosystem [7]. In other words, the participatory dimension has not yet been fully institutionalized as a structural component of the digital maturity architecture.

Recent research has identified inconsistencies in citizen integration within the DGMM [8]. Of the 18 models analyzed, approximately 17% did not mention citizens at all, 33% only mentioned them in a limited way, and 50% did so more extensively. These findings indicate that citizen presence in DGMM remains uneven. The study further identified seven thematic areas in which citizens are explicitly addressed—namely maturity stages,

areas of focus, enablers, constraints, metrics, insights, and recommendations—providing a structured overview of where citizen considerations appear within existing models. However, the research focused on descriptive mapping of the frequency and location of citizen presence, without developing an evaluative framework capable of explaining how citizen roles are positioned and developed across levels of digital maturity. Furthermore, the scope of the models analyzed was relatively limited and did not reflect the diversity of DGMM forms emerging in the literature and global practice.

Similar limitations are evident in studies mapping co-creation in e-government through a process theory perspective [9]. While providing insights into the dynamics of participation, these approaches tend to be government-driven and position citizen engagement as part of the service cycle, rather than as a structural variable within the digital maturity framework. Thus, the current literature does not provide a systematic, comprehensive and comparative analysis of the transformation of citizen roles within DGMM architectures.

Addressing this conceptual gap, this study examines how citizen roles are represented and structurally positioned across DGMMs developed in both literature and practice. By analyzing 77 DGMMs derived from 14 selected studies, this research proposes a role-based analytical lens that classifies citizen representation into five levels of integration: None, Limited, Implicit, Explicit, and Strong. The study contributes by moving beyond descriptive identification of citizen presence toward a typological evaluation of the depth of citizen-role institutionalization within digital maturity architectures, thereby extending prior work.

2. METHODS

This research uses the SLR approach to identify and analyze DGMMs that have emerged in academic literature and policy practice. SLR was chosen because it provides a systematic, transparent, and replicable procedure for collecting and synthesizing scientific evidence. The use of Kitchenham's guidelines is relevant because this research focuses on mapping and classifying maturity models developed in various institutional contexts. This approach helps minimize selection bias, enhance methodological transparency, and ensure consistency in the model identification and coding process [10].

The SLR is implemented through three main stages: (1) planning, (2) conducting, and (3) reporting [11].

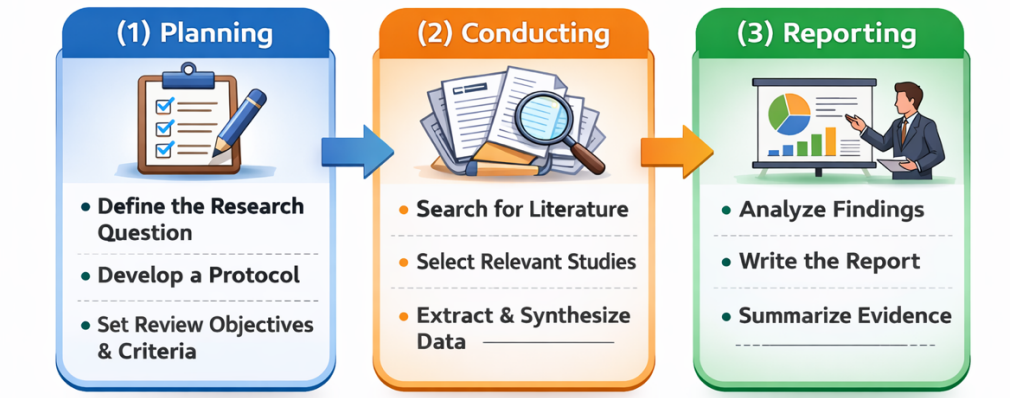

Figure 2. Main stage of kitchenham's SLR guidelines [11]

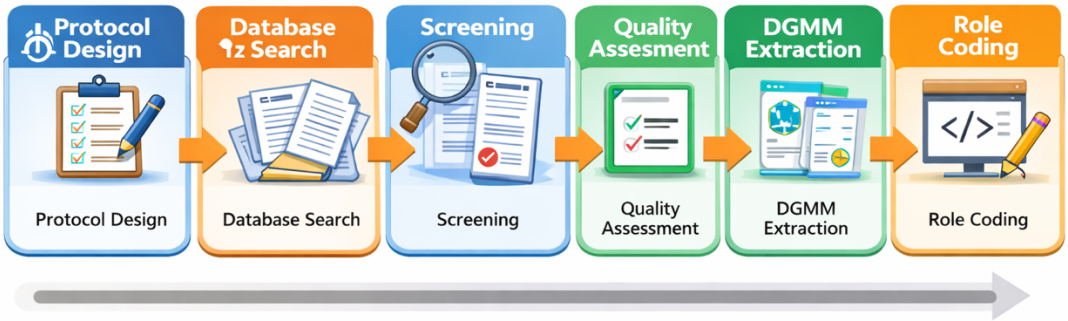

Figure 3. Stepwise methodological workflow of the SLR and DGMM coding process

In the course of the planning phase, a review protocol was developed as the basis for conducting a systematic, transparent, and documented SLR. This protocol included formulating research questions, designing a literature search strategy, establishing selection criteria, developing a data extraction template, and developing a role-based analytical lens. This stage purposed to ensure that the review process was structured and replicable, in accordance with the principles of methodological rigor in the SLR guidelines.

The literature selection criteria were formulated using the PICOC (Population, Intervention, Comparison, Outcome, Context) framework. In this research, Population refers to the DGMM developed in the context of digital government. Intervention includes the development, adaptation, or implementation of a digital maturity model. The

Comparison element was not explicitly used because this research is conceptual mapping. Outcome focuses on the form and orientation of the DGMM and the representation of citizen engagement within it, while Context is limited to the digital transformation of government at various administrative levels.

The conducting phase included a literature search, research selection, and data extraction, following established protocols. The search was conducted in internationally reputable academic databases, including Scopus, IEEE Xplore, ScienceDirect, ACM Digital Library, Taylor & Francis, Sage Journals, and ProQuest. The publication period was limited to 2020–2025 to capture the latest developments in digital government discourse and GovTech maturity frameworks. This temporal limitation purposed to ensure the relevance of the findings to the contemporary digital transformation context, while foundational models were considered in the conceptual framework formulation phase where relevant. The search strategy was designed using a combination of keywords systematically arranged based on the research focus. The main keywords used included: *"digital government," "e-Government," "smart government," "maturity model," "maturity framework," "digital maturity," "evaluation," "assessment," "measurement," and "analysis."* Keyword combinations were performed using Boolean operators (AND, OR) to broaden the scope while maintaining the relevance of the search results. This strategy allows for the identification of literature that addresses not only the structure of maturity models but also the representation of citizen participation within them. Furthermore, additional selection criteria were applied to ensure the relevance and quality of the literature. Subject areas were limited to fields related to digital government and information systems, such as Engineering, Technology, Computer Science, Information Systems, Administrative Science, Government, Public Sector, Management, and Sustainability. Included documents included journal articles and final published academic conference proceedings. The literature was limited to English-language publications to maintain consistency across international contexts.

Table 1. Combination of keywords

Combination of keywords
("digital government" OR "e-government" OR "smart government") AND ("maturity model" OR "maturity framework" OR "digital maturity") AND ("evaluation" OR "assessment" OR "measurement" OR "analysis")

The selection process was conducted in stages. An initial screening was conducted based on titles and abstracts to identify conceptual relevance to the DGMM and citizen engagement. Next, a full-text screening was conducted to ensure that included articles genuinely developed, adapted, or evaluated a maturity model with an explicit stage or dimension structure. Articles were excluded if they lacked a clear model framework, were irrelevant to the research focus, were not fully accessible, or duplicated other publications.

Table 2. Literature search

Databases	Initiation	Title and Abstract	Full Text
ProQuest	464	79	3
IEEE Xplore	104	55	7
Science Direct	191	58	1
ACM	49	27	1
Scopus	32	27	2
Taylor&Francis	41	16	0
Sage Journals	19	5	0
Total	**900**	**267**	**14**

The literature search process yielded a total of 900 articles from all databases used. After screening based on titles and abstracts, the number of articles meeting the initial criteria was reduced to 267. Furthermore, through a full-text screening process, 14 articles were identified that explicitly developed or evaluated the DGMM, meeting the established inclusion criteria. In addition to articles obtained through the primary database search, the identification process also considered models documented in policy publications and relevant cross-references. After multiple stages of selection and quality control, a total of 77 DGMMs were selected as the units of analysis in this research. It should be noted that a single article may contain more than one maturity model, so the number of models analyzed exceeds the number of articles that passed the final selection process. This selection procedure ensures transparency in the research identification process and allows for methodological replication of the review process.

Table 3. Literature search results

Literature	Title	Reference
Literature 1	Examining Digital Government Maturity Models: Evaluating the Inclusion of Citizens	[8]
Literature 2	Government Digital Transformation: A Tailor-Made Digital Maturity Assessment Framework	[12]
Literature 3	Unboxing maturity models: A set-theoretic perspective on e-Government configurations over time	[13]
Literature 4	Decoding the Digital Landscape: An Empirically Validated Model for Assessing Digitalisation across Public Administration Levels	[14]
Literature 5	Conception of a digital Government maturity model for developing countries. Application to Uruguay	[15]
Literature 6	Exploring the Landscape of e-Government Maturity Models: Insights from Systematic Mapping Study and Comparative Analysis	[16]
Literature 7	Developing Digital Service Transformation Maturity Model in Public Sector	[17]
Literature 8	Comparative analysis of selected process maturity assessment models applied in the public sector	[18]
Literature 9	Assessing digital Government maturity model for developed countries. Application to Singapore	[19]
Literature 10	Analysing e-government maturity models	[20]
Literature 11	Developing E-Maturity Model for Municipal Project and Program Management System	[21]
Literature 12	Assessing Readiness for e-Government Enterprise Architecture in a Developing Economy – Towards an Integrated Maturity Model	[22]
Literature 13	Acceleration of Integrated Electronic-Based Government System in Indonesia with the Maturity Model of Electronic-Based Government System: A Systematic Literature Review	[23]
Literature 14	E-Government Maturity Models: More of the Same?	[24]

A quality assessment was conducted to ensure the scientific quality of the analyzed literature. The evaluation used a checklist consisting of eight indicators: (1) clarity of research objectives, (2) context and theoretical basis, (3) contribution to previous research, (4) clarity of methodology or model architecture, (5) clarity of research results, (6) relevance of conclusions, (7) recommendations for further development, and (8) academic indexing status. Each indicator was assessed using a three-point scale (1 = clearly met; 0.5 = partially met; 0 = not met), with a maximum score of 8 points. Articles were deemed eligible for analysis if they obtained a score of at least 5.5 out of 8 (≥70%). This threshold was set as a moderate standard in SLR practice to maintain a balance between rigorous selection and the representativeness of the analyzed models. The assessment process was conducted based on the indicator definitions established in the protocol, and articles with ambiguous assessment results were reviewed to minimize subjective bias.

Table 4. Quality assessment

Literature	Quality assessment indicator								Score	Eligible or no?
	1	2	3	4	5	6	7	8		
1	1	1	1	1	1	1	1	1	8.0	Eligible
2	1	1	1	0.5	1	1	0.5	1	7.0	Eligible
3	1	1	1	1	1	1	1	1	8.0	Eligible
4	1	1	1	1	1	1	1	1	8.0	Eligible
5	1	1	1	1	1	1	0.5	1	7.5	Eligible
6	1	1	1	1	1	1	1	1	8.0	Eligible
7	1	1	1	1	1	1	1	1	8.0	Eligible
8	1	1	1	1	1	1	1	1	8.0	Eligible
9	1	1	1	1	1	1	0.5	1	7.5	Eligible
10	1	1	1	1	1	1	0.5	1	7.5	Eligible
11	1	1	1	1	1	1	0.5	1	7.5	Eligible
12	1	1	1	1	1	1	0.5	1	7.5	Eligible
13	1	1	1	1	1	1	1	1	8.0	Eligible
14	1	1	1	1	1	1	1	1	8.0	Eligible

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The multi-layered selection and quality assessment process resulted in 77 DGMMs as the primary units of analysis for the research. The extracted data were then analyzed through a structured thematic classification and synthesis process to identify the DGMM development orientation and the representation of citizen roles within them. The analysis was conducted by grouping models based on their characteristics and development objectives, and coding the level of citizen involvement using a role-based analytical lens approach.

After the 14 studies were selected through the primary SLR process, each article was examined in full to identify all DGMMs discussed, compared, adapted, or synthesized within the study. This extraction process included both the focal model proposed by the study and additional referenced DGMMs used as comparative or theoretical foundations. As a result, 77 DGMMs were identified as the final analytical units.

To ensure methodological transparency, all extracted models—regardless of publication year—were subjected to the same eligibility logic: the model had to contain explicit maturity stages, dimensions, or evaluative structures relevant to digital government transformation. Older foundational models published before 2020 were therefore included only when they appeared within the final selected studies through backward references or comparative synthesis.

The proposed role-based analytical lens was operationalized using five coding categories: None, Limited, Implicit, Explicit, and Strong. Coding decisions were based on the depth of citizen-role integration within each model's dimensions, indicators, stage descriptions, and governance narratives. Boundary cases between adjacent categories were resolved through iterative comparison of definitional criteria, particularly distinguishing user-centric service orientation (Implicit) from explicit participatory indicators (Explicit), and differentiating consultation-oriented participation from co-creation and empowerment mechanisms (Strong). To improve coding consistency, all classifications were reviewed twice against the coding rubric before final synthesis.

To improve methodological clarity, the overall review workflow can be summarized into five sequential steps: (1) protocol design and research question formulation, (2) database search and keyword combination, (3) title–abstract and full-text screening, (4) quality

assessment and DGMM extraction, and (5) role-based coding and thematic synthesis. This stepwise sequence ensures transparency from literature identification to the final structural classification of citizen roles across DGMMs.

3. RESULTS AND DISCUSSION

This section contains two main research findings. First, the literature selection, which yielded 14 articles selected after a screening and quality control process. Second, the data analysis of 77 DGMMs to map the representation of citizen roles using a role-based analytical lens approach.

3.1. Literature Selection Results

Based on the final selection results, 14 selected articles were drawn from several databases with uneven distribution. IEEE Xplore dominated with 7 articles, followed by ProQuest (3), Scopus (2), and one article each from ScienceDirect and the ACM Digital Library. No articles met the inclusion criteria for Taylor & Francis or Sage Journals. IEEE Xplore's dominance indicates that DGMM research has primarily focused on technical issues, focusing on model development, evaluation frameworks, and system implementation. Conversely, contributions from public administration and social governance perspectives were relatively limited, indicating that the DGMM discourse remains dominated by information systems approaches rather than socially oriented governance approaches.

Temporally, DGMM publications showed an upward trend towards the end of the period. There was only one article in 2020, increasing to three in 2021, no selected articles in 2022, then increasing again to three in 2023, peaking in 2024 with four articles, and then decreasing slightly to three in 2025. This pattern reflects the increasing attention paid to evaluating public sector digital transformation in recent years. The absence of articles in 2022 is more due to selection factors—such as keyword specifications, full manuscript access, and the requirement for an explicitly described maturity model—than to the absence of DGMM research overall.

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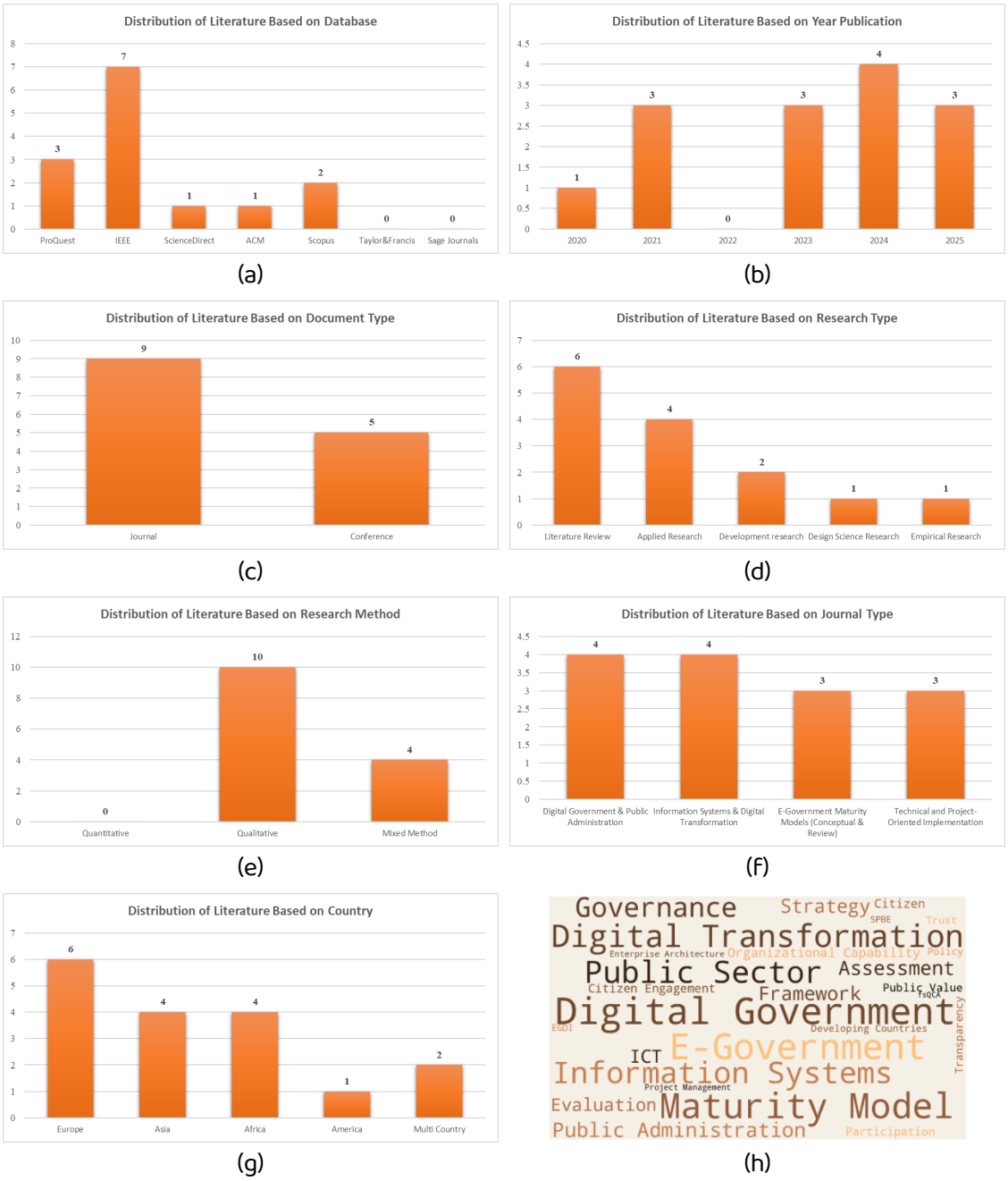

Figure 4. Distribution of literatur

(a) Based on database, (b) Based on year of publication, (c) Based on document type, (d) Based on research type, (e) Based on research method, (f) Based on journal type, (g) Based on country, (h) Based on keyword

In terms of document type, nine studies are journal articles and five are conference proceedings. This composition demonstrates two main paths of DGMM development. Journal articles generally discuss the model in greater depth, with a comprehensive

conceptual foundation and validation, while conference publications tend to present frameworks or models more quickly, with a technical and implementation emphasis. This pattern reflects the strong role of technology forums, particularly those indexed by the IEEE, in encouraging early experimentation with digital government maturity models.

Based on research type, the SLR approach dominated the articles (6 articles), followed by applied research (4 articles) and model development (2 articles). Furthermore, there were also articles using Design Science Research (1 article) and purely empirical studies (1 article). This composition indicates that DGMM research remains focused on consolidating knowledge through literature synthesis, while also beginning to move toward practical application and development. This aligns with the DGMM's character as an evaluation tool that requires a strong conceptual foundation and demonstrated usability in the context of government organizations.

Most studies used a qualitative approach (10 articles), while others combined qualitative and quantitative methods (4 articles). No studies were entirely quantitative. The dominance of qualitative approaches is understandable, as much DGMM research focuses on developing model structures, determining maturity stages, policy analysis, and case studies with limited expert validation. However, this pattern also highlights a research gap. The representation of citizen roles in the DGMM is rarely tested using quantitative approaches with large numbers of respondents, so empirical evidence regarding citizens' contributions to digital maturity levels is often conceptual or descriptive. This finding underscores the need for a more systematic and structured analytical approach to mapping citizen roles within the DGMM framework.

The fourteen articles are distributed relatively evenly across four categories: Digital Government and Public Administration (4 articles), Information Systems and Digital Transformation (4 articles), conceptual/review-based E-Government Maturity Models (3 articles), and Technical and Project-Oriented Implementation (3 articles). This distribution indicates that DGMM studies are interdisciplinary, with two main pillars: information systems and digital transformation on the one hand, and public administration and governance on the other. The presence of technical and project categories confirms that some models were developed to address practical needs, such as enterprise architecture or government IT governance. In the context of this research, this classification is

important for mapping the position of citizens in DGMM. The Digital Government and E-Government Maturity Models categories are more relevant for examining how citizens are normatively positioned—as service recipients, consultation participants, or decision-making partners. Meanwhile, the Information Systems and Technical Implementation categories help assess whether citizens are reduced to mere system users or are beginning to be viewed as co-creative actors in the development of digital government services.

Geographically, studies are dominated by Europe (6 articles), followed by Asia (4 articles), Africa (2 articles), and the Americas (1 article), with one cross-country study. This pattern demonstrates geographic disparity in the development and testing of the DGMM. Europe's dominance reflects the contribution of relatively more mature contexts to digital administrative reform, supported by stable policy foundations, institutional capacity, and infrastructure. Meanwhile, studies from Asia and Africa emphasize the model's adaptation to local challenges, such as the digital literacy gap, variations in institutional readiness, and disparities in public services. In the context of this research, geographic distribution is important because citizen representation and participation in the DGMM are strongly influenced by the institutional and social context. Traditions of openness, capacity for digital participation, and institutional design determine how citizens are positioned within the maturity model. Thus, analysis of citizen roles cannot be separated from the geographic and administrative context in which the model is developed and implemented.

The word cloud shows that the DGMM literature is still dominated by terms related to systems, structures, and governance, while concepts directly related to citizens appear less frequently. This indicates that digital maturity is generally understood as a result of institutional readiness and system integration, with citizens more often positioned as recipients of services rather than active actors of transformation. As a result, the dimensions of citizen participation are often implicit or only emerge at high levels of maturity without systematic explanation. Therefore, an analytical approach based on a role-based lens is needed to uncover how citizen roles are constructed at each maturity level. This approach allows for analysis not only of citizens' presence but also of their varied roles—from information recipients to collaborators and co-creators of digital government services.

3.2. Data Analysis

The data analysis examines how citizen roles are structurally embedded across DGMMs through dimensions, indicators, and governance narratives. To maintain analytical consistency, each model was classified into five levels of role depth: None, Limited, Implicit, Explicit, and Strong. This classification captures the progression from citizen absence to empowered co-creation within digital maturity architectures.

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The "None" category includes DGMMs that do not represent citizens at all in any dimension, indicator, or narrative. These models are government-centric and assess maturity based on institutional readiness, governance, infrastructure, and bureaucratic efficiency, rather than citizen participation. This indicates an early stage of evolution before the participatory paradigm is adopted. A summary is presented in Table 5.

Table 5. DGMM with Citizen Involvement Category None

Num	DGMM	Citizen Involvement	Ref
1	Digital Maturity in Swedish Public Sector	Does not mention citizens; the assessment focuses exclusively on the government's internal digital maturity.	[8]
2	Turning Point Theory and Alignment-based Maturity Model	Emphasizes organizational alignment and internal factors without involving citizens.	[24]
3	Multidimensional PS Organisations DMM	Assesses public sector organizational maturity without incorporating citizen roles.	[8], [16]
4	Digital Maturity Balance Model	Evaluates the balance of internal digital maturity within the organization without referencing users.	[8]

The four models classified in the "None" category demonstrate that citizen engagement has not yet been integrated into the conceptual structure of government digital maturity. In these models, citizens do not appear as an explicit dimension, indicator, or narrative element. The primary emphasis is on strengthening the internal capacity of public organizations, strategic alignment, and optimizing bureaucratic processes, without considering citizen participation as either service users or partners in governance.

For example, the "Digital Maturity in the Swedish Public Sector" model focuses on measuring digital readiness through internal aspects such as strategy, organizational structure, and resource management. A similar approach is also seen in the Turning Point Theory and Alignment-based Maturity Model, which emphasize the alignment between an organization's strategic and operational objectives without incorporating the public engagement dimension. Both models reflect the early phase of digital transformation, which is still government-centric, where success is measured based on the institution's internal efficiency and readiness.

Two more up to date models, the Multidimensional Public Sector Organizations and the Digital Maturity Balance Model, also maintain a strong institutional orientation. Both evaluate digital maturity through a balance of internal dimensions—such as processes, technology, strategy, and human resources—without positioning citizens as relevant external actors in the evaluation framework. This suggests that, despite being developed in a more recent context, the approaches used still position digital transformation as an administrative agenda, rather than a participatory process.

The "None" category represents the earliest stage in the evolution of the DGMM. At this stage, digitalization is understood primarily as an effort to modernize bureaucracy and improve internal performance, rather than as an instrument for expanding public engagement. The absence of citizen roles in these models indicates that the values of participation and collaboration were not yet a conceptual priority in digital maturity design during this period.

The Limited category includes DGMMs that recognize citizens as mere users or recipients of services. Maturity is measured through accessibility, system adoption, interface quality, and intensity of use. The relationship remains one-way—government as provider, citizens

as recipient—without the integration of substantive participation. This category represents a transitional stage toward service orientation, but is not yet collaborative. A summary is presented in Table 6.

Table 6. DGMM with Citizen Involvement Category Limited

Num	DGMM	Citizen Involvement	Reference
1	Statskontoret Model	Focuses on public service efficiency, with citizens positioned solely as beneficiaries.	[18]
2	SAFAD Model	Emphasizes the efficiency of digital administration across government institutions.	[18]
3	Hiller & Bélanger Model	Citizen engagement is limited to issues of trust and privacy.	[13], [18], [25]
4	Howard's E-Gov Model	Focuses on government digital readiness without participatory elements.	[18], [20]
5	Wescott Model	Citizens are positioned solely as portal users, with no indicators of participation.	[18]
6	ANAO Model	Adopts an internal audit perspective, in which citizens are not a focal consideration.	[18]
7	World Bank E-Gov Model	Citizens are acknowledged as passive users, with engagement indicators remaining implicit.	[25]
8	Moon Model	Assesses digital service adoption without positioning citizens as active actors.	[18], [25]
9	Reddick Model	Limited two-way communication; no policy-level participation is present.	[18], [20]

Num	DGMM	Citizen Involvement	Reference
10	Synthesizing e-Government stage models	Integrates classical e-government stages, with public participation remaining absent.	[18], [24], [25]
11	Stage-models for public e-services	Focuses on one-way public service delivery without citizen participation.	[18], [24]
12	Digital Democracy Model	Introduces themes of digital democracy; however, citizen participation remains limited.	[18], [24], [25]
13	Cisco Model	Emphasizes service delivery and technology adoption, with minimal citizen participation.	[18]
14	United Nation E-Government Survey	Communication remains predominantly one-way, and public participation is not measured.	[13]
15	Measurement-based E-Government Portals	Focuses on portal-related performance metrics, with citizens positioned solely as users.	[8], [24]
16	3-D Maturity Model	Citizens are positioned solely as subjects of service satisfaction measurement	[8], [16]
17	Deloitte Digital Government Transformation Model	Refers to users in general terms without participatory mechanisms.	[18], [25]
18	National e-Government Readiness and Maturity Model	Citizen participation is limited, with the assessment focusing on institutional readiness	[16]
19	SPBE Model	Assesses maturity across domains without a citizen dimension,	[23]

Num	DGMM	Citizen Involvement	Reference
		emphasizing policy and digital governance integration.	
20	Digital Government Maturity Framework	Focuses on digital public service provision, with low levels of public participation.	[8], [16]
21	ARGEA – Assessing Readiness to develop an e-Government Enterprise Architecture	Assesses e-government architecture readiness, with citizens positioned only as system users.	[22]
22	Smart Government Maturity Model	Measures smart service adoption without assigning an active role to citizens.	[16]

Models categorized as Limited demonstrate that the issue of citizen engagement is beginning to receive attention in the DGMM literature, but remains limited and passive. Citizens are recognized as users of digital services, but are not yet viewed as actors involved in the evaluation process or policy formation. The underlying orientation of this approach tends to be service-oriented, where the success of digital transformation is assessed through indicators such as service availability, operational efficiency, and the level of adoption of online systems, rather than through the intensity of public participation.

Early models, such as the Statskontoret Model and the SAFAD Model, focused on system integration and improving administrative efficiency across agencies, without incorporating the dimension of active interaction with citizens. Although public access to electronic services has begun to be recognized, citizens remain positioned as policy objects. A similar pattern is seen in Howard's E-Gov Model and the ANAO Model, which emphasize organizational readiness and internal audit mechanisms over citizen engagement.

Subsequent developments are evident in models such as the Moon Model, Reddick Model, and Synthesizing Stage Models, which begin to address two-way communication between government and citizens. However, these interactions generally remain at the informative stage—limited to providing information and receiving simple feedback—without reaching deliberative or collaborative participation. Meanwhile, the Hiller & Bélanger Model introduces dimensions of trust and information security, but maintains the position of citizens as policy recipients, rather than as part of the digital governance process.

In more recent times, several models, such as Measurement-based E-Government Portals approach and the Deloitte Digital Government Transformation Model, have begun to measure user satisfaction and digital service performance. However, citizen engagement indicators are still limited to quantitative aspects related to service usage. In the Indonesian context, the SPBE Model emphasizes policy integration and digital governance effectiveness but does not yet explicitly measure public participation. A similar approach is found in ARGEA, which focuses on architectural readiness and internal strategic planning.

A consistent pattern is evident in the 22 models included in this category: citizen engagement is viewed as an indirect impact of improving service quality, rather than as the primary objective of digital transformation. Citizens are still treated as end-users, rather than partners in the public value creation process. Therefore, the Limited category represents a transitional phase in the evolution of the DGMM—a shift from a purely government-oriented approach to a more service-focused approach, but not yet reaching the participatory stage.

Conceptually, this group marks a crucial moment when public digital access began to expand, but the citizen engagement paradigm had not yet become the foundation for measuring maturity. This stage then laid the foundation for the emergence of subsequent categories (Implicit and Explicit), which gradually broadened the meaning of citizen engagement from mere service users to increasingly active actors in the digital governance ecosystem.

The Implicit category includes DGMMs that implicitly recognize citizens through approaches such as user-centric design, satisfaction, and service adoption, but not yet as

an explicit dimension. The focus shifts from internal efficiency to the quality of interactions, but citizens remain positioned as consumers, not policy actors. This category marks a transition to a more participatory model. A summary is presented in Table 7.

Table 7. DGMM with Citizen Involvement Category Implicit

Num	DGMM	Citizen Involvement	Reference
1	Multi-Dimensional Plug-and-Play Matrix	Participation is implied through the use of public service modules.	[16]
2	Chandler & Emanuel Model	Citizens appear implicitly through a focus on user experience (UX) and service quality, but are not positioned as part of the evaluation process.	[18]
3	e-Government Maturity Model for Local Government	Measures citizen usage and satisfaction in an implicit manner.	[16]
4	3D e-Governance Model	Citizen participation is implied through user experience–related metrics.	[16]
5	Three-stage model	Citizens are implicitly involved through their use of public services.	[24]
6	Nielsen Model	Emphasizes service utilization by citizens without incorporating a participation dimension.	[24]
7	COBIT-based e-Governance Maturity	Grounded in IT governance, with citizen involvement remaining implicit.	[16]
8	Organizational Interoperability Maturity Model	Citizens appear implicitly as beneficiaries of interoperability.	[16]

Num	DGMM	Citizen Involvement	Reference
9	COBIT based IT Governance Maturity Model	Focuses on IT enablers and internal governance, with no explicit citizen participation.	[16]
10	Digital Service Transformation Maturity Model in Public Sector	Measures service transformation without an explicit participation dimension.	[17]
11	Government Digital Transformation Maturity Assessment Framework	Citizens appear implicitly through the use of the term "user-centricity."	[12]

The Implicit category represents a transitional stage in the development of DGMMs, where the evaluation orientation shifts from simply providing services to focusing on the user experience. In these models, citizens are indirectly acknowledged through terms such as user, adoption, or experience, but have not yet been formalized as a participatory dimension or indicator within the digital maturity structure. Citizens are seen as a crucial element in the utilization of digital systems, but are not yet given space in planning, evaluation, or policy decision-making processes.

Models such as Chandler & Emanuel Model can be understood as early examples of this approach. E-government success is measured through service quality and user experience, without explicitly assessing citizen engagement in governance. A similar pattern is seen in e-Government Maturity Model for Local Government and 3D e-Governance Model, which used indicators of user satisfaction and the quality of user interaction with government service portals. Although the user dimension began to be considered, citizens remained positioned within the framework of service recipients, rather than as subjects of active participation.

Subsequently, Three-stage model and the Nielsen Model expanded attention to citizen utilization of digital services. However, this expansion continued to focus on the intensity of service use and effectiveness, without establishing collaborative mechanisms between government and citizens. Thus, models in this category reinforce the concept of citizens as active users, but do not yet lead to deliberative participation or co-creation.

Technology governance-based approaches, such as those proposed by COBIT-based e-Governance Maturity and COBIT based IT Governance Maturity Model, also demonstrate a similar pattern. Despite emphasizing interoperability, system integration, and IT management efficiency, citizen engagement remains understood as an indirect impact of improved system quality. Citizens benefit from improved technology governance, but it is not considered part of the design or evaluation of digital policies. More recent models, such as Digital Service Transformation Maturity Model in Public Sector and Government Digital Transformation Maturity Assessment Framework, have begun to explicitly use terms like digital service transformation and user-centricity within the digital maturity framework. While this demonstrates a growing awareness of the importance of user experience, citizen engagement has not yet been translated into measurable and structural participatory indicators.

Overall, the Implicit category marks a crucial conceptual phase in the evolution of the DGMM. The government began to understand citizens as active users whose experiences and perceptions were relevant in evaluating digital maturity. However, the established relationship remained asymmetrical and had not yet reached the stage of equal collaboration. Theoretically, this stage represents a shift from the service delivery paradigm to user experience, which then became the foundation for the emergence of the Explicit and Strong categories, where citizen participation began to be institutionalized within the digital maturity framework.

The Explicit category encompasses the DGMM that explicitly integrates the role of citizens as a measurable dimension or indicator. Maturity is assessed not only by technological readiness but also by structured participation mechanisms, such as e-participation, online consultations, and deliberative forums. This marks a shift toward more open and inclusive governance. A summary is presented in Table 8.

Table 8. DGMM with Citizen Involvement Category Explicit

Num	DGMM	Citizen Involvement	Reference
1	Gartner Group Baum & Di Maio	Citizens are explicitly addressed at interactive stages, with two-way	[18], [20]

Num	DGMM	Citizen Involvement	Reference
	Gartner's Four Phases of E-Government	interaction beginning to be measured.	
2	Layne & Lee Model	Users are explicitly referenced within service integration stages.	[13], [18], [20]
3	World Bank Stage Model	Users are explicitly mentioned at each stage of service delivery.	[18]
4	Deloitte Six-Stage Digital Gov	Personalized services for citizens are treated as maturity indicators.	[20]
5	Accenture Model	Citizen-centric services are explicitly included as evaluation indicators.	[18]
6	United Nations Five Stages Model	Citizens are explicitly referenced at the "seamless service" stage.	[18]
7	Public Sector Process Rebuilding	Public processes and policies are explicitly linked to users.	[13], [18], [20]
8	Gottschalk Model	Citizens are explicitly mentioned within general maturity indicators.	[18]
9	Six-stage model for local government portals	Government portals are explicitly oriented toward users.	[18], [20], [24]
10	Four-Stage Arab Countries E-Gov Model	Explicitly refers to citizens, with public service–specific indicators.	[20]
11	Frame of reference with metaphors and dual perspectives	Explicitly adopts a multi-actor perspective, recognizing citizens as users.	[13], [24]
12	Open Government Maturity Model	Public participation is treated as an explicit indicator.	[8], [13], [16], [18], [20]
13	Four-Stage E-Government Maturity	Citizens are explicitly positioned as end users.	[8]
14	Manchester E-Government Maturity Model	Explicit indicators are used to assess user engagement.	[8]
15	Toasaki Model	Users are explicitly referenced within service integration stages.	[18]

Num	DGMM	Citizen Involvement	Reference
16	Single Service Maturity Model	Explicitly focuses on individual users of digital services.	[16]
17	Digital Heritage	Explicitly identifies users as part of digital capability measurement.	[16]
18	E-Maturity Assessment Model for Municipal Project and Program Management System	Explicit indicators are used to measure user participation in public projects.	[21]
19	A model for measuring the digital state at the organisation	Explicitly incorporates user-centricity within both process and service dimensions.	[14]

The Explicit category demonstrates a significant development in the evolution of the DGMM. At this stage, the presence of citizens is no longer implicit but is clearly included in the dimensions, indicators, and stages of digital maturity. Unlike the previous category, models in this group no longer view citizens solely as service users, but as elements consciously integrated into digital service systems and their evaluation processes. Thus, citizen involvement has been formally recognized, although the forms of participation generally remain limited to interaction and consultation.

Classic models such as Gartner's Four Phases of E-Government and the Layne & Lee Model marked the first milestones in explicitly recognizing the role of citizens in the maturity of digital services. Both models demonstrate a transition toward two-way communication, where interactions between government and citizens are increasingly used as indicators of the effectiveness of digitalization. Models such as the World Bank Stage Model and Deloitte's Six-Stage Digital Government also introduce elements of personalization and user segmentation, indicating that e-government success is linked to the government's ability to understand citizen needs.

Between 2003 and 2012, models such as the Accenture Model, the UN Five Stages Model, and the Open Government Maturity Model further strengthened the position of citizens within the maturity framework. The concept of citizen-centric services began to be

positioned as a pillar of digital services, and public participation was introduced as an explicit indicator. This approach reflected the emergence of the open government paradigm, which positions citizens as a crucial part of transparent and responsive governance.

In the context of local government and public portal governance, models such as the Six-Stage Model for Local Government Portals and the E-Maturity Assessment Model expanded the explicit meaning by measuring the level of user participation in government digital platforms. Meanwhile, the Frame of Reference Model introduced a multi-actor perspective, recognizing citizens as part of the digital government ecosystem. This development demonstrates a shift from informational interactions to functional partnerships.

More recent models, such as the Single Service Maturity Model and the Model of Measuring the Digital State at the Organizational Level, present a more systematic approach to user-centricity. Both models utilize metrics that measure user experience and engagement in the use of public digital systems. Thus, citizen engagement is not only recognized but is beginning to be operationalized through measurable indicators.

Overall, the Explicit category represents a phase of conceptual maturity in which citizen participation has been institutionalized within the model structure through formal dimensions and indicators. While the forms of participation accommodated have not yet fully reached co-creation or strategic collaboration, this group provides an important foundation for the shift toward the Strong category, which positions citizens as active actors in the design and decision-making of digital policies.

The Strong category represents the most advanced level of citizen engagement, where citizens become strategic partners in digital governance through co-creation, digital democracy, and empowerment. Maturity is measured by the government's ability to build collaborative mechanisms that enable substantive participation in policy and service innovation. This reflects an equal and participatory partnership. A summary is presented in Table 9.

Table 9. DGMM with Citizen Involvement Category Strong

Num	DGMM	Citizen Involvement	Reference
1	West Model	Emphasizes transparency and active public participation.	[18]
2	E-Government maturity model using CMMI and Intellectual Capital	Measures citizen participation through specific indicators.	[18], [24]
3	United Nations E-Government Survey	Demonstrates a strong citizen-centric orientation supported by comprehensive indicators.	[8], [25]
4	Recommendation of the Council on Digital Government Strategy	Adopts a comprehensive strategy that positions citizens as partners.	[8], [18], [20]
5	O-Government Assessment Model	Assesses government–citizen collaboration, with strong co-creation elements.	[16]
6	Digital Government Evolution Model	Represents a collaborative participation stage with strong citizen-centricity	[8], [13], [16], [18], [20], [24]
7	Digital Maturity Model	Positions citizens as primary actors in digital public services.	[8]
8	McKinsey Digital-by-Default	Places citizens at the center of digital service delivery, supported by comprehensive indicators.	[8]
9	eG3M – e-Government Generic Maturity Model	Explicitly incorporates government–citizen co-creation.	[16]
10	Generic e-Government Maturity Model	Citizens play an active role in service design and evaluation.	[16]
11	Gartner Digital Government Model	Promotes cross-stakeholder collaboration involving both public institutions and citizens.	[20]

Num	DGMM	Citizen Involvement	Reference
12	CiRM-based e-Government Maturity Model	Citizens are positioned at the center of government–citizen relationship management (CRM).	[16]
13	E-Government Maturity Model for Sustainable E-Government	Represents sustained co-creation between citizens and government.	[8], [16], [18], [25]
14	Socio-political and e-Democracy Model	Emphasizes digital democracy and citizens' social and political participation.	[16]
15	Organisation for Economic Co-operation and Development Digital Government	Positions citizens as partners in open digital governance.	[13]
16	E-Government Maturity Model	Demonstrates strong citizen engagement supported by comprehensive indicators.	[8], [16]
17	SMARTGOV – Smart Government Model	Recognizes citizens as collaborative partners and co-creators.	[16]
18	European Commission eGov Benchmark	Evaluation frameworks position citizens as both service beneficiaries and evaluators.	[8], [18], [25]
19	SMARTGOV Extended Model	Represents a participatory extension of SMART governance, emphasizing citizen co-creation.	[8]
20	DGSA – Digital Government Strategy Assessment	Incorporates citizen participation in the design of national digital strategies.	[19]
21	Maturity Model for Government's Evaluation	Positions citizens as evaluative partners, supported by collaboration-specific indicators.	[15]

The Strong category represents the highest level of citizen engagement within the DGMM framework. At this stage, citizens are recognized not only as users of digital services but also as collaborative partners and co-creators in digital governance. Models in this group uphold the principles of co-creation, open collaboration, and digital democracy, and make public participation a key indicator in measuring digital maturity.

The key characteristic of this category is the integration of citizens throughout the entire policy cycle—from design and implementation to evaluation of digital services. Thus, digital maturity is no longer simply defined as the optimization of systems and technology, but rather as the ability to build equal partnerships between government and citizens. The Strong model can be understood as the most advanced manifestation of the citizen-centric governance paradigm.

One of the early milestones of this approach is seen in the West Model, which emphasizes transparency and active citizen participation in government portals. This model paved the way for the development of the DGMM, which views public engagement as a prerequisite for successful digitalization. This approach was later reinforced by Kim & Grant, who incorporated citizen participation indicators through the CMMI and Intellectual Capital frameworks, marking a shift in focus from administrative efficiency to public collaboration.

In the following decade, the strengthening of the participatory paradigm became increasingly evident through the UN E-Government Survey and the OECD Recommendation on Digital Government Strategy. Both frameworks position data transparency, participation, and collaboration as core elements of digital maturity. Digitalization is no longer solely assessed by the quality of services, but also by the level of citizen empowerment and inclusiveness in governance. This perspective is further deepened in the O-Government Assessment Model, which views co-creation between government and citizens as the ultimate indicator of mature digital governance.

Mid-generation models such as the Digital Government Evolution Model and the Digital Maturity Model further emphasize the position of citizens as central actors in public innovation. The shift from traditional e-government to collaborative digital governance is becoming increasingly evident. A similar approach is also seen in the CiRM-based Model,

which places citizens at the center of relations within the Citizen Relationship Management framework, thus fostering sustainable two-way interaction between the government and the public.

In the 2016–2023 period, the operationalization of citizen engagement has become increasingly systematic. Models such as SMARTGOV and SMARTGOV Extended reinforce the principle of co-creation through active citizen participation in service innovation. The DGSA integrates public participation into the formulation of national digital strategies, while the European Commission eGovernment Benchmark expands the role of citizens as evaluators of digital public services at various levels of government. These developments demonstrate that citizen engagement has evolved into a multi-level, cross-scale strategic indicator.

The Strong category emphasizes that digital government maturity is no longer measured solely by technological capacity or bureaucratic efficiency, but rather by the quality of partnerships between government and citizens in creating public value. This group reflects a paradigm shift toward open, collaborative, and socially sustainable digital governance. Therefore, the models in the Strong category represent the pinnacle of the evolution of the DGMM—an ideal form of digital transformation that places citizens at the center of innovation, legitimacy, and sustainability of digital governance in the contemporary era.

Table 10. Distribution of Citizen Involvement Levels across DGMMs

Num	Category	Count
1	None	4
2	Limited	22
3	Implicit	11
4	Explicit	19
5	Strong	21

The distribution shown in Table 10 and Figure 5 shows that of all identified DGMMs, the Limited category is the most dominant group, with a total of 22 models. This finding indicates that the majority of digital maturity models still position citizens as end-users

of services, without providing adequate space for participation in the formulation, implementation, and evaluation of digital policies. The dominance of this category reflects that digital transformation in various contexts is still oriented towards improving the efficiency and quality of public services, rather than strengthening the role of citizens as collaborative partners.

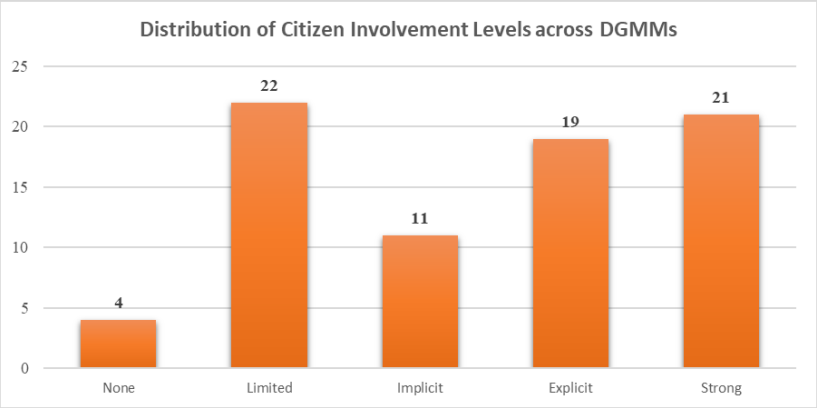

Figure 5. Distribution of citizen involvement levels across DGMM

The next most prominent categories are Strong (21 models) and Explicit (19 models). These two groups demonstrate a shift towards a more participatory and collaborative approach to digital government. Models in these categories are beginning to integrate the principles of citizen-centricity and co-creation, where citizens are no longer viewed solely as service users but also as stakeholders in the design, evaluation, and development of public services. This reflects a growing awareness of the importance of citizen engagement in building public value and strengthening the legitimacy of digital policies. Meanwhile, the Implicit category (11 models) represents a transition phase from a service-oriented to a user-centric approach. Models in this group have begun to address user experience and service adoption, but have not yet institutionalized these issues in explicit participatory indicators. The None category (4 models) is the smallest, indicating that only a small proportion of models have yet to incorporate the role of citizens into the digital maturity framework.

This distribution pattern demonstrates the DGMM's evolution from a focus on strengthening internal capacity to a more collaborative governance model. This shift reflects the maturity of the global digital governance paradigm, where the success of digital transformation is no longer solely measured by infrastructure readiness and

service quality, but also by the level of citizen empowerment as partners in creating public value. Thus, these results confirm that citizen engagement has become a critical dimension in assessing the sustainability and inclusiveness of digital governance.

3.3. Discussion

The findings show that Digital Government Maturity Models (DGMMs) have gradually evolved from internally oriented and government-centric frameworks toward more collaborative, participatory, and citizen-centric governance models. This evolution is clearly reflected in the distribution of citizen involvement levels across the 77 identified DGMMs. The Limited category remains the most dominant, with 22 models, indicating that many DGMMs still position citizens primarily as users, beneficiaries, or recipients of digital public services. In these models, digital maturity is commonly assessed through service availability, accessibility, system adoption, portal quality, and administrative efficiency. Although citizens are recognized, their role is generally passive and does not extend to participation in policy formulation, service design, implementation, or evaluation.

The relatively high number of models in the Strong category, with 21 models, and the Explicit category, with 19 models, indicates an important shift in DGMM development. These categories show that more recent and advanced models have begun to integrate citizens as active actors in digital governance. In the Explicit category, citizen involvement is formally included through indicators such as user engagement, consultation, participation, service personalization, and citizen-centric design. In the Strong category, citizens are positioned more substantially as partners, evaluators, collaborators, and co-creators of public value. This shift demonstrates that digital government maturity is increasingly understood not only as a matter of technological readiness or bureaucratic efficiency, but also as the government's ability to create meaningful interaction, trust, transparency, and collaboration with citizens.

The Implicit category, consisting of 11 models, represents a transitional stage between passive service use and active participation. Models in this category acknowledge citizens indirectly through concepts such as user experience, satisfaction, service adoption, and user-centricity. However, these concepts are not yet translated into explicit participatory indicators. This suggests that some DGMMs have moved beyond purely internal government readiness, but still treat citizens mainly as users whose experiences must be

improved rather than as actors who can influence digital policy and service innovation. Meanwhile, the None category, consisting of only 4 models, shows that a small number of DGMMs still exclude citizens entirely and focus only on institutional capacity, infrastructure, organizational alignment, and internal digital transformation.

These results also confirm the pattern identified in the literature selection. The dominance of IEEE Xplore and the strong presence of information systems-oriented studies indicate that DGMM research has been shaped largely by technical and system-development perspectives. This helps explain why many models continue to prioritize internal capabilities, enterprise architecture, interoperability, system integration, and service performance. At the same time, the growing number of Explicit and Strong models suggests that the field is gradually absorbing ideas from public administration, open government, digital democracy, and public value governance. Therefore, DGMMs can be seen as moving along a continuum: from internal digital readiness, to digital service delivery, to user-centric transformation, and finally to collaborative digital governance.

Compared with previous work [8], which mainly mapped whether citizens were present and in which thematic locations they appeared, this study advances the discussion by evaluating the structural depth of citizen-role integration across maturity architectures. Rather than simply identifying the presence of citizen-related terms, the proposed typology explains how citizens are positioned within the logic of each model. This role-based lens reveals whether citizens are absent, treated as service users, implicitly considered through user experience, explicitly included through participation indicators, or strongly embedded as co-creators and strategic partners. This distinction is important because the mere appearance of the term “citizen” does not necessarily mean that a model is participatory or citizen-centric in a substantive sense.

The proposed typology therefore contributes to the DGMM literature by offering a more nuanced framework for assessing citizen representation. It shows that citizen-centricity is not a single condition, but a layered construct with different degrees of maturity. A model may mention citizens but still limit their role to satisfaction measurement or portal use. Another model may include participation indicators but still restrict citizens to consultation. Stronger models go further by embedding citizens into collaborative service design, public value creation, policy evaluation, and digital democracy mechanisms. This

analytical distinction is useful for researchers and policymakers because it helps identify whether a DGMM genuinely supports participatory governance or merely adopts citizen-centric language at a surface level.

The findings also have practical implications for the design of future DGMMs. Governments that aim to develop mature digital governance frameworks should not only measure infrastructure, institutional readiness, interoperability, cybersecurity, and service quality. They should also include indicators that assess how citizens participate in the design, delivery, monitoring, and evaluation of digital public services. Participation should be measured not only by access or usage statistics, but also by the quality of engagement, feedback mechanisms, inclusiveness, responsiveness, transparency, and the extent to which citizen input influences policy and service improvement. Without these dimensions, digital maturity models risk reinforcing a one-way service delivery paradigm rather than supporting democratic and collaborative transformation.

Nevertheless, the categorization process has limitations. The distinction between Limited, Implicit, and Explicit categories may involve interpretive judgment, especially when models use broad terms such as "users," "stakeholders," "engagement," or "citizen-centricity" without clearly defining the role of citizens. Some models may mention participation rhetorically but provide few measurable indicators, while others may include user-oriented dimensions that imply citizen relevance without explicitly naming citizens. Although the coding rubric was applied iteratively to improve consistency, future studies should strengthen methodological rigor through inter-rater reliability testing, expert validation, and empirical testing across different governance contexts.

Future research should also examine how citizen roles in DGMMs are shaped by geographic, institutional, and administrative contexts. The literature reviewed in this study shows that Europe dominates DGMM publications, followed by Asia, Africa, and the Americas. This uneven distribution suggests that citizen representation in maturity models may be influenced by differences in democratic traditions, administrative capacity, digital infrastructure, public participation culture, and policy priorities. Therefore, future studies should compare how citizen-centric maturity is conceptualized across developed and developing countries, centralized and decentralized governments, and national and local government settings.

The results indicate that DGMMs are undergoing a significant conceptual transformation. While the dominance of the Limited category shows that many models remain service-oriented and government-led, the strong presence of Explicit and Strong categories demonstrates a growing recognition that mature digital government requires citizen empowerment, collaboration, and co-creation. Digital maturity should therefore be understood not only as the ability of government institutions to adopt technology, but also as their capacity to build inclusive, responsive, and participatory relationships with citizens. This study contributes to that understanding by providing a typology that clarifies how deeply citizen roles are embedded within DGMM structures and by highlighting the need for future models to place citizens at the center of digital governance maturity.

4. CONCLUSION

This study demonstrates that citizen roles in DGMMs evolve across five levels—None, Limited, Implicit, Explicit, and Strong—reflecting a broader shift from government-centric digitalization toward collaborative and citizen-centric governance. The review shows that Limited representation remains the dominant pattern, indicating that most DGMMs still position citizens primarily as service end-users. However, the growing emergence of Explicit and Strong models confirms a progressive transition toward participatory, co-creative, and empowerment-oriented digital governance. By proposing a typology of citizen role representation based on structural depth, this study extends prior descriptive mappings into a more rigorous evaluative framework for understanding how public participation is institutionalized within digital maturity architectures. A limitation of this review lies in the interpretive nature of role categorization, which requires future empirical validation and inter-rater reliability assessment across broader governance contexts.

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