

Evaluating public service value within collaborative e-governance: a study in the Indian context

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Public service
value

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Abstract

Purpose – This study aims to meticulously evaluate the public service value-generation process facilitated by collaborative e-governance services within the framework of the National e-governance Plan (NeGP).

Design/methodology/approach – The study formulates a comprehensive research model through a combination of literature review, insights from domain experts and hands-on experience gained from the e-governance project. A conceptual research model was meticulously structured, validated, and interpreted by using a reflective measurement theory. The analytical tool SmartPLS3 was used to assess the proposed model rigorously.

Findings – The analysis of collected data reveals a statistically significant positive correlation between the implementation of collaborative e-governance strategies and the creation of public service value. This relationship is further reinforced by a strong alignment between the perceived aspects of collaborative e-governance, such as responsiveness, transparency and service delivery and their substantial contribution to the enhancement of public service value.

Originality/value – This study contributes to the scholarly discourse by introducing an innovative methodology for assessing public service value through analyzing empirical data from citizen-centric collaborative e-governance projects. It is noteworthy that no prior studies have examined the nuanced concept of public service value in the context of collaborative e-governance.

Keywords Collaborative e-governance, E-governance impact on public value, Indian e-governance initiatives, National e-governance plan (NeGP), Public service value, Reflective measurement theory

Paper type Research paper

1. Introduction

Government organizations often work in silos, with independent processes, control structures and decision-making environments (McDermott, 2010; Suri, 2014). This can lead to inefficiencies, ineffective decision-making and a lack of trust and cooperation. Citizens, on the other hand, expect their problems to be addressed seamlessly, without having to navigate the long channels of a traditional government department (O'Leary & Vij, 2012). To meet these expectations, government organizations need to build cross-organizational strategic collaboration. Strategic collaboration can lead to several benefits for creating public service value, including Increased efficiency and effectiveness (Ansell & Gash, 2008), Improved decision-making (Suri, 2014) and Greater citizen satisfaction (Kumar, Singh, & Shankar, 2016). To be successful, strategic collaboration must be carefully planned and implemented with the integration of newer technologies.

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The integration of information and communication technology (ICT) into governance can significantly enhance government institutions' capabilities. Specifically, the use of collaborative governance mechanisms can extend the involvement of citizens in government decision-making, as noted by [Lofstedt \(2012\)](#) and [Pandey and Suri \(2020\)](#). A key aspect of collaborative governance is the adoption of good governance practices for the creation of public service value, which encompasses elements of transparency, citizen engagement, improved service delivery and streamlined administrative procedures ([Deng, Karunasena, & Xu, 2018](#); [Pandey & Suri, 2020](#)). The effectiveness of intergovernmental collaboration in addressing complex challenges, such as resource allocation, technological interoperability and compliance with legal and regulatory models, is highlighted in the work of [O'Leary and Vij \(2012\)](#), [Pardo, Nam, and Burke \(2012\)](#) and [Kumar et al. \(2016\)](#). As a result, the combination of ICT and collaborative governance emerges as a transformative pathway for strengthening government functionality and responsiveness.

The National e-Governance Plan (NeGP) was introduced in India in 2006 to provide affordable, efficient, transparent and reliable government services. The plan of 2006 is referred to as NeGP 1.0 and it could partially remain successful as it had some limitations, such as a lack of comprehensive need analysis, integration of processes and collaboration across applications and databases. NeGP 2.0 or e-Kranti was launched in 2014 to address these limitations and to enhance public service value by improving governance efficiency and service delivery. Notable citizen-centric e-governance projects such as BHOOOI, CARD, e-SEVA, FRIENDS, GYANDOOT, LOKVANI, etc., have had a significant impact on citizens' lives. However, strategic collaboration within and across government agencies emerged as a key challenge to the full success of e-governance projects in India ([Suri, 2016](#)). Overcoming this challenge for bettering public service value is essential for the success of e-governance projects.

This research examines four collaborative e-governance initiatives in India that are aligned with the objectives of NeGP and were accessible to the researcher. Of these projects, three were affiliated with the Indian central government and one was associated with the state government of Delhi (the capital city of India). The projects were chosen based on the criteria that they have been in operation for at least five years, are citizen-centric and require citizens to visit government offices. The research also explores the potential for corruption in these initiatives drawing on the work of [Sheikh and Mandelkern \(2014\)](#) and the CVC (GOI) Annual Report ([2020-2021](#)). The following are the research objectives:

- (1) To clarify and analyze the interdependencies between public service value components and collaborative e-governance.
- (2) To propose an empirically validated research model for assessing public service value derived from collaborative e-governance.

The paper has a clear structure and is well-organized. The introduction provides an overview of the research, including the objectives and significance. The literature review section provides a comprehensive overview of the research topic, including the theoretical underpinnings, the development of the conceptual research model and the formulation of research hypotheses. The research methodology section describes a case study approach of selected projects for evaluation, a detailed description of the questionnaire development and sampling methods. The data analysis and results section presents the analysis of measurement and structural models along with the tested hypotheses results. The final section of the paper highlights the discussions, implications, limitations and scope for future research.

2. Literature review

E-governance has the potential to improve organizational efficiency and meet citizens' expectations, but its full potential is still not being realized. A comprehensive literature

review was conducted to explore the research topic, including the concepts of e-governance, strategic collaboration, public service value and good governance principles (Bannister & Connolly, 2014; Gupta & Suri, 2017; Soni, Dey, Anand, Malhotra, & Banwet, 2017).

2.1 Theoretical background

Several scholars have explored the relationship between collaborative e-governance and public service value, emphasizing its transformative potential. For example, Bannister and Connolly (2014) found that ICT can make government more open, transparent, participatory and responsive, which are all important public values. Austin (2010), Flak, Solli-Saether, and Straub (2015), and Gupta and Suri (2017) also found that collaborative e-governance can improve planning, decision-making and control processes, ultimately contributing to the creation of public service value. These perspectives align with the broader research trend in examining how collaborative approaches in e-governance can yield substantial benefits for public service delivery and citizen engagement.

Furthermore, investigations by Osman *et al.* (2014) and Gupta and Suri (2017) have highlighted that collaborative e-governance not only streamlines service delivery but also ensures accessible and simplified information dissemination, particularly benefiting marginalized individuals. These insights emphasize the practical implications of collaborative e-governance in addressing social inclusivity and equity, thereby contributing to the overall enhancement of public service value. Chun, Luna-Reyes, and Sandoval (2012) and Gupta and Suri (2017) have additionally emphasized how collaborative e-governance aligns with domain-specific goals, including safety, security, privacy and responsiveness. Such alignment serves to fortify the theoretical underpinning that collaborative e-governance strategies can effectively address specific service-related challenges, contributing to the creation of public service value.

Moreover, the works of Reddick (2011), Suri (2014) and Picazo-Vela, Gutierrez-Martinez, Duhamel, Luna, and Luna-Reyes (2015) emphasize that collaborative e-governance fosters transparency and citizen participation, further enhancing the public service value proposition. This aligns with the theoretical model that effective collaboration in e-governance can lead to more accountable, citizen-centric and participatory governance, ultimately resulting in value creation for the public.

2.1.1 E-governance. The integration of ICTs into government has transformed the way that information is disseminated and services are delivered. This has led to improvements in transparency, accountability and responsiveness, which have enhanced the value of public services (Tripathi, Gupta, & Bhattacharya, 2012). E-governance offers several advantages, such as high-quality services, enhanced accessibility, improved information security, cost reduction and increased citizen participation (Bannister & Connolly, 2014; Soni, Dey *et al.*, 2017). However, the predominant technical focus of e-governance can sometimes overshadow citizens' needs (Chun *et al.*, 2012). Additionally, there are some challenges to e-governance in developing countries, such as inadequate ICT infrastructure, disparities between design and implementation, institutional support, content localization and the digital divide (Luna-Reyes & Gill-Gracia, 2011; Gómez & Heeks, 2016; Soni, Anand, Dey, Dash, & Banwet, 2017). These challenges require aligning expectations with limited resources and advocating for strategic collaboration (Pandey & Suri, 2020).

2.1.2 Strategic collaboration. Notably, governmental entities aspire to optimize online service delivery via single-window systems. However, achieving this goal requires seamless coordination and integration across horizontal and vertical dimensions (Pardo *et al.*, 2012). While strategic collaboration can take various forms (Ansell & Gash, 2008), its significance in the e-governance domain transcends conceptual boundaries. It serves as a mechanism for enhancing citizen engagement, generating public service value and effectively achieving governance objectives (Austin, 2010; Tripathi *et al.*, 2012; United Nations Department of

[Economic and Social Affairs, 2016](#)). Yet, pursuing strategic collaboration faces obstacles such as organizational culture differences, conflicting goals, financial constraints and interoperability challenges ([Tripathi et al., 2012](#); [Pham & Tanner, 2014](#)). Shifting toward a collaborative governance paradigm becomes essential for successful initiative execution ([Bertot, Jaeger, & Grimes, 2012](#)). Thus, fostering a collaborative mindset within government agencies and providing essential competencies becomes crucial ([McDermott, 2010](#)), thereby enhancing the process of collaborative e-governance.

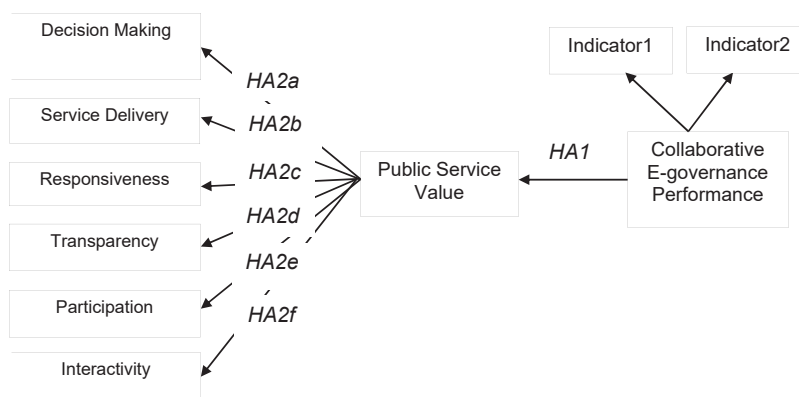
2.1.3 Collaborative e-governance performance. Collaborative e-governance is a combination of strategic collaboration and electronic governance that is powered by economic incentives, citizen engagement, technological advancements and the pursuit of public service value ([Chun et al., 2012](#); [Gupta & Suri, 2017](#); [Pandey & Suri, 2020](#)). It has the potential to enhance public service value by strengthening processes like planning, executing and evaluating ([Gupta & Suri, 2017](#)). The assessment of collaborative e-governance performance is based on the degree of advancement of the system, which is characterized by positional advantage and relationship advantage ([Dyer & Singh, 1998](#)). Positional advantage refers to the ability to provide enhanced functionality and efficient service delivery, while relationship advantage refers to the ability to actively involve citizens in the decision-making process. The measurement of outcomes in collaborative e-governance is rooted in the cultivation of public service values ([Kelly, Mulgan, & Muers, 2002](#); [Kernaghan, 2003](#); [Moore, 2014](#)).

2.1.4 Public service value. Public value and public service value are interrelated concepts that have distinct meanings and implications in public administration and governance. Public value refers to the broader societal benefits and outcomes pursued by public organizations for citizens and the community ([Moore, 1995](#); [Kelly et al., 2002](#); [O'Cass & Ngo, 2011](#); [Luna-Reyes, Picazo-Vela, Luna, & Gil-Garcia, 2016](#)), while public service value refers to the principles and beliefs that guide public policy and the delivery of public services. Public service value is a more specific and tangible facet of public value, focusing on the quality, effectiveness and efficiency of government-provided services to the public ([Golubeva, 2007](#); [Karunasena & Deng, 2012](#)). It is often evaluated in terms of customer satisfaction, accessibility, affordability and contribution to public well-being ([Chun et al., 2012](#); [Cordella & Bonina, 2012](#); [Gupta & Suri, 2017](#)). A spectrum of public service values, including ethical, democratic, professional and people-oriented values, has been systematically categorized by [Kernaghan \(2003\)](#) and [Bannister and Connolly \(2014\)](#) taken as the guiding principle for this research.

Within the scope of this research, public service value denotes the specific value derived from the quality and delivery of public services to citizens by government organizations ([Bryson, Crosby, & Bloomberg, 2014](#); [Luna-Reyes et al., 2016](#)). This study adopts constructs of public service values that encapsulate the value intended for citizens, shaped by government efforts in collaborative e-governance ([Cordella & Bonina, 2012](#); [Bannister & Connolly, 2014](#); [Gupta & Suri, 2017](#)). The Public Service Value for the study includes effective planning, decision-making and control ([Gupta & Suri, 2017](#)), improved service delivery with accessible and understandable information and benefiting marginalized and disabled populations ([Chun et al., 2012](#); [Flak et al., 2015](#)). Additionally, it fosters transparency by tracking and displaying information, involving citizens in policy-making and facilitating seamless government-citizen interactions ([Ramaswamy & Ozcan, 2018](#); [Green & Sergeeva, 2019](#); [Pereira, Lohmann, & Houghton, 2021](#)).

2.2 Hypotheses development

The study adopted variables from a literature review, expert insights and project experience. These variables were relevant to collaborative e-governance and public service value. A conceptual research model and hypotheses were constructed based on the variables. [Figure 1](#)



Source(s): Figure by authors

Public service value

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Figure 1.
Research
conceptual model

shows the interrelations between public service value and collaborative e-governance performance.

The theoretical underpinning guided by the "reflective measurement theory" elucidated by [Hair, Ringle, and Sarstedt \(2011\)](#), was instrumental in developing a conceptual research model and formulating hypotheses to assess the public service value engendered by collaborative e-governance. This theory posits that latent factors "cause" or "reflect" the indicative variable, resulting in a hierarchical arrangement. The model comprises six first-order factors (micro variables), a second-order factor (macro variable) and a third-order factor (outcome variable). The reflective-reflective model underwent validation in stages and is depicted in [Figure 4](#).

Within the realm of collaborative e-governance performance, Indicator1 and Indicator2 are the two key factors that contribute to the overall success of collaborative e-governance initiatives, aligned with the process of public service value creation. To be more specific, Indicator1 measures the extent to which e-governance services are aligned with the needs of citizens. Meanwhile, Indicator2 measures the extent to which e-governance services are comprehensive and effective in addressing the concerns of citizens.

The proposed model posits that Public Service Value (VCEG), constitutes Collaborative E-governance Performance (CEGP) comprising six fundamental elements essential for the generation of public service value: Decision Making (VCDM), Service Delivery (VCSD), Responsiveness (VCRP), Transparency (VCTP), Participation (VCPT) and Interactivity (VCIT). To validate this proposed model, two sets of hypotheses were constructed-one for the main dimension and the other for its sub-dimensions.

Enhanced functionality, efficient service delivery and citizen participation in decision-making have a positive effect on public service value. It can, therefore, be argued that the existence of strong public service value substantially shapes and contributes to the realization of collaborative e-governance performance.

HA1. Public Service Value is a significant constituent of Collaborative E-governance Performance

Additionally, the interrelationships among the six micro variables within Public Service Value have also been subject to hypothesis formulation.

Decision Making: The augmentation of public service value within a governmental entity encompasses the expeditious resolution of citizens' concerns, the enactment of well-informed decisions, the vigilant oversight of procedural activities and the execution of efficacious

regulatory measures aimed at achieving the desired outcomes (Suri, 2014; Green & Sergeeva, 2019; Pereira *et al.*, 2021). The augmentation of public service value is a complex undertaking, but it is essential for the effective functioning of a democracy.

HA2a. Decision-making is a significant element of Public Service Value.

Service Delivery: The optimization of citizen service delivery for public service value creation is enhanced through the establishment of accessible and up-to-date information on processes and procedures via the designated online portal. This includes multi-language content ensuring its availability through common service centres. Moreover, the facilitation of accessibility for marginalized and disabled citizens should be ensured (Cordella & Bonina, 2012; Osman *et al.*, 2014; Gupta & Suri, 2017; Deng *et al.*, 2018).

HA2b. Service Delivery is a significant element of Public Service Value.

Responsiveness: Issuing receipts and token numbers to citizens when they submit applications and promptly handling inquiries, grievances recommendations, are proactive ways to provide public service values (Satapathy, 2014; Gupta & Suri, 2017). These proactive practices help to prevent problems from arising in the first place and improve the overall quality of public services.

HA2c. Responsiveness is a significant element of Public Service Value.

Transparency: The enrichment of transparency in e-governance through web-based functionalities that present comprehensive information about government initiatives, schemes, strategies, procedures the status of submitted applications of the citizens can enhance public service value (Suri, 2014; Deng *et al.*, 2018; Schoenmaker & Schramade, 2019). Such transparent activities also allow citizens to have a clear understanding of how public services are delivered and how their paid taxes are being used.

HA2d. Transparency is a significant element of Public Service Value.

Participation: The active involvement of citizens plays a critical role in enhancing the overall value of public service delivery, particularly through the model of collaborative e-governance. This entails the integration of citizens' constructive contributions, including their suggestions and remarks, into the processes of policy conceptualization and decision-making (Reddick, 2011; Chun *et al.*, 2012; Bryson *et al.*, 2014; Green & Sergeeva, 2019).

HA2e. Participation is a significant element of Public Service Value.

Interactivity: The augmentation of public service value through collaborative e-governance is facilitated by the seamless engagement of stakeholders, both within and outside government entities. This requires government organizations to accord high priority to stakeholder engagement. Interactivity, a pivotal dimension in this context, entails the utilization of a range of communication channels, including but not limited to social media platforms, call centres and organized events (Karunasena & Deng, 2012; Suri, 2014, 2016; Ramaswamy & Ozcan, 2018).

HA2f. Interactivity is a significant element of Public Service Value.

2.3 Concise project descriptions for evaluation

The study defined selection criteria for e-governance projects, which involved on-site visits to government offices, collaborative methodologies, a track record of at least five years and the exclusion of early-stage projects. It encompassed projects at state, autonomous and national levels within the NeGP initiative, including those with documented corruption concerns. Table 1 presents succinct information on the projects selected for assessment.

Project name/Operating organization	Coverage	Focus	Implementation status
Passport SEWA project/ ministry of external affairs (MEA)	All India	To enhance public service values by providing passport-related services to the citizens in a collaborative manner with private agencies and several other government organizations. The government agencies look at on fundamental functions such as verification, authorization, and passport issuance, leaving technology-oriented services to the purview of the private company. This initiative holds the potential to substantially enhance the efficiency and efficacy of passport services within India	Operational since 2010
Leased hold to freehold conversion of properties/Delhi development authority (DDA)	All India	Enabling citizens to access services through a unified platform that embodies efficiency, transparency, reliability, and user-friendliness. This initiative engages multiple stakeholders to ensure interactive and timely service delivery, all within a streamlined timeframe of 45 days	Operational since 2014
Booking of community hall/open spaces and parks/DDA	Delhi	To encourage and foster interactions between citizens from diverse social and cultural backgrounds, prioritizing their collective well-being, the approach for reservations operates on a 'First Come First Serve (FCFS)' basis. This reservation system is inclusive, welcoming individuals of all religious affiliations, and facilitating the organization of various activities	Operational since 2012
Driving License/Government of National Capital Territories (NCT) of Delhi	Delhi	A collaborative e-governance projects engaged in the issuance of driving licenses across all types of motor vehicles, including personal, passenger, and commercial transport. This approach aims to improve efficiency by reducing human involvement and enhancing security, transparency, and overall performance	Operational since 2007

Source(s): Table by authors

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Table 1.
Projects selected for assessment

3. Research methodology

In order to acquire data for this study, structured questionnaires were administered to individuals utilizing e-governance services. The research framework underwent validation and testing employing Partial Least Squares Structural Equation Modeling (PLS-SEM). PLS-SEM is primarily used in exploratory analysis, and it does not require the normal distribution of data and is suitable for a small size sample (Hair *et al.*, 2011) as is the case of this study.

The selection of the PLS-SEM approach in this research aligns with the recommendations set forth by Sarstedt, Ringle, and Hair (2017). This method is deemed suitable when (1) the research objective is to explain and predict target constructs and/or to detect important driver

constructs, (2) the structural model has reflectively measured constructs and (3) the researcher is working with small sample size. For data collection and model evaluation Smart PLS version 3.0 software has been employed.

3.1 Questionnaire development

The questionnaire was designed using a five-point Likert-type scale, allowing respondents to express their agreement on a scale of intensity from 1 (no extent) to 5 (very large extent). A closed-ended questionnaire was distributed between April 1, 2020 and December 31, 2020, during the Covid-19 pandemic. The initial version underwent pre-testing with a panel of 10 participants, including academic experts and e-governance practitioners, to refine the wording, order and structure of questions. Feedback refined the questionnaire, addressing potential biases, including non-response bias and Common Method Bias (CMB). The questionnaire was neutral to prevent personal opinions from influencing responses and double-barreled questions were avoided. Options were designed to align with the "interest hypothesis," which posits that respondents more interested in the subject matter would respond more promptly (Donald, 1960). The questionnaires, along with the constructs' are provided in Supplementary B (Supplementary file).

3.2 Sampling method and data collection

Survey administration began with the distribution of questionnaires to the initially identified beneficiaries in person. The beneficiaries were requested to distribute the surveys to individuals who had utilized the services of the selected projects under study.

3.2.1 Target respondents and sample size. The survey aimed for 300 participants but concluded with 250 responses, out of which 210 were suitable for analysis. This sample size of 210 was deemed adequate for the conceptual model analysis using PLS-SEM (Sarstedt *et al.*, 2017; Ringle, Sarstedt, Mitchell, & Gudergan, 2020). Data collection used both offline and online methods. In the offline approach, respondents were given physical questionnaires. For online, Google Forms were used and distributed via email, Facebook and WhatsApp.

3.2.2 Participant demographics and service usage. The study included respondents aged 18 to 55, with a small portion above 56 years (4.28%). Males constituted 77.14% of the sample, while females were 22.85%. Most had a graduation or higher degree (91.40%). The professional distribution was diverse, with government employees (50.4%), private employees (33.33%) and students (12.38%) being prominent. Regarding e-governance service use, 78.56% engaged with services like 'Passport Sewa' and 'Driving License', while 21.42% used 'Online Booking of DDA's Park and Open Spaces' and 'Lease-hold to Free-hold Conversion of Properties'. Participants' demographics and e-governance services used are given in Supplementary A.

4. Data analysis and results

Structural equation modeling (SEM) comprising measurement model and structural model was used to evaluate the reliability and validity of the constructs and the predictive capabilities of the target constructs. The results of the evaluation are presented below.

4.1 Measurement model analysis

The study assesses construct reliability using Cronbach's alpha ($\alpha \geq 0.70$) and Composite Reliability (CR ≥ 0.70). Convergent validity is examined through Average Variance Extracted (AVE >0.50) and factor loadings (≥ 0.70). Discriminant validity is established using the Fornell-Larcker criterion, cross-loadings and HTMT ratio. According to the Fornell and Larcker (1981) criterion, AVE (>0.50) should exceed squared correlations between latent

variables, representing the square root of the construct's AVE. The measurement model analysis shows that the constructs' reliability and validity (Table 2) meet the recommended thresholds of all the constructs.

HTMT (Table 3) assesses the correlation between constructs, with a threshold of 0.90 at 95% confidence (Henseler, Ringle, & Sarstedt, 2015). A value over 0.90 indicates weak discriminant validity. In this study, all values are below 0.90, except "Service Delivery", which is 0.91, still within acceptable limits. Cross-loadings indicate construct items loading better within their constructs (Table 4).

4.2 Structural model analysis

The structural model's predictive capacity is assessed through collinearity, path coefficients, coefficients of determination (R^2), effect size (f^2), blindfolding and predictive relevance (Q^2).

Constructs	Items	Factor loadings	α	CR	AVE	Fornell Larcker criteria (SQRT AVE)
Decision making	DMC1	0.812	0.896	0.924	0.708	0.841
	DMC2	0.876				
	DMC3	0.888				
	DMC4	0.782				
	DMC5	0.843				
Interactivity	ITN1	0.789	0.818	0.880	0.647	0.804
	ITN2	0.805				
	ITN3	0.827				
	ITN4	0.795				
Participation	PTN1	0.915	0.912	0.945	0.851	0.922
	PTN2	0.943				
	PTN3	0.909				
Responsivity	RSP1	0.762	0.790	0.864	0.614	0.784
	RSP2	0.851				
	RSP3	0.772				
	RSP4	0.746				
Service delivery	SDL1	0.796	0.785	0.861	0.608	0.780
	SDL2	0.813				
	SDL3	0.733				
	SDL4	0.775				
Transparency	TRP1	0.849	0.806	0.873	0.633	0.795
	TRP2	0.762				
	TRP3	0.782				
	TRP4	0.785				

Source(s): Table by authors

Table 2.
Constructs reliability
and validity

	VCDM	VCIN	VCPT	VCRP	VCSD	VCTP
VCDM						
VCIN	0.49					
VCPT	0.29	0.74				
VCRP	0.89	0.74	0.40			
VCSD	0.89	0.70	0.53	0.90		
VCTP	0.83	0.76	0.60	0.92	0.91	

Source(s): Table by authors

Table 3.
HTMT for the
constructs (based on
0.90 criterion)

Table 4.
Correlations between
the constructs and their
indicators

	VCDM	VCIN	VCPT	VCRP	VCSD	VCTP
DMC1	0.812	0.313	0.041	0.553	0.603	0.564
DMC2	0.876	0.356	0.122	0.631	0.648	0.638
DMC3	0.888	0.325	0.152	0.659	0.706	0.622
DMC4	0.782	0.396	0.273	0.654	0.673	0.586
DMC5	0.843	0.396	0.144	0.666	0.690	0.614
ITN1	0.379	0.789	0.526	0.493	0.437	0.475
ITN2	0.347	0.805	0.486	0.489	0.495	0.486
ITN3	0.335	0.827	0.539	0.492	0.379	0.484
ITN4	0.307	0.795	0.519	0.462	0.354	0.557
PTN1	0.155	0.594	0.915	0.363	0.222	0.388
PTN2	0.182	0.607	0.943	0.326	0.262	0.389
PTN3	0.152	0.578	0.909	0.294	0.172	0.353
RSP1	0.698	0.354	0.062	0.762	0.602	0.591
RSP2	0.640	0.524	0.427	0.851	0.595	0.674
RSP3	0.562	0.393	0.162	0.772	0.493	0.488
RSP4	0.462	0.603	0.433	0.746	0.542	0.580
SDL1	0.718	0.361	0.082	0.598	0.796	0.592
SDL2	0.690	0.414	0.159	0.606	0.813	0.603
SDL3	0.463	0.448	0.381	0.466	0.733	0.581
SDL4	0.583	0.402	0.139	0.550	0.775	0.583
TRP1	0.634	0.518	0.287	0.619	0.659	0.849
TRP2	0.416	0.497	0.427	0.495	0.525	0.762
TRP3	0.730	0.443	0.176	0.680	0.666	0.782
TRP4	0.482	0.525	0.437	0.575	0.541	0.785

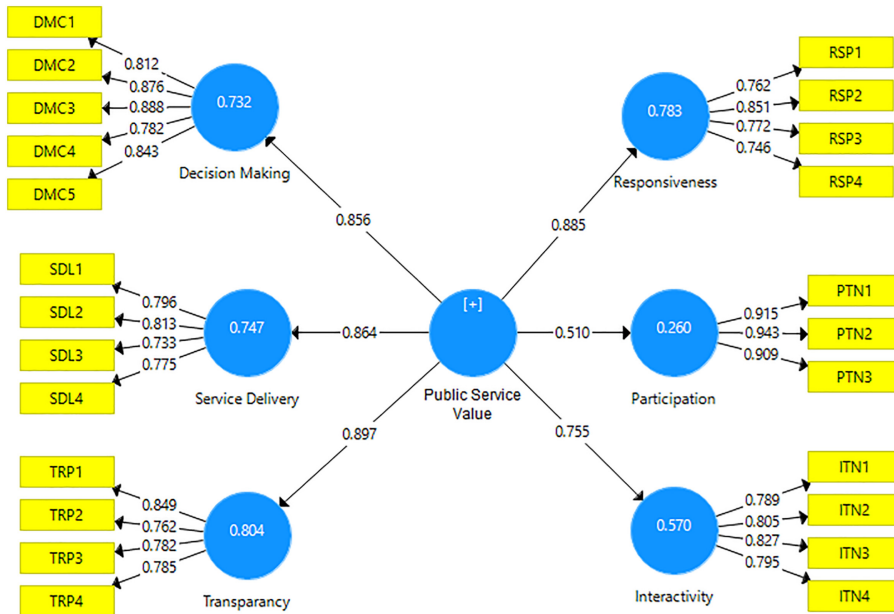
Source(s): Table by authors

Collinearity, evaluated by the Variance Inflation Factor (VIF), should be < 5 (Hair *et al.*, 2011). Path coefficients denote relationships among constructs, with values near +1 indicating strong positive connections and those near zero suggesting weak links. Figure 2 illustrates path coefficient interconnections, demonstrating robust relationships among all constructs. The significance of path coefficients depends on bootstrapped standard error. Empirical t-values and p-values are computed for structural path coefficients, with values exceeding critical thresholds (1.65 for 10% significance, 1.96 for 5% significance) indicating statistical significance. Figure 3 portrays bootstrapping outcomes with measures exceeding the critical value of 1.96 at 5% significance.

The R^2 value, on a scale of 0 to 1, measures predictive accuracy with 0.67, 0.33 and 0.19 denoting substantial, moderate and weak predictability respectively (Chin, 1998). This study's R^2 values mostly fall within the acceptable range, implying substantial predictive accuracy, except for "Participation". Effect size (f^2), interprets exogenous variable effects as small (0.02), medium (0.15), or large (0.35), with below 0.02 indicating no effect (Cohen, 1988). Predictive relevance is appraised via Stone-Geisser's (1974) Q^2 value, indicating model predictive power. A Q^2 value > 0 implies predictive relevance, while <0 suggests otherwise. All constructs exhibit positive predictive relevance. Refer to Table 5 for a summary of relevant measures in the structural model.

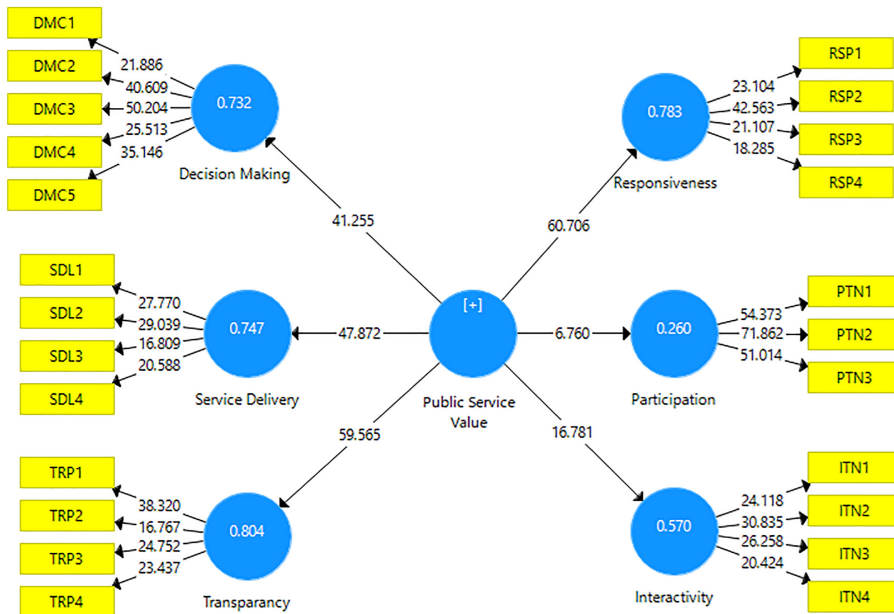
4.3 Hypothesis testing

The reflective-reflective model validation process is conducted in stages, starting with the low-order construct (LOC) and then moving on to the high-order construct (HOC) (Sarstedt *et al.*, 2017). In this study, VCEFG is initially considered the HOC, but it is treated as the LOC because there is another HOC, CEGP, as the outcome variable. The proposed conceptual



Source(s): Figure by authors

Figure 2.
Path coefficients of the
research model (LOC)



Source(s): Figure by authors

Figure 3.
Bootstrapping of the
research model (LOC)

Figure 4.
Results of the research
model (HOC)

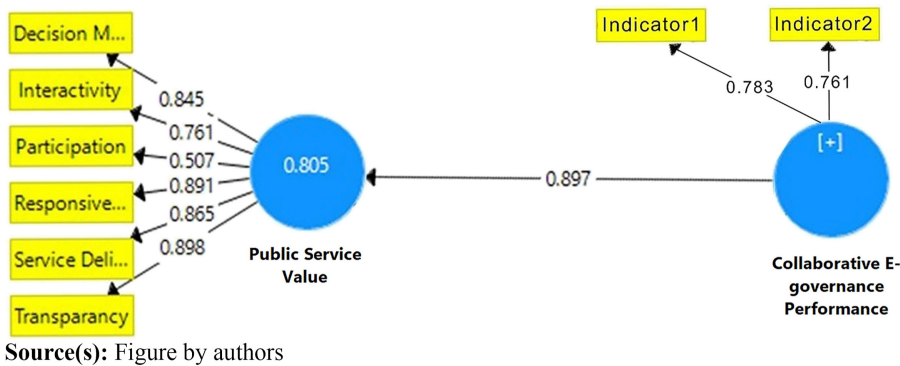


Table 5.
Summary of structural
model findings

Structural relationship	VIF	R ²	t-value*	Path coefficients	P-values**
CEGP → VCEG	1.00	0.805	51.847	0.897	0.000
VCEG → VCDM	1.00	0.732	41.255	0.856	0.000
VCEG → VCIN	1.00	0.570	16.781	0.755	0.000
VCEG → VCPT	1.00	0.260	06.710	0.510	0.000
VCEG → VCRP	1.00	0.783	60.706	0.885	0.000
VCEG → VCSD	1.00	0.747	47.872	0.864	0.000
VCEG → VCTP	1.00	0.804	59.565	0.897	0.000

Note(s): *Critical t-value for two-tailed test >1.96 (significant level = 5%)
**Critical P-value for two-tailed test <0.001 (significant level = 1%)
Source(s): Table by authors

model for CEGP demonstrates a strong relationship between all paths in its structural model, with path coefficients falling within the recommended threshold of 0-1. The validated research model is shown in Figure 4.

The results of the hypothesis testing are presented in Table 6. The study confirmed the significance of the proposed hypotheses and recommended their acceptance. This validates the conceptual research model and provides valuable insights into the relationship between the different variables. The findings also contribute to the understanding of collaborative e-governance performance and its impact on public service value.

Table 6.
Hypotheses and results

#Hypotheses	Result
HA1. Public service value is a significant constituent of collaborative e-governance performance	Supported
HA2a. Decision making is a significant element of public service value	Supported
HA2b. Service delivery is a significant element of public service value	Supported
HA2c. Responsiveness is a significant element of public service value	Supported
HA2d. Transparency is a significant element of public service value	Supported
HA2e. Participation is a significant element of public service value	Supported
HA2f. Interactivity is a significant element of public service value	Supported

Source(s): Table by authors

4.4 Goodness-of-fit

Goodness-of-fit (GOF) indices evaluate model fitness, computed as $(\sqrt{(AVE \times R^2)})$ (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005). Model fit indices' acceptable range is 0 to 1, with a suggested threshold of 0.36 (Akter, D'ambra, & Ray, 2011). The obtained GOF value, 0.592, surpasses the cut-off, confirming comprehensive model fitness. Standardized Root Mean Square Residual (SRMR) by Henseler *et al.* (2015) was also used to measure GOF in PLS-SEM, where SRMR values of 0.77 (saturated) and 0.088 (estimated) denote a good fit.

5. Discussions

This study investigated the impact of all constructs adopted for the study on enhancing public service value within collaborative e-governance initiatives. The conceptual model for the study posits that VCEG is a constituent construct of CEGP and is composed of six foundational elements essential for the generation of public service value. These elements are VCDM, VCSD, VCRP, VCTP, VCPT and VCIT. The statistical measures for constructs reliability (α) are found to be $> .80$ which is above the recommended threshold of $\geq .70$. Similarly, the validity of all of the constructs in terms of convergent validity (factor loadings $\geq .70$ and $AVE > .50$) and divergent validity (Fornell-Larcker Criterion (SQRT AVE) and HTMT $\leq .90$ (doesn't include 1)) are also found to be significant as per the recommended threshold. Please refer to Table 2 for all statistical values for the measurement model.

The validity of the model was assessed by formulating two sets of hypotheses: one for the primary dimension (VCEG) and another for its constituent sub-dimensions (VCDM, VCSD, VCRP, VCTP, VCPT, VCIT). All hypotheses were supported by the data, as evidenced by the significant structural relationship in terms of path coefficient (β -values), t -statistics (≥ 1.96 at significant level = 5%) and p -values (< 0.001 at significant level = 1%). The structural relationship of the primary dimension, $CEGP \rightarrow VCEG$ ($\beta = 0.897, t = 51.847, p = 0.000$) was also found to be significant. Please refer to Table 5 for statistical values of the structural relationship of all foundational elements for public service value creation.

Key among the findings is the undeniable impact of transparency [$VCEG \rightarrow VCTP$ ($\beta = 0.897, t = 59.565, p = 0.000$)], responsiveness [$VCEG \rightarrow VCRP$ ($\beta = 0.885, t = 60.706, p = 0.000$)] and decision-oriented governance [$VCEG \rightarrow VCDM$ ($\beta = 0.856, t = 41.255, p = 0.000$)] on the overall perception of public service value. Equally noteworthy is the pivotal role of citizen participation and interactivity in the creation of public service value. However, the findings show that although the structural relationship between public service value creation and citizen participation [$VCEG \rightarrow VCPT$ ($\beta = 0.510, t = 06.710, p = 0.000$)] is significant, its path coefficients, and t -statistic is the lowest among all the correlations in the model. This suggests that citizen participation in government organizations requires greater attention, as it is a key determinant of collaborative e-governance performance and public service value creation.

This research study adds significant value to academic and theoretical discourse through its rigorous examination, statistical validation of variables, validation of conceptual research framework and tested hypotheses. The study findings provide crucial insights through transparency, responsiveness, decision-making, participation and interactivity, this research provides valuable insights that extend beyond mere theoretical postulation. The elucidation of the intricate relationships between these variables lends empirical credence to the theoretical constructs that underlie collaborative e-governance initiatives.

6. Research implications, limitations and future scope

The outcome of this research has significant implications for a variety of stakeholders, including practitioners and policymakers, societies and beneficiaries, as well as researchers and the academic community.

- (1) Practitioners and policymakers: The findings can help practitioners and policymakers to improve the design and implementation of collaborative e-governance initiatives. For example, the findings suggest that transparency and responsiveness are essential for creating public service value. Practitioners and policymakers can use this information to design initiatives that are more transparent and responsive to the needs of citizens. Notably, the study's focus on dimensions like citizens' participation and interactivity highlights critical areas for improvement. This emphasizes the need for policymakers to establish strategic mechanisms that encourage citizen engagement, fostering effective communication among government stakeholders.
- (2) Societies and beneficiaries: The findings can help societies and beneficiaries to better understand the potential benefits of collaborative e-governance for public service value. For example, the findings suggest that collaborative e-governance can lead to improved service delivery, increased citizen participation and stronger government decisions. This information can help societies and beneficiaries advocate for the development and implementation of collaborative e-governance initiatives for the generation of public service values.
- (3) Researchers and academia: The findings of this research can help researchers and academics to better understand the factors that contribute to the success of collaborative e-governance initiatives in generating public service value. The information provided in this paper, which adopts relevant constructs based on a comprehensive literature review and the results of a rigorously tested model, can be used to develop new theories and models of collaborative e-governance. It can also be used to guide future research on this topic.

6.1 Limitations of the study

The study has two limitations. First, it focuses on a limited set of variables, which may not capture the full intricacies of collaborative e-governance. Second, it only considers government-to-citizen (G2C) projects, which narrows the research scope. Future research should explore other types of collaborative e-governance projects, such as government-to-business (G2B) and government-to-government (G2G) projects. This would help us to understand this transformative paradigm better.

6.2 Future research scope

This study can be expanded in three ways: 1) to include G2B and G2G interfaces-this would allow for a more comprehensive understanding of the complex dynamics of collaborative e-governance among stakeholders, 2) to adopt a content-based collaborative approach-this would focus on the exchange of information, knowledge, resources, policies and expertise and 3) to explore other developing countries-for enhancing the applicability of the findings by investigating similar context. This would help to understand the intricate dynamics of collaborative e-governance and its universality across different contexts.

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Supplementary

The supplementary material for this article can be found online.

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